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Executive summaries

FinTech is gaining traction and young, high-income users are the early adopters

By **Imran Gulamhuseinwala**, Partner, FinTech Leader, EY U.K.

Thomas Bull, Director, FinTech, EY U.K.

Steven Lewis, Director, Global Banking & Capital Markets Lead Analyst, EY U.K.

This article presents the findings of new research focused on the consumer adoption of FinTech. FinTech products – financial services products developed by non-bank, non-insurance, online companies – offer alternative ways of accessing a variety of services, from money transfers to financial planning. Adoption is relatively high for such a new category – with 15.5% of digitally active consumers using FinTech products. The projected growth is dramatic: the adoption levels could potentially double in 12 months. FinTech adoption peaks above 40% among digitally active users with high incomes – which means that some of the most economically valuable customers for banks and insurers are already FinTech customers.

Emergence of FinTech and the LASIC principles

By **David LEE Kuo Chuen**, Director and Practice Professor of Quantitative Finance, Sim Kee Boon Institute for Financial Economics, Singapore Management University, and Visiting Fellow, Shorenstein Asia-Pacific Research Centre, Stanford University

Ernie G.S. Teo, Research Fellow, Sim Kee Boon Institute for Financial Economics, Singapore Management University

Financial technology (FinTech) has been receiving much attention lately. And, although the development of FinTech is still in early stages, many believe that it will define and shape the future of the financial services industry, and at the same time increase participation by those who have until recently been under- or unserved. Given the intense competition, however, success in this space will not be easy, and various factors, both internal and external, will play key roles in identifying those that will be successful. In this article, we identify some of these factors, which we term the LASIC (low margin, asset light, scalable, innovative and compliance easy) principles. FinTech companies could benefit from applying some of the ideas presented in this article to their businesses.

Sharing ledgers for sharing economies: an exploration of mutual distributed ledgers (aka blockchain technology)

By **Michael Mainelli**, Executive Chairman, Z/Yen Group Limited

Mike Smith, Associate Director - Systems Architecture, Z/Yen Group Limited

Mutual distributed ledgers (MDLs) have the potential to transform the way people and organizations handle identity, transaction and debt information. MDL technology provides an electronic public transaction record of integrity without central ownership. The ability to have a globally available, verifiable and untamperable source of data provides anyone wishing to provide trusted third party services, i.e., most financial services firms, the ability to do so cheaply and robustly. Blockchain technology is a form of MDL.

The InterChainZ project was a consortium research project to share learning on MDLs during the summer of 2015. The study found that InterChainZ showcased several distributed ledger configurations and numerous variants, exploring how they might work in a set of agreed “use cases.” The outputs were a series of functioning, interlinked MDLs along with software, explanatory materials and website information. The research consortium concluded that MDLs incorporating trusted third parties for some functions had significant potential in financial services, such as know-your-customer (KYC), anti-money laundering (AML), insurance, credit and wholesale financial services.

Moving mainstream: benchmarking the European alternative finance market

By **Bryan Zhang**, Director (Operations and Policy), Cambridge Centre for Alternative Finance, and Research Fellow in Finance, Cambridge Judge Business School

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Since the global financial crisis, alternative finance – which includes financial instruments and distributive channels that emerge outside of the traditional financial system – has thrived in the U.S., the U.K. and Continental Europe. In particular, online alternative finance, from equity-based crowdfunding to peer-to-peer business lending, and from reward-based crowdfunding to debt-based securities, is supplying credit to SMEs, providing venture capital to start-ups, offering more diverse and transparent ways for consumers to invest or borrow money, fostering innovation, generating jobs and funding worthwhile social causes.

Although a number of studies, including those carried out by the University of Cambridge and its research partners, have documented the rise of crowdfunding and peer-to-peer lending in the U.K., we actually know very little about the size, growth and diversity of various online platform-based alternative finance markets in key European countries. There is no independent, systematic and reliable research to scientifically benchmark the European alternative finance market, nor to inform policymakers, brief regulators, update the press and educate the public. It is in this context that the University of Cambridge has collaborated with EY and 14 leading national/regional industry associations to collect industry data directly from 255 leading platforms in Europe through a web-based questionnaire, capturing an estimated 85-90% of the European online alternative finance market. This article presents the results of this study, conducted between October 2014 and January 2015.

FinTech in China: from the shadows?

By **Douglas W. Arner**, Professor, Co-Director, Duke-HKU Asia America Institute in Transnational Law, and Member, Board of Management, Asian Institute of International Financial Law, Faculty of Law, University of Hong Kong

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In July 2015, China's peer-to-peer (P2P) lending platforms numbered 2,136, with settlements of around RMB82.5 billion transactions in that single month, making it the country with the most P2P platforms in the world. As the sector went from one platform in 2007 to more than an estimated 2,000 platforms currently, the P2P sector went from too-small-to-care to too-big-too-fail, attracting a new level of regulatory scrutiny. Ultimately, this systemic shift offers China a regulatory and market reform opportunity with profound consequences for the country and the developing world. Indeed, the Internet Finance Guidelines released in July 2015 indicate that the country is creating both a financial market infrastructure and a regulatory framework that is built with financial technology (FinTech) in mind.

Trends in cryptocurrencies and blockchain technologies: a monetary theory and regulation perspective

By **Gareth W. Peters**, Department of Statistical Science, University College London, Associate Fellow, Oxford-Man Institute, Oxford University and Associate Fellow, Systemic Risk Center, London School of Economics

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The internet era has generated a requirement for low cost, anonymous and rapidly verifiable transactions to be used for online barter, and fast settling money has emerged as a consequence. For the most part, electronic money (e-money) has fulfilled this role, but the last few years have seen two new types of money emerge – centralized virtual currencies, usually for the purpose of transacting in social and gaming economies, and cryptocurrencies, which aim to eliminate the need for financial intermediaries by offering direct peer-to-peer (P2P) online payments. We describe the historical context that led to the development of these currencies and some modern and recent trends in their uptake, in terms of both usage in the real economy and as investment products. As these currencies are purely digital constructs, with no government or local authority backing, we discuss them in the context of monetary theory, in order to determine how they may have value under each. Finally, we provide an overview of the state of regulatory readiness in terms of dealing with transactions in these currencies in various regions of the world.

Financial regulation of FinTech

By **Philip Treleaven**, Professor of Computing and Director of the Financial Computing Centre, University College London

Effective financial regulation is clearly crucial to innovation and the future success of the financial services industry and in specific FinTech.¹ There are also unprecedented opportunities for reforming regulation and also creating new businesses in the process. Examples include: using “big data” regulatory online reporting and analytics to streamline reporting; and stimulating a new generation of “RegTech” companies to provide the regulatory/compliance software. This paper reviews the current regulatory pressures faced by the financial services industry, and discusses new “big data” approaches to regulating financial companies. Three actions are highlighted: a) an Open Source platform for FinTech regulation, b) a regulatory XML to help standardize reporting and c) an overarching international standards body. Lastly, we examine responses by the U.K. Financial Conduct Authority (FCA), such as Project Innovate.

Building consumer demand for digital financial services - the new regulatory frontier

By **Ross P. Buckley**, Scientia Professor, CIFR King & Wood Mallesons Chair of International Finance Law and Member, Centre for Law, Markets and Regulation, University of New South Wales

Louise Malady, Senior Research Fellow, University of New South Wales

Digital financial services (DFS) are held out as key financial solutions for improving financial inclusion. However, targeted end-users often offer little in the way of obvious profitable opportunities and so market forces alone are not enough to ensure the supply of services and products that match end-users’ means, needs or wants. As a result, DFS in emerging markets may suffer from limited uptake and usage, with little effect on financial inclusion. In emerging markets, financial regulators have been focusing on supporting the success of DFS largely through institutional and regulatory framework efforts. This article argues that financial regulators must first work to understand and build consumer demand for DFS rather than purely focusing on developing enabling regulatory frameworks. This requires a change in mindset for financial regulators, who are more familiar with promoting financial stability, safety and efficiency. In this article, we explore this changing role for financial regulators. We recommend that regulators particularly focus on building consumer demand through promoting partnerships in DFS as a means of promoting financial inclusion. We highlight that partnerships introduce collaboration risks and heighten consumer risks, requiring regulators to adjust regulatory frameworks to ensure such risks are identified and mitigated.

The hidden cost of accommodating crowdfunder privacy preferences: a randomized field experiment

By **Gordon Burtch**, Carlson School of Management, University of Minnesota

Anindya Ghose, Stern School of Business, New York University

Sunil Wattal, Fox School of Business, Temple University, Philadelphia

Online crowdfunding has received a great deal of attention as a promising avenue to foster entrepreneurship and innovation. Because online settings bring increased visibility and traceability of transactions, many crowdfunding platforms provide mechanisms that enable a campaign contributor to conceal his or her identity or contribution amount from peers. We study the impact of these information (privacy) control mechanisms on crowdfunder behavior. Employing a randomized experiment at one of the world's largest online crowdfunding platforms, we find evidence of both positive (e.g., comfort) and negative (e.g., privacy priming) causal effects. We find that reducing access to information controls induces a net increase in fund-raising, yet this outcome results from two competing influences—treatment increases willingness to engage with the platform (a 4.9% increase in the probability of contribution) and simultaneously decreases the average contribution (a U.S.\$5.81 decline). This decline derives from a publicity effect, wherein contributors respond to a lack of privacy by tempering extreme contributions. We unravel the causal mechanisms that drive the results and discuss the implications of our findings for the design of online platforms.

Advice goes virtual: how new digital investment services are changing the wealth management landscape

By **Juan Carlos Lopez**, Executive Director, Wealth & Asset Management, EY U.S.

Sinisa Babic, Senior Manager, EY U.S.

Andres De La Ossa, Manager, EY U.S.

The emergence of a new group of digital wealth management firms offering automated investment advice services has quickly become one of the most frequently debated topics in the industry. Comparisons are being made to the travel industry of the 1990s, when the travel agent model lost ground to online services such as Expedia, and some media outlets and analysts are predicting that the emerging start-ups will revolutionize how wealth management advice is provided. Yet others have discounted and labelled this “robo-advisor” movement as unproven and believe its solutions are no match for human personalized investment advice. In this context, we wanted to explore these new firms to understand the innovations they are offering and their aspirations for the future and answer some of the questions many in the industry are asking. Are these firms going to challenge the traditional wealth management model and change the industry landscape? Is there a large enough market for their services beyond the young, tech-savvy client segment they have attracted so far? And, if the underlying changes (e.g., client experience, new potential client segments) are permanent, what should traditional firms do?

This report presents our insights and perspectives based on numerous interviews and discussions with senior executives across the industry, including traditional wealth managers and digital entrants, as well as secondary market research. Our key findings are as follows: digital entrants use a combination of simplified client experience, lower fees and increased transparency to offer automated advice direct to consumers; the new models have the potential to make advice for the mass market feasible at last; the changes digital firms have introduced are here to stay, so traditional players need to determine if and how they want to approach them. In summary, our view is that the emergence of digital entrants into the wealth management space will indeed change the industry in several ways. This will ultimately benefit new and existing investors alike by providing better and more affordable products and services through an improved client experience.

The impact of digital technology on consumer purchase behavior

By **Sue Yasav**, Research Insights Leader, Synchrony Financial

The retail industry is going through a transformation, according to a study by Synchrony Financial. The transformation is largely driven by the influence of digital technology on the shopping experience. According to the third annual Digital Study, almost 50% of consumers say they have performed shopping related tasks on their mobile phones in the past three months. Consumers state they are using digital technology to research, browse and purchase, sometimes all on one website.

As a result, retailers have implemented new strategies to attract and retain this omni-channel shopper. Some strategies include responsive website design, free shipping offers, mobile alerts and content marketing. The imperative to implement these digital tools has gone from spotty and isolated, to mainstream and necessary. In this article, we summarize the results of the Digital Study and outline strategies retailers use to proactively engage this new shopper.

Innovative corporate services digitally enabled (Part 1)

By **Andrea Ferretti**, Partner, EY Italy

Marco Brandirali, Director, EY Italy

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Innovative corporate services digitally enabled for internationalization (Part 2)

By **Marco Giorgino**, Full Professor of Finance and Risk Management,
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Valentina Palummeri, Research Fellow, Politecnico di Milano

This paper, structured in two parts, delves into the future roadmap of digitally enabled banking services in support of Italian companies that are moving into new markets. In the first part, EY Italy explains the reasons why this research project was undertaken in collaboration with Politecnico di Milano and describes the best-in-class digital business services offered by the main Italian and European global banking groups. The research focuses on the internationalization process and the best practices of business products and services offered by the main global marketplace platforms, as leading business and technology innovators. In the second part, Politecnico di Milano presents the main research findings about the needs of Italian companies that undertake internationalization processes, the potential use of digital enablers to innovate the business services portfolio and generate new revenue sources for the banks, and the best practices on the “digitally-enabled” processes, products and services for companies.

Driving digital: welcome to the ExConomy

By **Stijn Viaene**, Fellow, Cutter Consortium's Business Technology Strategies practice, Full Professor and Head of the Information Systems Management Cluster, Vlerick Business School, and Professor, Decision Sciences and Information Management Department, KU Leuven

Lieselot Danneel, PhD Candidate, Vlerick Business School and KU Leuven

A first step in better applying the new digital technologies currently at our disposal is understanding what creating digital value really means. To give digital a more precise focus, we have coined the “ExConomy” framework, which breaks down what digital entails into four realities: customer experience is value, experimentation is necessary, collaboration reshapes strategy and business models, and digital ecosystem platforms rule. This paper gives a presentation of these four realities and provides a tool for self-assessment of an organization's digital readiness.

FinTech is gaining traction and young, high-income users are the early adopters



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Abstract

This article presents the findings of new research focused on the consumer adoption of FinTech. FinTech products – financial services products developed by non-bank, non-insurance, online companies – offer alternative ways of accessing a variety of services, from money transfers to financial planning. Adoption is relatively high for such a new category – with 15.5% of digitally active consumers using FinTech products. The projected growth is dramatic: the adoption levels could potentially double in 12 months. FinTech adoption peaks above 40% among digitally active users with high incomes – which means that some of the most economically valuable customers for banks and insurers are already FinTech customers.

1. Introduction: Getting to a baseline understanding of FinTech adoption.

There has been an explosion in the number of new technology-led entrants in financial services in the last few years, broadly operating under the term FinTechs. In this article we define FinTechs as firms that are combining innovative business models and technology to enable, enhance and disrupt financial services.

Last year \$12 billion of private capital was invested into FinTechs, helping thousands of new companies form, win customers and scale up their operations. The most promising FinTech companies have a laser-like specific customer proposition – generally one that is poorly served, if at all, by traditional financial services companies – and serve up a seamless and intuitive user experience.

Banks and other financial services companies have watched nervously as more and more FinTechs have brought significant innovations to the market. Some of these more traditional companies have begun to engage with FinTechs through partnerships, incubator programs and outright acquisitions. They are trying to understand the level of threat and get answers to some basic questions. For instance, how many consumers are using FinTech products? What is the profile of the user base? What is their reason for using FinTech? In short, how much traction does FinTech really have?

To fill this information void, we have launched the *EY FinTech Adoption Index*. *The Index* attempts to capture the level of FinTech adoption among digitally active consumers. Our research also allows us to develop a detailed picture of the existing FinTech user base.

In this first article, which draws on a survey of 10,131 digitally active consumers, we look at FinTech adoption in Australia, Canada, Hong Kong, Singapore, the U.K. and U.S.¹ In each of these markets, we have identified 10 FinTech services which fall into four broad categories: savings and investments, money transfers and payments, borrowing and insurance (see Table 1).

Non-bank money transfers have become extremely common among digitally active consumers – they are a mainstream product. We have adjusted for this over-indexing by categorizing as FinTech adopters those who say that they have used two or more of the 10 products listed in Table 1 in the last six months. We believe this makes our definition of FinTech use more rigorous, and our discussion of FinTech adoption cohorts more reliable.

2. Investment, support from government and falling technology costs are fuelling innovation in financial services.

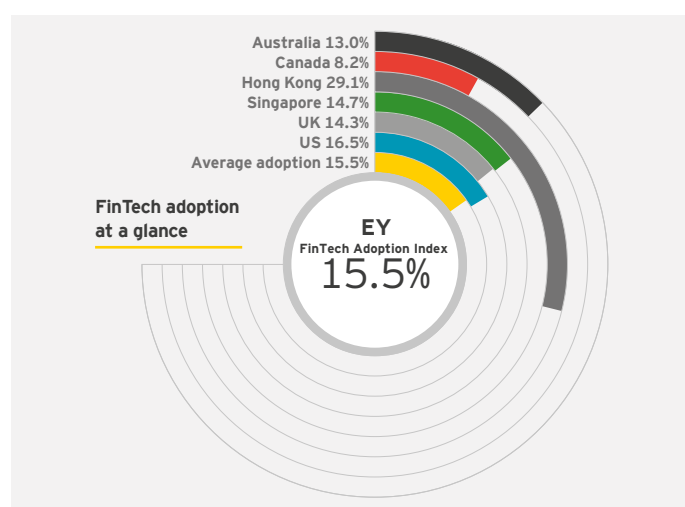
In the race for online financial services, the starting gun has sounded. FinTech companies are giving users new ways to raise debt and equity financing, manage investments, obtain cheaper insurance through telematics and make payments. By some estimates, as many as 12,000 financial technology start-ups now compete for consumers’ attention. The start-up activity has been supported by the ever-lower cost of technology, and by capital

Table 1

Savings and investments	Money transfer and payments	Borrowing	Insurance
1. Peer-to-peer (marketplace) platforms for investments	6. Online foreign exchange	9. Borrowing using peer-to-peer platforms	10. Health premium aggregators or car insurance using telematics intended to lower premiums
2. Equity or rewards crowdfunding	7. Overseas remittances		
3. Online investment advice and investments	8. Non-banks to transfer money		
4. Online budgeting and financial planning			
5. Online stockbroking or spread betting			

1 The survey was conducted in September and October 2015.

Figure 1: FinTech users by market



Base: EY FinTech Adoption Index 2015

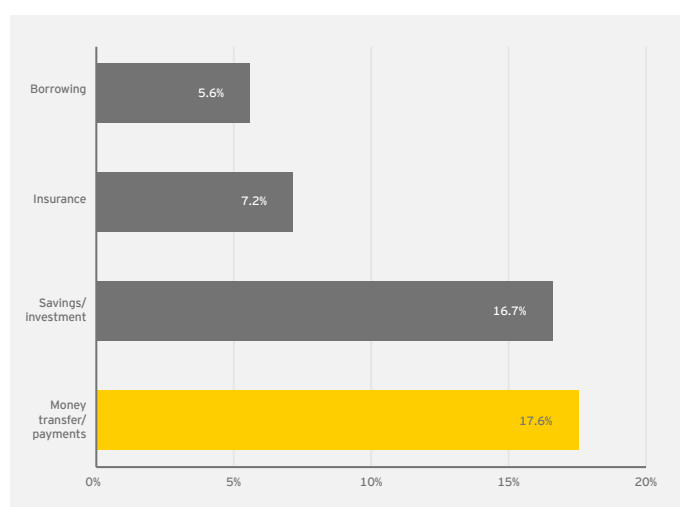
from both corporate sources (including banks and financial services companies) and more traditional early-stage investors (including venture capitalists and angel funders). Today, there are dozens of FinTech firms (so-called unicorns) with valuations in excess of \$1 billion.²

FinTechs have also benefited from the open support of governments looking to promote competition and innovation in financial services. While the impact of this support is hard to quantify, it undoubtedly sets the tone both within the broader business environment, and for the application of regulations. One of the governments providing this support is the U.K., for which EY previously authored a study about FinTech's potential (*Landscaping UK FinTech*, 2014).

3. Adoption levels by market.

FinTech is clearly more than just hype. In the six markets we surveyed, a weighted average of 15.5% of digitally active consumers are FinTech users (according to our definition as having used at least two FinTech products). Hong Kong, where 29.1% of

Figure 2: Analysis of FinTech use by product type



Base: 2,592 respondents who indicated using at least one FinTech service
EY FinTech Adoption Index 2015

the digitally active use FinTech products, and Canada, with 8.2% are the only markets surveyed that differ significantly from the 15.5% average; all other countries' rates gravitate within 2.5 percentage points (Figure 1).

The survey suggests the proportion could swell to twice these levels, or even higher, within 12 months. EY plans to update *The Index* regularly and expand the country coverage in order to develop a time series of adoption.

4. The main FinTech categories and the extent to which they are catching on.

That money transfers and payments have high adoption rates should not come as a surprise. In effect, these are entry-level FinTech products, allowing consumers to test the waters with simple transactions that don't involve much risk or commitment. Payment services provided by FinTechs are also an integral part of the customer journey of many popular e-commerce sites, designed to eliminate friction and improve conversion rates at the purchase stage.

² [http://www.ey.com/Publication/vwLUAssets/Landscaping_UK_Fintech/\\$FILE/EY-Landscaping-UK-Fintech.pdf](http://www.ey.com/Publication/vwLUAssets/Landscaping_UK_Fintech/$FILE/EY-Landscaping-UK-Fintech.pdf)

Because of these factors, 17.6% of respondents have made a transaction in the last six months through an online company that is not a bank. Online payments (including through PayPal) account for the most transactions in this category, followed by online foreign exchange and overseas remittances (Figure 2).

The savings and investments category comes as the second most heavily used, at 16.7%. Online stockbroking and spread betting are the most common activity types within this category. These are followed in order by online budgeting and planning, online investments, equity and rewards crowdfunding and investing through peer-to-peer (or marketplace lending services) loans.

Insurance, including health premium aggregators and car insurance utilizing telematics, intended to lower premiums, is the third most-used FinTech category, followed by online borrowing (through peer-to-peer websites). These two categories of FinTech have the lowest adoption, though both still have usage rates above 5% among those we surveyed.

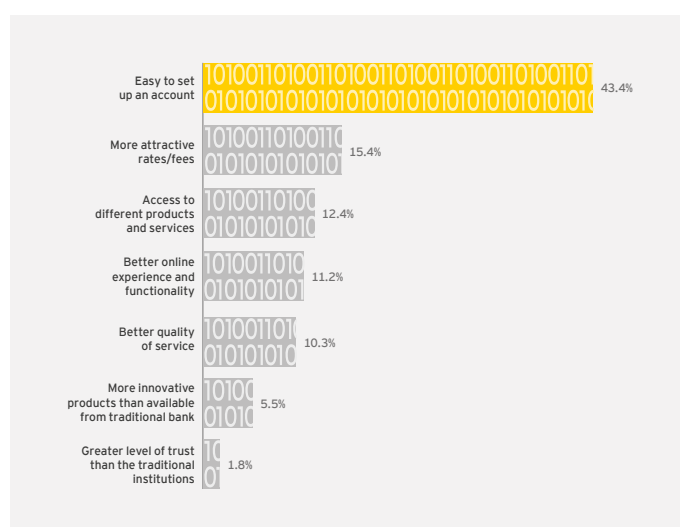
There are some notable differences in the ordering of products by geography. For instance, online stockbroking and spread betting are the most common activity types in Australia and Hong Kong. Online budgeting and planning is popular in the U.S., with almost 10% of respondents saying they have used this service in the last six months.

5. Why FinTech is gaining traction and the key constraints on its growth.

Consumers using these new online financial services say that a big part of their appeal is the ease of setting up an account. More than two in five FinTech users (43.4%) cite ease of setup as the number one reason to use these products. This is followed by more attractive rates/fees, access to different products and services, and better online experience and functionality (Figure 3).

That FinTech succeeds along these dimensions, especially ease of setup and the quality of online experience, is in our view a function of the design principles followed by many FinTech firms. These design principles include:

Figure 3: Reasons for using FinTech services (reasons that responses voted as first choice)



Base: 1,485 respondents who indicated using two or more FinTech products in % of first choice rankings

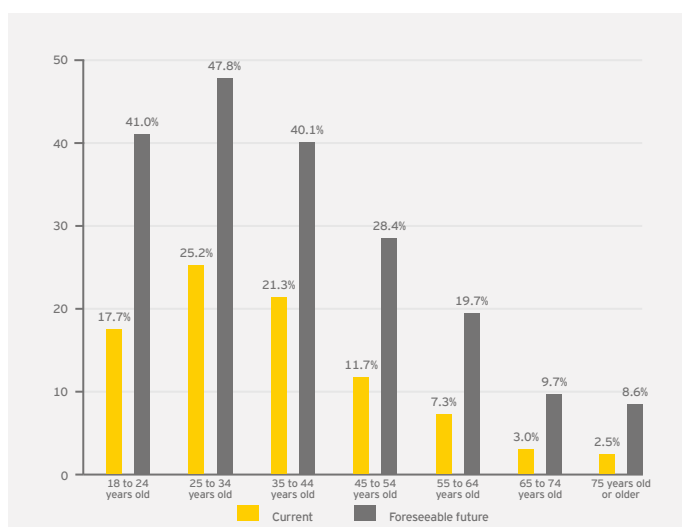
EY FinTech Adoption Index 2015EY FinTech Adoption Index 2015

- ▶ construction and delivery of their proposition entirely around the consumer, ideally embedded in a non-financial services use case
- ▶ simple and intuitive customer visuals and journey, with easy onboarding
- ▶ simple product constructs (customizable, but with limited variability) with no penalties or commitments.

The use of these design principles, in many cases for building services from the ground up, has led to easy-to-understand customer propositions and product sets that can be very appealing. By contrast, traditional players are often constrained by product silos, rigid product suites and pricing structures, and legacy core IT systems. As a result, their online products have more cumbersome user interfaces than FinTech products, and are more apt to involve complex and manual processes.

Banks are not necessarily stuck with this baggage. Many are beginning to replicate certain FinTech design principles, using mechanisms like customer experience laboratories and

Figure 4: Use of FinTech users by age group



Base: 1,485 respondents who indicated using two or more FinTech products
EY FinTech Adoption Index 2015

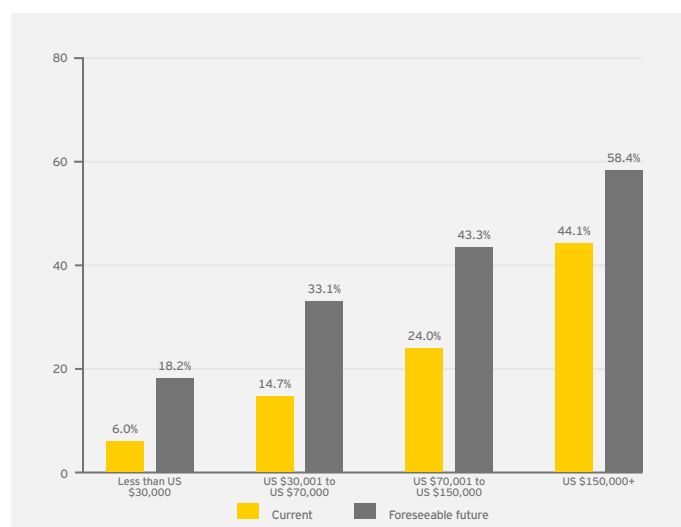
rapid prototyping to research and test new services. These methodologies are allowing traditional financial institutions to create more intuitive online products. And in certain service areas and segments, financial services companies are getting to where they want to be by partnering with FinTechs.

6. Early adopters of FinTech tend to be young, high-income, high-value customers.

The use of FinTech skews toward younger, higher-income groups. For instance, about one in every four respondents aged 25 to 34 has used at least two FinTech products in the last six months. FinTech use is also higher than average among 35 to 44 year-olds (21.3%), and among those in the 18 to 24 cohort (17.7%). For each cohort above age 44, the proportion of FinTech users declines and is below the average of all users (Figure 4).

Younger non-FinTech users are also far more likely than older non-users to say they plan to give additional FinTech products a try in the future. Among non-FinTech users aged 18 to 34, roughly 23% expect to be using at least two of these newer

Figure 5: Profile of FinTech users by income group



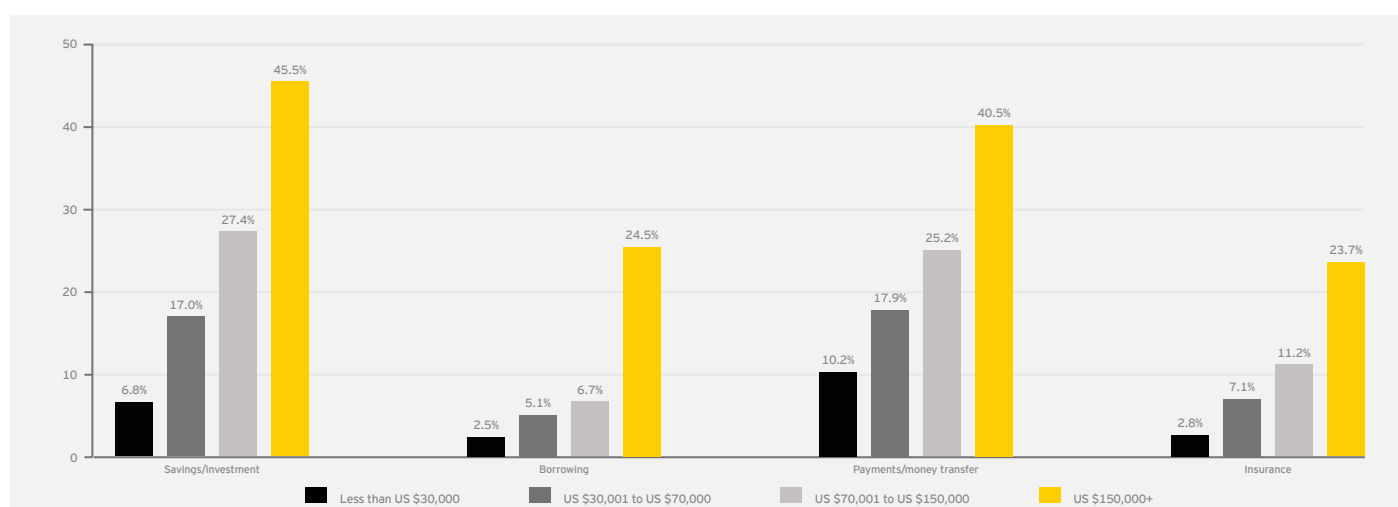
Base: 1,485 respondents who indicated using two or more FinTech products
EY FinTech Adoption Index 2015

online financial products in the next six months. If they behave as they say they intend to, nearly half (47.8%) of all digitally active consumers aged 25 to 34 will be FinTech users in the near future.

FinTech use is light among those who make less than US \$30,000 (Figure 5). Usage grows steadily as respondents' incomes move higher, reaching 44% for those with incomes above US \$150,000.³ In addition, many high earners not currently using FinTech expect to make more use of their products in the next six months, suggesting a situation where almost 60% of people earning US \$150,000 and above may soon be FinTech users. The high adoption rates, current and planned, reflect higher earners' greater interest in money transfer and investment products, the FinTech propositions of most interest to this cohort.

³ Our sample has limited coverage of high-income segments. Still, the trend toward higher usage in this segment is clear.

Figure 6: Consumer preferences by income levels



Base: 2,592 respondents who indicated using at least one FinTech service
EY FinTech Adoption Index 2015

By contrast, lower-income respondents are much less likely to use savings and investment products, and fewer than 3% have bought insurance or borrowed money through a FinTech (Figure 6).

The upshot of FinTech's high-end penetration is that FinTech companies are threatening banks' share of wallet in one of their most important segments. In response, financial institutions may want to re-assess how they attract and serve this high-value segment. Traditional customer segmentation strategies, focusing on customers' wealth, probably made sense when banks were the natural, and in many cases, the only real choice for many retail financial products. However, in the era of FinTech, a more nuanced segmentation strategy should come into play with banks taking a fresh look at how they assess customer lifetime value and reaching out to key customer segments in a more focused way.

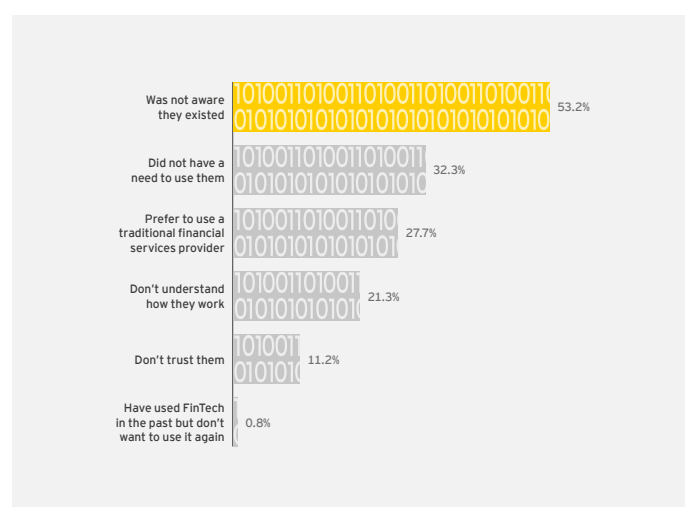
Our view is that banks should review their multi-channel strategy, particularly for the product areas and high-value segments most impacted by FinTech, in order to deliver a better online experience to customers.

7. Urban areas have a higher rate of FinTech adoption.

In the six markets in our survey, city dwellers are significantly above the average in their use of FinTech. For instance, the New York digitally active users are twice as likely to take advantage of two or more FinTech products than the country average (33.3% compared to the U.S. 16.5% rate). The trend is similar for London (25.1% of Londoners use FinTech versus 14.3% of the U.K. country average) and to a lesser extent, Sydney (16.3% versus 13% for all of Australia).

The high adoption rates in cities is a function of demographics and access. On the demographic side, cities tend to have a disproportionate number of higher-income users and millennials. On the access side, offline media is more effective within cities than outside of them, thanks in part to the wide reach of advertisements in buses, subways and other heavily trafficked urban settings. For these reasons, it seems certain that FinTech adoption rates in cities will remain structurally higher than outside cities.

Figure 7: Reasons consumers say they don't use FinTech



Base: 7,539 respondents who have not used any FinTech products
EY FinTech Adoption Index 2015

8. For the substantial majority of respondents who have not used FinTech products in the last six months, awareness is the main hurdle.

Over half of non-FinTech users say they simply are not aware of the existence of FinTech services. About a third say they don't need such products, and just over a quarter say they prefer working with a traditional bank or insurance company.

One factor that has not hampered these services to date, is trust (Figure 7). That suggests that usage may increase as marketing grows and awareness rises, and reinforces the notion that the threat to banks and insurers will intensify.

Many FinTechs are using the significant funds they have been raising to invest in customer acquisition strategies including marketing and awareness raising. This puts the two worlds on a collision course, increasing the urgency for financial services providers to come up with a competitive response.

Conclusion

Banks and insurance companies have historically been protected by barriers to entry. These include the complexity of the regulatory environments in which they operate, the lack of “killer apps” that have come along to replace them, and the trust that consumers and governments implicitly have in brand-name financial institutions. This protection has been reinforced by a degree of customer inertia, and by the burdensome process of switching and opening new accounts.

However, all of these barriers are starting to come down. Regulators, especially in a post-crisis world where banks' reputations have taken a hit, are actively working with new entrants in the hope of giving consumers more choice. Some of the new FinTech services are simply better, offering deeper or unique value propositions, and a more intuitive experience than traditional financial products. Ease of setting up an account is a great example: with many FinTech products, account setup can be completed in a few minutes. Finally, traditional bank and insurance customers have learned that they can get some of what they need online, in the same way that traditional retail customers, 10 or 15 years ago, embraced the online channels. The issue of trust online has not gone away completely, but it is receding, as the findings in this survey make clear. As FinTech adoption catches on, it is inevitable that more consumers will drift away from traditional financial services companies. Banks and insurers are already beginning to work with FinTechs through partnerships and acquisitions. In doing so, they are tacitly acknowledging that some level of coexistence between the new and the old will be inevitable in the future.

However, if these firms are to compete effectively with the challenge from FinTech providers, they need to provide a more comprehensive response. They must re-assess their view of which customers are most at risk from the new competition and re-double their efforts to serve them effectively. Customers who don't meet traditional wealth management segmentation criteria, but who are potentially valuable users of savings/investments or payment products, may merit fresh attention. Furthermore, traditional firms must learn to adopt, in their own way, the design elements that make FinTech services so engaging and easy to use. While not directly replicable, there is much to learn from how FinTechs are designing the customer proposition and how they are harnessing technology to deliver compelling services.

Emergence of FinTech and the LASIC principles¹



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Abstract

Financial technology (FinTech) has been receiving much attention lately. And, although the development of FinTech is still in early stages, many believe that it will define and shape the future of the financial services industry, and at the same time, increase participation by those who have until recently been under- or unserved. Given the intense competition, however, success in this space will not be easy, and various factors, both internal and external, will play key roles in identifying those that will be successful. In this article, we identify some of these factors, which we term the LASIC (low margin, asset light, scalable, innovative and compliance easy) principles. FinTech companies could benefit from applying some of the ideas presented in this article to their businesses.

1. Introduction

FinTech refers to innovative financial services or products delivered via new technology. With advancements in technology (such as mobile and internet) coupled with their global widespread adoption, consumer expectations are changing. Many companies or start-ups are working on FinTech-related products and major disruptions in financial services are looming.

In the West, we saw developments in decentralized internet protocols for money with cryptocurrencies, which allow for low transaction costs and cheap international transfers. Many new FinTech start-ups are Bitcoin or blockchain related, with venture capital investments in such start-ups nearly doubling from U.S.\$133 million in Q4 2014 to U.S.\$229 million in Q1 2015. There are also developments in other nonpayment-related FinTech services, such as crowdfunding, and peer-to-peer (P2P) lending.

Giants such as Apple and Google are also moving into the mobile payment market with the introduction of Apple Pay and Google Pay. Google has moved into the payment business and has begun to work closely with Verizon, AT&T and T-Mobile to have the Google Wallet payments app preinstalled on Android phones sold by these carriers. Similar to other payment companies, it is also acquiring technology and intellectual property from the carriers' joint-venture, Softcard (formerly Isis Mobile Wallet) payments, as announced on 23 February 2015. Neither Google nor the telcos were able to fully take off without cooperating with each other and they have come to realize the advantages of working together.

This phenomenon is not restricted to Western countries. In the East, giants in the internet industry, such as Alibaba and Tencent, are rising to become providers of banking services with branchless banks such as Ant Financial and WeBank. These technologies not only enhance the financial services sector, but also provide wider access to banking and financial services. FinTech services are booming in China with numerous P2P lending providers. As of the first half of 2015, there were 2,028 P2P platforms in China, which has made RMB683.5 billion in loans, with RMB208.7 billion outstanding [Lee (2015c)].

FinTech products and services are continuously being invented. This has given rise to a boom of FinTech start-ups in the major

technology hubs, such as the Silicon Valley and London. The amount of investment in FinTech companies grew by 201% globally in 2014; this is compared to a 63% growth in overall venture capital funding in the same year [Accenture (2015)]. However, not every funded start-up succeeds. In this fast-moving industry, where regulations are constantly changing and network externalities play an important role, there are many factors that would contribute to the success of a FinTech company. In this paper, we outline several key success factors which we term the LASIC principles. The five factors are: low margin, asset light, scalable, innovative and compliance easy.

The LASIC principles may provide an answer to creating sustainable businesses with the social objective of improving income and wealth inequality. With our case studies, we demonstrate that LASIC businesses face the least resistance from social media and are encouraged by governments. This improves profitability with support from the general public, as well as governments, from both the financial and social aspects.

This paper is organized as follows: in section 2, we lay the foundation for our analysis with the LASIC principles, which outlines five important attributes for successful FinTech businesses. In section 3, we use these principles to discuss two successful FinTech firms – Alibaba and M-PESA. We conclude by discussing the benefits of investing for financial inclusion. LASIC businesses should concentrate on serving the unbanked and underbanked, as technology substantially lowers business costs and opens up new opportunities.

2. The LASIC principle

The LASIC principle defines five important attributes of business models that can successfully harness financial technology to achieve the objective of creating a sustainable social business for financial inclusion. The five attributes are: low margin, asset light, scalable, innovative and compliance easy. We discuss these in turn below.

2.1 Low profit margin

Low profit margin is a key characteristic of successful FinTech businesses. In a world where there is widespread internet access, where information and services are readily available for free, users not only search for lowest prices, but in many cases, are even unwilling to pay for some services or products, such

as video streaming or internet games. High network effects exhibited in such technologies require an initial phase of critical mass accumulation. This is a costly process that demands much marketing effort. Once critical mass is built, monetization becomes possible through channels such as advertising, subscription fees or consumer data analysis. Constant effort is needed to ensure lock-in of users through the reinforcement of network externalities and the increase in switching costs. Profit margins will remain low at the user level. The idea is to obtain a large mass of users and attain profitability through low margins and high volumes. Alternatively, the subsequent buildup of big consumer data can be monetized either through third parties or by creating new products. One such example is Alipay, which utilizes consumer spending behavior to extend credit to worthy customers identified through big data analytics.

In the technology and internet space, most users expect information to be provided for free. Most products or services in this industry exhibit large network effects; consumers benefit more from the product, if many others also use it. From the perspective of the providers, there is a need to build a critical mass from the very beginning of the business. This will entail a period of high burn rate with low- or no-revenue period (usually by giving away the product for free), followed by exponential growth with multiple sources of revenue (such as advertising and selling complementary products or services). Over a long period of time, the initial margin will appear low but will increase over time as different sources of revenue are captured.

2.2 Asset light

Asset light businesses are able to be innovative and scalable without incurring large fixed costs on assets. This results in relatively low marginal costs, which reinforces the first principle of “low profit margin.” One can add on to an existing system (such as the mobile phone) that depreciates quickly but offers an alternative revenue source (such as an internet phone messaging service) at low marginal costs. By riding on existing infrastructure, fixed costs and initial setup costs can be minimized.

2.3 Scalability

Any FinTech business may start small but needs to be scalable, in order to reap the full benefits of network externalities as described above. One has to be mindful of the fact that when developing technology, it needs to be able to increase in scale

without drastically increasing costs or compromising the efficiency of the technology. As more business gets conducted online, the need for physical outlets is greatly reduced. This makes businesses easier to scale. However, developers need to be mindful and ensure that the technology itself is scalable. One such example is the Bitcoin protocol. Although very innovative, the protocol's implementation is hard to scale, as it is unable to manage a massive amount of transactions at an instantaneous speed. This is also hard to change because of the way the protocol was implemented.

2.4 Innovative

Successful FinTech businesses also need to be innovative, both in terms of products and operations. With the increasingly widespread use of mobile phones and internet services, much innovation can be made in mobile technologies (such as contactless technologies) in the FinTech space. Some examples of such innovations will be described with the case studies in the following sections.

2.5 Ease of compliance

Businesses that are not subject to high compliance regimes will be able to be innovative and have lower capital requirement. While financial stability and consumer protection are important for a market to function, tight regulatory environment has its trade-off. In addition to the advantages of a “compliance easy” environment, businesses that receive subsidies or incentives aided by social, financial and economic inclusion agenda brought about by an anti-income/wealth inequality regime will have an added advantage. The main advantage of operating in a lightly regulated environment is that fewer resources are spent on compliance activities and it encourages innovation.

3. Alibaba and Alipay

On 19 September 2014, Alibaba Group Holding Limited's initial public offering (IPO) made history by raising U.S.\$25 billion. Two months later, it raised another U.S.\$8 billion from six tranches of bond issues,² issued to refinance its existing credit facilities. These bonds were rated “A+” by Standard & Poor's and “A1” by Moody's Investors Services, with ratings higher than that of

² With a coupon rate of 1.625%, 2.5%, 3.125%, 3.6%, 4.5% for three-year (U.S.\$1 billion and U.S.\$300 million floaters), five-year (U.S.\$2.25 billion), seven-year (U.S.\$1.5 billion), 10-year (U.S.\$2.25 billion), 20-year (U.S.\$700 million) senior unsecured notes, respectively.

other well-known tech giants. These public fundraisings were achieved with group revenues of as little as U.S.\$8.46 billion and gross merchandise volume (GMV) of U.S.\$296 billion [Alibaba Group (2014)]. This amount of available cash makes Alibaba a formidable force in acquisitions, challenging financial institutions.

Alibaba started in 1999 with Alibaba.com, a business-to-business e-commerce portal. Since then, it has expanded to consumer-to-business and consumer-to-consumer, with five web portals in China among other affiliates in the group. Two of Alibaba's subsidiaries, TaoBao.com (淘宝网) and Tmall.com (天猫), ranked first and second in e-commerce in China, and have penetration levels of 87% and 69.7% of the Chinese internet market, respectively. Another subsidiary, the group discount store Juhuasuan (聚划算), has a penetration rate of 33.4%. It is second behind the market leader Meituan.com (美团网) with a rate as high as 56.6%.

In 2013, the Alibaba Group moved into internet finance through its third-party online payment platform, Alipay. The launch of Yu'e Bao (余额宝), a financial product platform, marks the start of Alibaba's foray into finance. This was followed by a plethora of finance services, including mutual funds, ETFs, crowdfunding, lending and insurance.

3.1 Alipay

Alipay was established in 2004 to address the issue of trust between buyers and sellers online for Alibaba. In this respect, it provides escrow services for all who transact within the Alibaba e-commerce business. As Alibaba expands globally and into logistics and infrastructure, Alipay can ride on its growing network and expand into financial services using technology and the internet.

In view of the impending restrictions placed on foreign ownership of payment systems in China in 2011, Alipay was divested by Alibaba and placed under the Ant Financial Services umbrella. Even though Alibaba does not own Ant Financial, it is entitled to a payment if Alipay or its parent holds an IPO, according to the 12 August 2014 revision of the original agreement signed in 2011 [Alibaba Group, (2014) and (2015)]. Ant Financial Services Group is estimated to have a valuation of U.S.\$50 billion, with close to 190 million users and 45 million transactions a day, as of the end of 2014. According to Alibaba's IPO prospectus, as of June 2014,

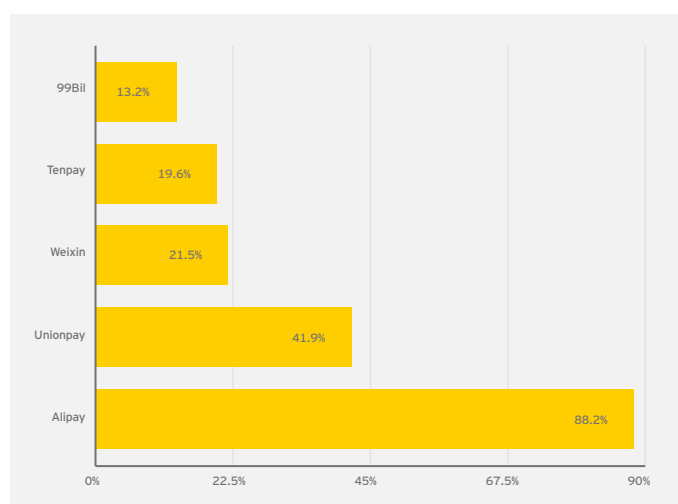


Figure 1: China's internet payment penetration rates

Source: China Internet Network Information Center

there were 600 million registered Alipay users, 188 million mobile app users (MAUs) and U.S.\$71 billion mobile GMV, accounting for 87.2% of total mobile retail GMV in China [Alibaba Group (2014)]. Alipay dominates internet payments in China (Figure 1).

Alipay has a well-established network in China for its mobile and internet payment services, which makes it a prime platform to launch internet financial services on. This, combined with Alibaba's rapid expansion and foray into the global market, makes it a formidable force. Technology disruption is becoming more rapid. It took Apple seven years to become the world's largest music retailer (in February 2010). The market capitalizations of the world's top GPS companies declined significantly within a year of the launch of Google Maps, and Alipay took just nine months to become the world's fourth largest money market fund [Lee (2015b)]. The Alipay business model is a good example of how the LASIC principles can be applied. In the next section, we will look at each principle and how it applies to Alipay.

3.2 Low margin

Alibaba's extensive network of consumers and merchants was built up with its low-cost, low-margin model right from the very beginning. Merchants are not charged any setup or transaction fees on Taobao.com and were even given free storage for images. Revenue is generated through advertising and other

merchant services. Consumers also don't need to pay to shop on Taobao.com. They can also enjoy different promotions on the web portal and earn points (which can be used to offset purchases) by participating in various activities. On top of this, many supplementary services are now offered via Alipay – for example, one can buy movie or plane tickets, order takeaways, buy insurance, pay utility bills, and buy music and even lottery tickets online. This further enforces consumer stickiness, giving them fewer reasons to use other portals.

Having established critical mass in the Chinese market, Ant Financial launched its first financial product in July 2013. Yu'e Bao, which offers an online money market fund, had about CNY578.93 billion (about U.S.\$93.25 billion) in assets by the end of 2014 [CNBC.com (2015)]. The fund offers a return of about 4% annually on average. Comparatively, its charges are low, their management fee is 0.3%, custody fee is 0.08% and the sales service fee is 0.25% [People.cn (2014)]. This strategy of keeping fees low and returns high has attracted many Alipay users to put their spare funds into Yu'e Bao. In the aftermath of stock market volatility in 2015, the "I want stable happiness" campaign was launched by Yu'e Bao, attracting consumers back to the relatively low-risk investment.

The success of Yu'e Bao helped pave the way for Ant Financial to expand its range of financial offerings. For example, the entertainment investment fund, Yu Le Bao, allows one to invest in movies and TV shows. Ant Financial also offers small business loans under RMB1 million to businesses unable to secure loans from the banking system. Another subsidiary, Zhao Cai Bao, acts as a platform that allows small businesses and individuals to borrow from investors directly. Through its branchless banking arm, MYBank (a conglomerate where Ant Financial owns a 30% stake), its lending business will see further expansion. Utilizing the group's data resources, Ant Financial also offers credit scoring services for consumers and small business owners through its subsidiary Sesame Credit. Data is collected from more than 300 million real-name registered users and 37 million small businesses that buy and sell using Alibaba's e-commerce platforms. It provides similar services to those offered by Equifax, Experian and TransUnion in the U.S. Accurate credit profiles can be established through consumption behavior on the e-commerce portals [Bloomberg Business (2014)].

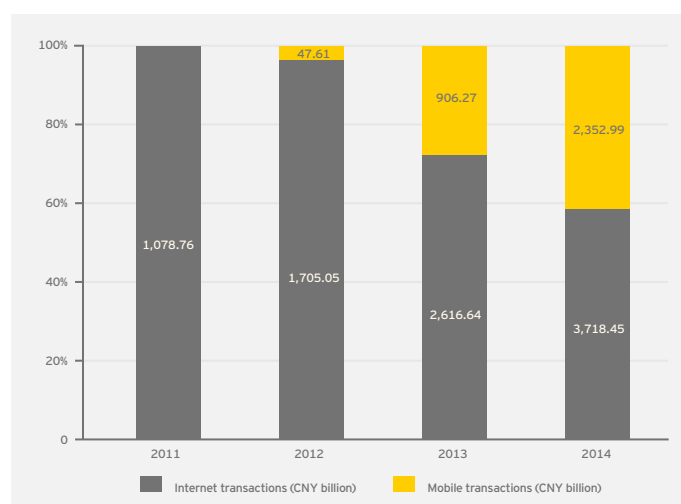


Figure 2: Transaction value of Alipay

3.3 Asset light

Alibaba's online bank (MYBank) was officially launched in June 2015. The new bank is "not for the rich, but for the little guys," said Executive Chairman Eric Jing [TechInAsia (2015b)]. MYBank will concentrate on loans and offer loans up to RMB5 million (about U.S.\$800,000). MYBank will develop its business through interbank borrowing with traditional banks and financial organizations.³ With no need for physical branches or counters, MYBank requires very little physical infrastructure investment and off-line risk management.

Other financial services offered by Ant Financial Services Group also rely very little on physical infrastructure. By doing business online through web portals and mobile phone apps, fixed costs are kept very low. There is also no need to add physical branches when the number of consumers increases. This complements the first two LASIC principles. By keeping assets light, margins can be kept low and the business can scale easily without the need to build physical branches.

³ In 2015, the China Banking Regulatory Commission removed the loan-to-deposit ratio (LDR) requirement of the nonbank organizations. Internet banks are allowed to lend through interbank borrowing as the source of loan funds, instead of the traditional way of getting deposits. To MYBank's benefit, the interbank savings interest rates are expected to decrease with the further reduction of interest rates.

3.4 Scalable

The Alibaba business model is very scalable. By eliminating the need for physical shops and keeping costs low, it can scale as quickly as the number of e-commerce customers increases. Because of this, Alibaba was able to expand its network throughout China; there were 300 million registered users on Alipay as of April 2014. The volume of transactions on Alipay has also increased through the years with more users transacting via mobile phones.

The reach of the e-commerce network beyond China relies on the availability of logistic networks. "The company is beefing up its international presence by partnering with embassies and countries to bring foreign products into China through Tmall Global, an international shopping platform under Tmall. It is also stepping up logistics investment to help Chinese merchants sell to global customers through its AliExpress website." [Forbes (2015)]

3.5 Innovative

When eBay entered China in 2002, it believed that "free is not a business model" and that it was unsustainable for Alibaba to do so. However, after attempting to become the dominant e-commerce company in China for four years, eBay conceded defeat and exited China in 2006. In an era where most did not believe that free pricing works, Alibaba was innovative with its business model. This proved to be very much sustainable and spurred many profitable supplementary services for Alibaba. The need to gain critical mass is extremely important and the business model works. The introduction of Alipay in 2003 further reinforced consumer confidence and stickiness. By creating an escrow service through the Alipay platform, Alibaba was able to give consumers the trust needed to continue buying on the web portals.

Recognizing the potential of Alipay, Alibaba innovated on expanding the range of payments that can be made on the platform. This improved consumers' lives and increased the amount of online transactions as utility bills and mobile phone credits could be paid for on the platform.

As Alipay usage grew, many consumers had excess credits left dormant on their Alipay accounts. This prompted the introduction of Yu'e Bao. The innovative money market fund had no minimum sum, and withdrawals and deposits were instantaneous from Alipay accounts. This is made possible through the sheer size of the Alipay networks and funds.

Building on their extensive consumer databases, Alibaba was able to foray into another important area of financial technology – data analysis. Sesame Credit's data analytic services offer credit scoring using different pieces of information from the Alibaba network. This allows it to offer objective analysis and recommendations for its corporate customers, such as decision making, business model optimization and control. Data analytics also allows Alibaba to extend consumer credit without the need to offer credit cards. Lines of credit are extended to consumers on Alibaba's web portals based on purchasing behavior and other information.

The Alibaba Group continues to innovate by introducing new products. This approach is an important factor in its success. However, being innovative alone is not sufficient. Without the large network accumulated through its low-margin and asset light business model, the business would not be able to scale even with such innovation.

3.6 Compliance easy

Alibaba successfully listed its shares in the U.S. in 2014, making history as the world's largest IPO. However, regulation did not allow internet businesses to have foreign shareholders. This was circumvented through the variable interest entity (VIE) structure. This structure is also known as the "Sina-model," Sina being the first company to list in the U.S. with this operational structure. Other Chinese internet giants that listed in the U.S. using the VIE structure include Tencent and Ctrip [Lee (2015c)]. "Effectively the VIE structure means that equity holders have a somewhat indirect financial interest in the revenue and earnings stream and do not actually have a claim on the assets of the company in question" [Forbes (2012)]. Although the use of VIE structure has not been explicitly approved by the Chinese Government, it is most investors' opinion that the Chinese Government would be unlikely to take restrictive action against existing companies that were listed under the VIE structure, due to the sheer number of companies and the massive amount of financial interest.

As the Chinese economy grew, inequality between the rich and poor also widened. This inequality is further encouraged by financial exclusion. Many in the rural areas had little access to banking services. Alibaba's services and the rapid growth of internet adoption have improved the lives of many in China. Many goods and services are now available to rural regions; and

because of the need for transportation, infrastructure, such as roads, has also improved. The Chinese Government recognizes this benefit and chooses to regulate e-commerce with a light touch. In 2011, Alipay was one of the first companies to receive a third-party payment license issued by the central bank.

However, as the industry matures, the Government is likely to impose heavier regulations. In March 2015, Zhang Mao, minister of the State Administration for Industry and Commerce (SAIC), said in a parliamentary session that the Government will regulate e-commerce more strictly in an upcoming clampdown on counterfeit products and poor customer service [TechInAsia (2015a)]. The central bank has also imposed some restrictions on online payment processors in September 2015, such as limits on daily and annual transactions [South China Morning Post (2015)].

Alibaba benefited much from light government regulation in its initial stages. This is an important element to its success. However, as the industry matures, we see more government intervention. It is important to point out that being the first movers in the market is a key factor of success.

3.7 Summary: Alibaba and Alipay

The Yu'e Bao episode has shown that the combination of internet, mobile and finance can drive market-based financial innovation. As the middle class broadens and the internet-savvy demographic becomes more affluent, internet finance with low minimum investment thresholds is set to disrupt the industry. In particular, there were clear disruptions to the banking and insurance sectors with liberalizations of interest rates, financial services and cross-selling of products. This has been made possible because of Alibaba's e-commerce business and Alipay was initially established as a trust agent for buyers and sellers.

The Chinese story is significantly different from the model of financial inclusion in Africa (see next section). The innate desire to serve the rural areas and the underprivileged saw innovative internet finance companies backed by e-commerce giants or social networks, servicing the underserved and the poor, providing access to markets, services and information. China and Alibaba have the potential to emerge as an important success story for branchless banking and financial inclusion. A new paradigm in China will likely unfold, seeing a convergence of forces coming from banks and financial institutions that are forced to innovate.

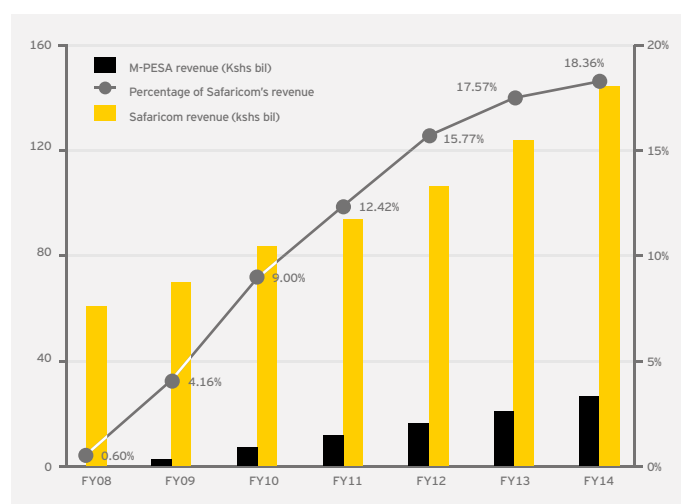


Figure 3: Revenues of M-PESA and Safaricom

4. Safaricom's M-PESA

M-PESA (pesa means money in Swahili) is a mobile money transfer service launched in 2007 and it has the widest coverage in urban and rural Kenya. It drives financial inclusion by providing money transfer services, local payments and international remittance services easily with a mobile device. M-PESA has since then expanded to Tanzania, Afghanistan, South Africa, India and Eastern Europe with varying degrees of success.

The M-PESA service is provided by telecommunications service provider, Safaricom. As of 2014, Safaricom had a customer base of 21.5 million and 34% of airtime top-ups were made directly through M-PESA. It has successfully penetrated 90% of Safaricom's telecom customers. M-PESA accounts for 18% of Safaricom revenue (Figure 3) and its agents employ more than 140,000 workers. M-PESA has 81,025 agents, 122,000 merchants (24,137 active), and 19.3 million registered customers (12.2 million active).

Since its conception, M-PESA has expanded to more than money transfer services. M-Shwari (a paperless banking platform with loan services by M-PESA) has 3.6 million active customers with KES4 billion in deposits and KES1.2 billion worth of loans issued per month with nonperforming loans at only 2.7%. Other key services include Lipa Na M-PESA (cash payments for goods and

services) and Lipa Kodi (rental payment to landlords). There are various reasons behind M-PESA's widespread adoption and success:

- ▶ **Safety:** eliminates the risks associated with handling cash for both customers and merchants
- ▶ **Reduced losses:** eliminates losses associated with receiving fake currency
- ▶ **Enhanced record keeping:** transaction records are readily accessible
- ▶ **Short and flexible settlement cycles:** allows timely collection
- ▶ **Acceptance of low value transactions:** as little as KES10
- ▶ **Lower costs:** avoids high point of sales (POS) and remittance fees

Below, we look at how each of the LASIC principles applies to M-PESA's business model.

4.1 Low-profit margin

In the initial stages, M-PESA had to attract both customers and merchants to participate in their network. It faced a chicken-and-egg problem; merchants are only interested in networks with an established customer base and vice versa. Safaricom's initial investment in its marketing efforts is estimated to be as high as U.S.\$25 million to U.S.\$30 million in its first two years [Mas and Radcliffe (2010a)].

Customers: M-PESA only charges its customers for "doing something," such as money transfers or withdrawals. There are no fees for registration or deposits, and there is no minimum deposit; even the SMSs that are used to deliver the service are free of charge. M-PESA has also largely maintained its transaction fees for the first three years, choosing to charge a fixed price for a different range of amount transacted.

Agents: Safaricom pays high commissions to retail outlets acting as its agents. In 2010, a store could earn about U.S.\$5.70 per day (if it conducts 60 transactions), which is equal to twice the prevailing daily wage for a clerk in Kenya [Mas and Radcliffe (2010b)].

By keeping fees low and commission high, M-PESA fostered a well-developed network. Combined with the large marketing efforts in its initial years, this kept M-PESA's profit margins low

but also helped to create the critical mass that was imperative to its success.

4.2 Asset light

M-PESA utilizes existing retail stores as cash-in or cash-out agents, reducing infrastructure and deployment costs, and provides greater convenience to its customers. The agent model is light on assets and does not require any brick-and-mortar investment. Money in M-PESA accounts are deposited at commercial banks and the interest earned is diverted to M-PESA Foundation (a not-for-profit organization focused on promoting education, health and environmental conservation). This eliminates the need for infrastructure required to manage cash deposits, keeping M-PESA asset light.

4.3 Scalable

The agent system that M-PESA adopts also makes it scalable. The same system can be replicated across many regions with minimum costs. The M-PESA is built on the existing technology of mobile phone SMS. As mobile phone adoption increases in the countries where it operates, its reach also extends. Both customers and agents only need a mobile phone to participate in the M-PESA network; there is no need to distribute bank cards or point of sales systems since the mobile phone is functionally equivalent [Mas and Radcliffe (2010a)]. This technology allows M-PESA to expand its customer base quickly without incurring any large setup costs.

4.4 Innovative

M-PESA is the first to offer P2P payments through mobile phone SMS. Through this innovation, the reliance on cash is heavily reduced. M-PESA can be used to pay bills, save and withdraw money, pay for public transport, pay monthly insurance premiums, receive pensions or social welfare payments, or receive loan disbursements and repay them electronically. Companies can also use M-PESA to pay salaries [Mas and Radcliffe (2010b)].

Partnering with Kenya's largest ATM service provider, PesaPoint, customers can now make withdrawals from their M-PESA accounts from any PesaPoint ATM and no bank card is required [Mas and Radcliffe (2010b)]. Lipa Na M-PESA is a cashless merchant service that allows small and medium enterprises to effortlessly collect and manage cashless payments from

M-PESA's significant customer base [Safaricom Limited (2014)]. In 2012, a virtual banking platform, M-Shwari, was introduced, which allowed M-PESA users to operate savings accounts, earn interest on deposits and borrow money using their mobile phones [Community-Currency Knowledge Gateway (2015) and Consultative Group to Assist the Poor (CGAP) (2015)].

By using Subscriber Identification Module (SIM) card technology, M-PESA is able to offer its services through simple SMS and does not require its customers to use smartphones. This innovation allowed it to gain widespread adoption in emerging economies like Kenya. By continuing to innovate beyond just payment services, M-PESA has retained its large user base and will continue to be a major player in mobile financial services.

4.5 Compliance easy

M-PESA operates mainly in emerging and developing countries, governments of which recognize that such technologies can promote financial inclusion and choose to adopt a lighter regulatory treatment than traditional banks. The Central Bank of Kenya (CBK) Act [Mas and Radcliffe (2010b)] gives the CBK the discretion to "formulate and implement such policies as best promote the establishment, regulation and supervision of efficient and effective payment, clearing and settlement systems." In 2009, the CBK determined that mobile money is not a banking service but a low-value retail money transfer service, which put to rest the questions about the legality of mobile money and reaffirming the Government's strong support for financial inclusion [Muthiora (2015)]. National Payment Systems (NPS) regulations were officially issued in 2014 by the Kenya Government. This allowed mobile phone operators to continue operating under their existing structures, creating minimum disruption to mobile money services (as long as roles and management are clearly separated) [Muthiora (2015)]. NPS regulations also provide for detailed consumer protection, requiring service providers to have disclosure mechanisms and open channels for consumer redress, while maintaining the privacy and confidentiality of consumer data. It is compulsory in Kenya for citizens of more than 18 years of age to hold national identity cards. This helped to facilitate the know your customer (KYC) process for M-PESA.

With central bank support and clear regulations in place, consumers are more likely to trust and use mobile payment

service providers. Identity cards also made the KYC process easy. Support from the Government is important for M-PESA's success.

4.6 Summary: M-PESA

Unlike Alipay that built up its user base from e-commerce, M-PESA expanded its services from telecom service to financial services. It is known that customers are sticky and defaulting on phone bill payment will be a lot more inconvenient than defaulting on a loan payment. Given its large user base, M-PESA has successfully increased its margin by expanding its range of financial services from payments, lending and microinsurance to other peripheral services. Utilizing an innovative approach to mobile money, M-PESA kept its business costs low and its operations scalable while keeping its prices affordable for its consumers. On top of that, it received much government support due to the very nature of the business, which is to encourage financial inclusion. M-PESA's business model exhibited the LASIC principles and how they can contribute to the success of a good FinTech business.

5. Financial inclusion

Being able to capitalize on the LASIC principles is insufficient for long-term sustainability. Investing into financial inclusion and serving the underbanked and unbanked is key. Cost of doing business continues to escalate for mainstream financial firms because of capital adequacy requirements and compliance costs. On the other hand, revenues are stagnating as they concentrate on competing for clients at the top of the pyramid. Although only 30% of the world have access to full banking service, much more own a smartphone. The exponential growth of smartphone adoption has created an opportunity to offer financial services on this platform. This allows businesses to reach the 70% of the pyramid who are underserved by banks and unbanked. Financial technology can bring about financial inclusion with its lower costs and large networks.

The unbanked and the underserved pose exciting opportunities for businesses that utilize FinTech to lower operating costs. There is scope for payment, remittance and credit businesses to lower transaction costs for consumers as well as operating costs for merchandise businesses. With the use of big data analytics, it will become viable for businesses to offer short-term microloans to credit-hungry consumers at the bottom of the pyramid by using other forms of information, such as social media, to provide credit

scoring; through risk profiling using similar data, microinsurance will also become a viable business.

Companies attempting to work in this area should work within networks with large existing critical mass, such as telecommunication services and e-commerce platforms. The success of such companies would increase the amount of economic inclusion in the world and decrease wealth inequality. Financial inclusion is not just a worthy cause but also opens a large pool of untapped demand for potential financial institutions.

5.1 The potential of cryptocurrencies

One noteworthy technology that can be harnessed for financial inclusion is cryptocurrencies – a type of programmable digital money that relies on cryptography to ensure secure transfer for tokens and to make records of all transactions on a decentralized digital register. Bitcoin is the first of the modern day cryptocurrencies. Created in 2008 in a whitepaper by Satoshi Nakamoto, Bitcoin gives incentives to those who are willing to participate in solving a cryptography quiz. Participants (known as miners) engage in proof-of-work (the contest) and as a consequence, form a consensus of a chain of transaction records. These transactions are stored in a decentralized digital ledger called the blockchain. Instead of a centralized authority maintaining the records, everyone who is part of the network holds a copy. A majority of the network need to agree in order to change any record or add new transactions to the ledger. Its decentralized nature means that it is hard for any single entity to control it. This feature has potential for uses in developing countries, where governments and monetary policies are frequently unstable.

Many intermediary companies have sprung up over the years since the inception of Bitcoin. Notable to the financial inclusion effort, 56 coins allow for the transfer of Bitcoins over SMS, thus giving anyone with a mobile phone the ability to make remittances at low costs. As the technology develops, cryptocurrencies can open the door to a whole new economy of sharing and financial inclusion. Lee (2015a) has described the different ways that cryptocurrency can change the financial world. It can allow the monetization of a person's social network (getgems.org); distribute music (Bitshares Music Foundation); allow for crowdfunding (Swarm, Counterparty, and Colored

Coins); decentralize data storage (MaidSAFE, Storj) and also the issuance of shares through crypto-equity (Hyperledger).

6. Conclusion

The world of financial services is fast changing. Consumers want more personalized services that increase convenience and yet retain security. Building on the idea of financial inclusion, we believe that the next big thing in financial services is about “connectivity inclusion”. Connectivity inclusion is more than just financial inclusion; it is about being connected by smartphones, wearables and across all radio signals [FST Media (2015)]. It entails the amalgamation of social inclusion and financial inclusion. Connectivity inclusion can be made possible through the use of new and innovative technology that embraces social networks and lowers costs. For the world economy to see sustainable growth, inclusion is key. New disruptive businesses should aim to conform to the LASIC principles (and keep inclusion in mind) to ensure success.

Of the LASIC principles, compliance or regulation may not be within full control of the business. Businesses should work on products or services that could improve the economy and advocate such that it gains government support. It is important to recognize that there is a first mover advantage – if regulators recognize that the product is beneficial to the country (such as M-PESA), it would allow such technology to proceed without hindrance. They should ensure “development-led regulation” rather than “development-lagged regulation.” Governments can then choose to step in when the industry reaches maturity (such as what is happening in China now with Alipay).

For long-term development to a much larger scale and other more complex financial services, regulation is essential and may prove to be a hindrance. India is a good example, where telcos or start-ups offering financial services have to partner a bank due to regulation. As a result, only 4% of the population reports using remittance or bill payment services on their mobile phones. KYC, counter terrorism financing (CTF) and other compliance requirements and the resulting costs (to consumers and the companies) may have made the business less viable.

If identification remains an issue, scalability remains unattainable. We suggest registration solutions that lie somewhere between

SIM registration and due diligence done by the financial institutions. Once KYC requirements are easy to achieve or an exempt status is given to small operators, the business can achieve scale with mass adoption. For example, Alipay can be easily downloaded into a mobile device by anyone but to use more complex functions, further compliance, such as linking with a bank account, credit card or with further identification, is required.

It is known that SIMs allow for end-to-end encryption and are controlled by mobile network operators (MNOs). MNO-led solutions may offer full security but these technology companies lack the experience in the finance services industry. Telcos may have to trade control of the SIM in exchange for more participation in the financial services sector. In some countries, governments have given a push by using mobile money to pay salaries and thus weeding out fraud, such as ghost or dead workers.

However, regulation is only part of the equation; low marginal costs and having social and cultural appeal are both important factors. Initial conditions are also important – some innovators succeeded because they started out as a monopoly, such as Kenya's M-PESA. Similarly, Alipay seems to be untouchable because of its dominant role in serving the underserved.

In conclusion, we discussed two successful alternative finance business models that exhibit the LASIC principles. The first is aided by its e-commerce company within the group and the second is aided by its large telecom user base. Although the LASIC principles are necessary conditions to a successful FinTech business, they are not sufficient conditions. Unlike many other FinTech firms of which many are not sustainable, the two businesses we discussed have one common trait – they have their roots in financial inclusion. This is especially important on two fronts:

1. It caters to a large untapped market with relatively low competition, and
2. It is more likely to gain the support of the government and face lighter regulation.

References

- Accenture, 2015**, "The future of FinTech and banking: digitally disrupted or reimagined?" <http://www.fintechinnovationlablondon.net/media/730274/Accenture-The-Future-of-Fintech-and-Banking-digitally-disrupted-or-reima-.pdf>
- Alibaba Group, 2014**, "Alibaba Group Holding Limited IPO Prospectus," Form F-1 Registration Statement Under the Securities Act of 1933, Securities and Exchange Commission, <http://www.sec.gov/Archives/edgar/data/1577552/000119312514184994/d709111df1.htm>
- Alibaba Group (2015)**, Alibaba Group and Ant Financial Announce Completion of Restructuring, 10 February, <http://www.alibabagroup.com/en/news/article?news=p150210>
- Bloomberg Business, 2014**, "Alibaba arm to create \$163 billion loans marketplace," Chen, L. Y., 24 September, <http://www.bloomberg.com/news/articles/2014-09-23/alibaba-arm-aims-to-create-163-billion-loans-marketplace>
- CNBC.com, 2015**, "How China's stock rout disrupted online funds, in a good way" by Shaffer, L., 16 July, <http://www.cnbc.com/2015/07/16/how-chinas-rout-disrupted-online-funds-like-alibabas-yue-bao-in-a-good-way.html>
- Community-Currency Knowledge Gateway, 2015**, "M-Pesa," <http://community-currency.info/en/currencies/africa/m-pesa/>
- Consultative Group to Assist the Poor (CGAP), 2015**, "Top 10 things to know about M-Shwari," by Cook, T., and C. McKay, 02 April, <http://www.cgap.org/blog/top-10-things-know-about-m-shwari>
- Forbes, 2012**, "Looking at Chinese VIE's," Richard Pearson, 18 October, <http://www.forbes.com/sites/richardpearson/2012/10/18/looking-at-chinese-vies/>
- Forbes, 2015**, "Alibaba steps up Asia logistics presence with new SingPost investment," Yue Wang, 7 July, <http://www.forbes.com/sites/ywang/2015/07/07/alibaba-steps-up-asia-logistics-presence-with-new-singpost-investment/>
- FST Media, 2015**, "An interview with David Lee Kuo Chuen," 14 July, <http://fst.net.au/knowledge-centre/interview-david-lee-kuo-chuen>
- Lee, D., and D. L. K. Chuen, 2015a**, Handbook of digital currency: bitcoin, innovation, financial instruments, and big data, 1st Edition, Academic Press
- Lee, D., and D. L. K. Chuen, 2015b**, "The rise of alternative finance," Presented at the 6th Annual ASEAN Technology & Innovation, 23 July, <http://www.smu.edu.sg/sites/default/files/skbife/pdf/ASEAN%20Technology%20and%20Innovation.pdf>
- Lee, D., and D. L. K. Chuen, 2015c**, "The rise of Chinese finance: the game of Dian Fu," presented at the Sim Kee Boon Institute for Financial Economics: Seminar Series, 17 August, <http://skbi.smu.edu.sg/sites/default/files/skbife/pdf/The%20Rise%20of%20Chinese%20Finance%20%E9%A2%A0%E8%A6%86.pdf>
- Mas, I., and D. Radcliffe, 2010a**, "Scaling mobile money," Bill & Melinda Gates Foundation, September 2010, <http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2010/02/Scaling-mobile-money.pdf>
- Mas, I., and D. Radcliffe, 2010b**, "Mobile payments go viral: MPESA in Kenya," Bill & Melinda Gates Foundation, March 2010, http://siteresources.worldbank.org/AFRICAEXT/Resources/258643-1271798012256/M-PESA_Kenya.pdf
- Muthiora, B., 2015**, "Enabling mobile money policies in Kenya," January, http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/02/2015_MMU_Enabling-Mobile-Money-Policies-in-Kenya.pdf
- People.cn, 2014**, "CCTV commentator shelling Yu'e Bao 'parasites,' Alipay responses it," February, <http://media.people.com.cn/n/2014/0224/c40606-24441365.html>
- Safaricom Limited, 2014**, Annual report 2014, http://www.safaricom.co.ke/annualreport_2014/public/downloads/Full%20Report.pdf
- South China Morning Post, 2015**, "China's booming e-commerce market faces challenges as regulators seek to restrict online payments," by Griffiths, J., 4 September, <http://www.scmp.com/tech/e-commerce/article/1854684/chinas-booming-e-commerce-market-faces-challenges-regulators-seek>
- TechInAsia, 2015a**, "All eyes on Alibaba as China proposes tighter regulations on ecommerce sites," by Millward, S., 9 March, <https://www.techinasia.com/china-stricter-e-commerce-regulations-affect-alibaba/>
- TechInAsia, 2015b**, "Alibaba launches online bank: 'It's for the little guys, not the rich'," by Millward, S., 25 June, <https://www.techinasia.com/alibaba-launches-online-bank-mybank/>

Sharing ledgers for sharing economies: an exploration of mutual distributed ledgers (aka blockchain technology)



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Abstract

Mutual distributed ledgers (MDLs) have the potential to transform the way people and organizations handle identity, transaction and debt information. MDL technology provides an electronic public transaction record of integrity without central ownership. The ability to have a globally available, verifiable and untamperable source of data provides anyone wishing to provide trusted third-party services, i.e., most financial services firms, the ability to do so cheaply and robustly. Blockchain technology is a form of MDL.

The InterChainZ project was a consortium research project to share learning on MDLs during the summer of 2015. The study found that InterChainZ showcased several distributed ledger configurations and numerous variants, exploring how they might work in a set of agreed “use cases.” The outputs were a series of functioning, interlinked MDLs along with software, explanatory materials and website information. The research consortium concluded that MDLs incorporating trusted third parties for some functions had significant potential in financial services, such as know-your-customer (KYC), anti-money laundering (AML), insurance, credit and wholesale financial services.

"Although the monetary aspects of digital currencies have attracted considerable attention, the distributed ledger underlying their payment systems is a significant innovation." ... "the potential impact of the distributed ledger may be much broader than on payment systems alone. The majority of financial assets – such as loans, bonds, stocks and derivatives – now exist only in electronic form, meaning that the financial system itself is already simply a set of digital records." Bank of England, Quarterly Bulletin (2014, Q3)

1. Background

1.1 What is trust in financial services?

Trust leverages a history of relationships to extend credit and benefit-of-the-doubt to someone. Trust is about much more than just money; it is about human relationships, obligations, experiences and about anticipating what other people will do. In risky environments trust enables cooperation and permits voluntary participation in mutually beneficial transactions that are otherwise costly to enforce, especially by third parties. By taking a risk on trust, we increase the amount of cooperation throughout the society while simultaneously reducing the costs, unless we are wronged. Trust is not a simple concept, nor is it necessarily an unmitigated good, but trust is the stock-in-trade of financial services. In reality, financial services trade on mistrust. If people trusted each other on transactions, many financial services might be redundant.

Technology is transforming trust. There are reputational ranking systems from point scores on Amazon, to supplier ratings on eBay, to collaborative filtering on many sites, to "I hate" websites, to social networks with referral or testimonial systems. We have fictional reputational currencies, such as the Whuffie, being realized in novel real ones such as Ripple with its Trust Lines. As a means of transacting business over space, never before has there been a time when it has been easier to start a distant geographic relationship. With a credible website and reasonable links, people are prepared to learn about companies half a world away and entertain the idea of conducting commerce with them. Society is changing radically when people find themselves trusting first encounters people with whom they have had no experience, e.g., on eBay or Facebook, less experience than on a first encounter with a local corner store.

Box 1: Ship registry skit

The ship registry skit - part 1: validating

Shady Shipper: "I'd like to register my vessel. Here's a photo I took on the island this morning of my supertanker berthed at the port terminal." Scrupulous Registrar: "We need a bit more than that to go on, your purchase certificate, IMO ship registration number, tonnage certificate, load line certificate ..." Shady Shipper: "Here's U.S.\$10,000." Scrupulous Registrar: "That will do nicely, Sir."

The ship registry skit - part 2: transacting

Shady Shipper: "I'd like to sell my vessel once to Otto and once to Maria." Sanctimonious Registrar: "But that's not possible." Shady Shipper: "Here's U.S.\$10,000." Sanctimonious Registrar: "That will do nicely, Sir."

The ship registry skit - part 3: recording

Shady Shipper: "I have to go court and need you to change your historical records for me such that only Maria is shown to own the ship." Shady Registrar: "That could cost you..." Shady Shipper: "Here's U.S.\$10,000." Shady Registrar: "That will do nicely, Sir."

People use trusted third parties in many roles in finance, as custodians, as payment providers, as poolers of risk, i.e., insurers. The "ship registry" skit in Box 1 illustrates three core functions that trusted third parties perform:

- ▶ **Validating:** identifying the existence of something to be traded and membership of the trading community
- ▶ **Transacting:** preventing duplicate transactions, i.e., someone selling the same thing twice or "double spending"
- ▶ **Recording:** holding the record of transactions in the event of dispute

If faith in the technology's integrity continues to grow, then MDLs might substitute for two roles of a trusted third party, preventing duplicate transactions and providing a verifiable public record of all transactions. Trust moves from the third party to the technology. Emerging techniques, such as smart contracts and

decentralized autonomous organizations, might in future also permit MDLs to act as automated agents. The consequence may be that the first role of a trusted third party, authenticating an asset and identifying community members, becomes the most important.

1.2 What is a ledger?

A ledger is a book, file or other record of financial transactions. People have used various technologies for ledgers over the centuries. The Sumerians used clay cuneiform tablets for recording transactions. Medieval folks used split tally sticks. So much so that in England, when tally sticks were retired in 1834, the destruction of tallies got so out of control that they burned down the Houses of Parliament. In the modern era, the implementation of choice for a ledger is a database, found in all modern accounting systems.

When many parties interact and need to keep track of complex sets of transactions, they have traditionally found that creating a centralized ledger is helpful. A centralized transaction ledger needs a trusted third party who makes the entries (validates), prevents double counting or double spending (safeguards) and holds the transaction histories (preserves). Over the ages, centralized ledgers are found in registries (land, shipping, tax), exchanges (stocks, bonds) or libraries (index and borrowing records), just to give a few examples. But while a third party may be trusted, it does not mean they are trustworthy.

The implementation of choice for a centralized ledger is a centralized database run by a trusted third party, such as a bank, an insurer, an exchange or a registry. Robert Sams describes a centralized transaction ledger's three weak points as "sin of commission" – forgery of a transaction; "sin of deletion" – reversal of a transaction; and "sin of omission" – censorship of a transaction. These weak points correspond to the three roles of a trusted third party – validation, safeguarding and preservation.

1.3 What is an MDL?

A distributed ledger is a technology that securely stores transaction records in multiple locations. The implementation of choice for a distributed ledger is a distributed database. "Distributed database: 1. A database that is not entirely stored in a single physical location, but rather is dispersed over a network

of interconnected computers. 2. A database that is under the control of a central database management system in which storage devices are not all attached to a common processor." – Federal Standard 1037: Telecom Glossary (7 August 1996) – <http://www.its.bldrdoc.gov/fs-1037/fs-1037c.htm>

MDLs allow groups of people to validate, record and track transactions across a network of decentralized computer systems with varying degrees of control of the ledger. Everyone shares the ledger. The ledger itself is a distributed data structure held in part or in its entirety by each participating computer system. The computer systems follow a common protocol to add new transactions. The protocol is distributed using peer-to-peer application architecture. In short, an MDL is a secure peer-to-peer ledger with storage analogous to peer-to-peer file sharing systems such as Gnutella, "Gnutella for accountants."

Peers are equally privileged participants in the protocol. MDLs are not new – concurrent and distributed databases have been a research area since at least the 1970s. Historically, the primary purpose of a distributed database was the continued existence of a ledger in multiple locations in extreme circumstances, for example during warfare. Distributed databases were persistent and pervasive. Defense organizations used distributed databases for this reason in the 1970s. A slightly more complicated distributed database approach allows people to continue to record new transactions in multiple locations with only periodic communication. Distributed databases of this form have been used for remote mutual working, allowing people to share information yet preventing errors arising in the ledger, or forms of mutual long-term archiving and backup.

Historically, distributed ledgers have suffered from two perceived disadvantages: insecurity and complexity. These two perceptions are changing rapidly due to the growing use of blockchains, a form of distributed database that has found success as the distributed ledger of choice for cryptocurrencies.

2. What is a blockchain?

Nick Williamson believes "that a blockchain consists of three main, complementary parts: a shared state, a set of rules for updating state via blocks and a trust model for timestamping." [Williamson (2015a)]

Williamson's three complementary parts correspond well with the trusted third-party ledger model introduced above: validate – a trust model for timestamping new transactions by members of the community; safeguard – a set of rules for sharing data of guaranteed accuracy; and preserve – a shared view of the history of transactions.

In January 2009, blockchain technology was used to help create Bitcoin, a cryptocurrency-based protocol for the exchange of tokens called bitcoins. Bitcoin and other cryptocurrencies (also called AltCoins) gained significant attention in 2013 with Bitcoin's sharp price rise when transacted in fiat currencies, the historic high being U.S.\$1,124.76 on 29 November 2013. Bitcoin market capitalization dropped from a high of U.S.\$13.9 billion on 4 December 2013 to about U.S.\$3.3 billion in May 2015. High prices and high volatility attracted speculation, as well as proliferation of competitive and complementary cryptocurrencies. Arguably, there are over 600 AltCoins based on blockchain technology. Bitcoin remains the preponderant cryptocurrency. The market capitalization of the top 600 cryptocurrencies tracked by <http://coinmarketcap.com/all/views/all/> including Bitcoin is U.S.\$3.9 billion. Technologists have drawn attention to the MDL underpinning cryptocurrencies, the blockchain.

A blockchain is a transaction database based on a mutual distributed cryptographic ledger shared amongst all nodes participating in a system. It is public in that it is decentralized and shared by all nodes of a system or network. There is integrity as double spending is prevented through block validation. The blockchain does not require a central authority or trusted third party to coordinate interactions, validate transactions or oversee behavior. A full copy of the blockchain contains every transaction ever executed, making information on the value belonging to every active address (account) accessible at any point in history.

The blockchain's main innovation is a public transaction record of integrity without central authority. The blockchain is decentralized by nature, i.e., shared by all nodes connected to a set network. Blockchain technology offers everyone the opportunity to participate in secure contracts over time, but without being able to avoid a record of what was agreed at that time.

While Bitcoin is problematic legally, socially and economically, and there have been technical glitches with Bitcoin wallets,

the blockchain technology has proven robust. In fact, as an experiment in proving blockchain technology's robustness, Bitcoin has been superb, showing the technology to be proof against a wide range of attacks, from criminals to national security agencies. Growing confidence has led numerous firms, particularly in financial services, to announce their interest in using them: Nasdaq, BNY Mellon, UBS, USAA, IBM, Samsung and many others. In turn, a number of firms have realized that the wider field of MDLs provides a variety of approaches that can be adapted to numerous uses.

2.1 Why is the Bitcoin blockchain important?

The Bitcoin blockchain is important because it showed that distributed ledgers could work in harsh environments of little, no, or even negative, trust. The Bitcoin blockchain has been challenged by businesses, criminals, law and security agencies. So far, though there have been some hiccups, the blockchain has not been compromised. Further, while more complex than a centralized ledger, the complexity of the blockchain is comprehensible and provides commensurate benefits for multi-party transactions. This change of perception, from distributed ledgers being "too insecure and too complex" to "it's the blockchain, stupid," has led people to reconsider the use of other types of MDLs in other applications.

For those interested in seeing some older, related MDL applications similar to blockchain thinking, the bullet points below provide a quick sampler (note: Z/Yen itself implemented a semi-distributed encrypted ledger in 1996 in the U.K. for a sensitive case management system):

- ▶ 1993 – "Encrypted open books" – <https://www.marc.info/?l=cypherpunks&m=85281390301301&w=3>
- ▶ 1995 – "WebDNA" – <http://www.webdna.us/page.dna?numero=27> & <http://en.wikipedia.org/wiki/WebDNA>
- ▶ 1996 – "Ricardo payment system" – <http://www.systemics.com/docs/ricardo/execsummary.html>
- ▶ 1999 – Stanford University's CLOCKSS (Controlled lots of copies keep stuff safe) <http://www.clockss.org/clockss/Home> and LOCKSS (Lots of copies keep stuff safe) – <http://www.lockss.org/about/history/> for archiving
- ▶ 2004 – Ripple, a consensus ledger approach to currency transactions – <https://ripple.com/>

While a work of significant technical ingenuity, the Bitcoin blockchain could be equally regarded as just a new assemblage of existing components. The principal components are public-key cryptography (Diffie-Hellman circa 1976) and a proper decentralized peer-to-peer network (Gnutella 2000). The use of these technologies in Bitcoin “mining” was ground-breaking, by applying an approach to Byzantine Fault Tolerance to the problem of transaction verification, though even here there was some precedent in a short 1998 paper on b-money by Wei Dai. The two technical weaknesses are also apparent. If public-key cryptography is cracked, or internet peer-to-peer somehow switches off, then cryptocurrencies would fail, along with much else in modern finance starting with credit cards.

Although cryptocurrencies have proven one form of MDL, blockchains, in a very harsh environment, once one relaxes some of the conditions, e.g., give back a trusted third party some of their role, a huge range of possible approaches that have been around a while open up. MDL technology promotes speculation. What if any group of companies could elect to create their own pooling system on the spot? What if a group of shippers decided to establish a shared carriage system for containers? What if a property developer elected to mandate participation among all their suppliers? Each supplier might buy all materials and goods such as cement or cabling from a central store under a sophisticated averaged pricing algorithm incentivizing each to buy cheaply and share fairly. We can easily imagine instant mini-insurers creating a shared economy approach to special purpose vehicles.

By relaxing conditions, e.g., assuming a trusted third party might perform some validation role, there are opportunities to throw away the expensive “mining” and keep the ledger. Before getting too carried away that all financial services will move to variants of the blockchain, it is worth quoting some informed skepticism (Box 2).

FinTech, a combination of “financial” and “technical” or “technology,” refers to the proliferation of new applications delivering financial services directly to devices. FinTech applications all need ledgers, and it is easy to conclude that there will be a proliferation of MDLs as well. FinTech devices frequently spawn currency or point schemes, such as air mile or supermarket point schemes. Ledgers also track “chain of

Box 2: Skepticism toward blockchain

“...we have reflected tiny bursts of enthusiasm for what blockchain technology, the distributed public ledger underpinning bitcoin, could do for the murky and shadowy world of OTC bilateral clearing.

Such enthusiasm should not, however, be confused with the current industry vogue of rubbishing bitcoin while simultaneously claiming that the blockchain technology is genius.

We are less sanguine on the latter front.

For one, we’re not convinced blockchain can ever be successfully delinked from a coupon or token pay-off component without compromising the security of the system. Second, we’re not convinced the economics of blockchain work out for anything but a few high-intensity use cases. Third, blockchain is always going to be more expensive than a central clearer because a multiple of agents have to do the processing job rather than just one, which makes it a premium clearing service – especially if delinked from an equity coupon – not a cheaper one.”

Kaminska, I., 2015, “On the potential of closed system blockchains,” FT Alphaville, 19 March - <http://ftalphaville.ft.com/2015/03/19/2122148/on-the-potential-of-closed-system-blockchains/>

custody” of assets. For example, shipping companies could use an MDL for all sorts of documentation tracking, bills of lading, letters of credit, load line exemptions, etc. The payment information, which might be going through SWIFT transactions, would be recorded in an MDL when it was relevant. SWIFT stays as it is, but the shipping industry gets new services. There are “chain of custody” situations in forestry, pharma, wine or fish, to take a few examples, where similar approaches could be used – and people are starting to do it (blood diamonds <http://blocktrace.io/>, or more general social and ethical tracing <https://www.provenance.org/>).

Area	Possible applications
Financial instruments, records, models	Currency, private and public equities, certificates of deposit, bonds, derivatives, insurance policies, voting rights associated with financial instruments, commodities, derivatives, trading records, credit data, collateral management, client money segregation, mortgage or loan records, crowdfunding, P2P lending, microfinance, (micro)charity donations, account portability, airmiles and corporate tokens, etc.
Public records	Land and property titles, vehicle registries, shipping registries, satellite registries, business license, business ownership/incorporation/dissolution records, regulatory records, criminal records, passport, birth/death certificates, voting ID, health and safety inspections, tax returns, building and other types of permits, court records, government/listed companies/civil society, accounts and annual reports, etc.
Private records	Contracts, ID, signature, will, trust, escrow, any other type of classifiable personal data (e.g., physical details, date of birth, taste) etc.
Semiprivate/semipublic records	High school/university degrees and professional qualifications, grades, certifications, human resources records, medical records, accounting records, business transaction records, locational data, delivery records, genome and DNA, arbitration, genealogy trees, etc.
Physical access	Digital keys to home, hotel, office, car, locker, deposit box, mail box, Internet of Things, etc.
Intellectual property	Copyrights, licenses, patents, digital rights management of music, rights management of intellectual property such as patents or trademarks, proof of authenticity or authorship, etc.
Other records	Cultural and historical events, documentaries (e.g., video, photos, audio), (big) data (weather, temperatures, traffic), SIM cards, archives, etc.

Figure 1: Possible applications of blockchain in financial services

The list of possible applications in financial services is growing rapidly. Figure 1 summarizes just some of the more outstanding ones.

People use trusted third parties in many roles in finance, as custodians, as payment providers, as poolers of risk, i.e., insurers. As mentioned earlier, trusted third parties in finance provide three functions: validation, safeguarding and preservation. If one believes in the integrity of distributed ledgers, then they might largely displace two roles of a trusted third party, no double spending and providing a verifiable public record of all transactions. Such displacement might also increase the importance of the first role, validating the existence or community membership of something in the first instance. Moreover, increased confidence in technology performing two third-party functions – safeguarding and preservation – should lower the barriers and costs of setting up trusted third-party services, and perhaps lead to increased demand.

Personal identity verification, authentication and data management could bring significant benefits for many sectors. In insurance, the streamlining of digital authentication and better management of personal data and history disclosure could translate into more direct and efficient relationships between insurance companies and individuals. Over time, this could bring additional benefits by reducing identity and claim frauds. In KYC and AML processes, an identity distributed ledger

application could transform service levels.

Finally, perhaps we should coin “RegTech,” a proliferation of new applications regulating financial services directly on devices. RegTech would need to cover everything from systems that monitor and control core ledgers to the “purses” on the periphery that store value locally with users. Regulators could insist on people recording transactions externally on MDLs, thus reducing the cost of firm failures, providing open sources of transaction prices and volumes, or increasing competition through increased data portability, e.g., switching financial accounts.

2.2 MDL architectures

MDLs can be implemented in a number of ways. Changing the type of ledger or relaxing some constraints releases a huge range of possibilities. For example, by reintroducing trusted third parties or regulators, one can “throw away the expensive mining” yet keep the ledger. There are numerous technical choices on cryptography standards, peer-to-peer arrangements, guaranteed distribution approaches, partial cryptography, programming languages, communication protocols, etc. Perhaps the most general implementation choices are: public versus private – is reading the ledger open to all or just to defined members of a limited community? Permissioned versus permissionless – are only people with permission to add transactions, or can anyone attempt to add a transaction? Proof-of-stake, proof-of-work, consensus or identity mechanisms – how are new transactions

authorized? True peer-to-peer or merely decentralized – are all nodes equal and performing the same tasks, or do some nodes have more power and additional tasks?

The Bitcoin blockchain is just one type of public, permissionless, proof-of-work, peer-to-peer distributed ledger. One categorization of leading approaches runs as follows [adapted from Mougayar (2015)]:

1. **Bitcoin currency + Bitcoin blockchain:** Bitcoin. A public, permissionless, proof-of-work, peer-to-peer reference point.
2. **Bitcoin currency + non-Bitcoin blockchain:** Blockstream, Truthcoin. Side chains are “pegged” to the main Bitcoin blockchain via various schemes.
3. **Non-Bitcoin currency + Bitcoin blockchain:** Factom, Mastercoin, Counterparty, Namecoin. In this case, the Bitcoin blockchain is used, but a native currency or token is added.
4. **Non-Bitcoin currency + non-Bitcoin blockchain:** Ethereum, BitShares, Truthcoin, Litecoin, PayCoin. New types of blockchains and new currencies.
5. **Non-blockchain consensus or identity:** Ripple, Stellar, NXT, Hyperledger, Tendermint, Pebble, Open Transactions, Z/Yen's InterChainZ. Decentralized platforms with new types of MDLs.
6. **Blockchain-neutral smart services:** Eris Industries, PeerNova, Codius, SmartContract, SAE, Tezos, Tillit. This category is still developing, but includes a mix of decentralized platforms and dumb/smart contracts.

3. InterChainZ

3.1 Project summary

InterChainZ was a cooperative research project aimed at providing a generic demonstration pilot of how MDL technology might provide such capabilities for current financial services.

InterChainZ aimed to answer a core question – “what elements of a trusted third party are displaced by MDL technology?” by providing a basic demonstrator of distributed ledgers, including variants of blockchains, and comparing how they might work within selected financial services use cases. The objective was to build a small suite of software providing an interface to MDLs for tasks such as selection and storage of documents, document encryption, sharing keys, viewing the MDL transactions and viewing the MDL contents subject to encrypted limits. The software permitted testing a variety of MDL configurations.

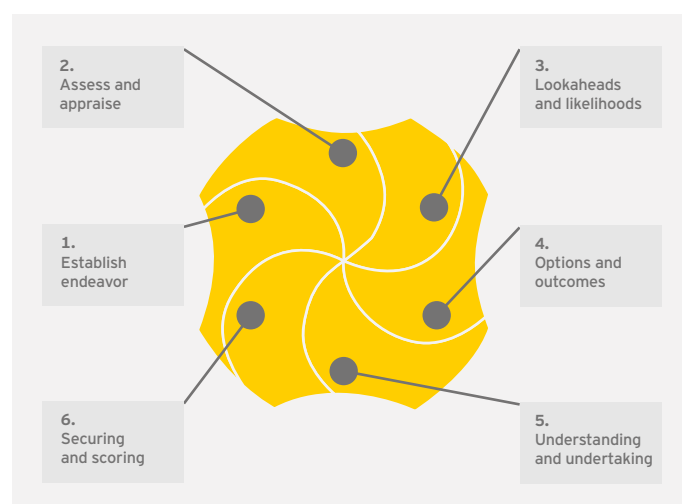


Figure 2: Z/EALOUS methodology

Suite of software was then used to discuss and test various options for MDLs. The outputs were shared with participants as joint intellectual property for their own future use. InterChainZ provided:

- ▶ A demonstrator showing the potential applications in action, specifically: simple ledger for data of any sort, identity application for a person, identity application for a company, personal insurance policy (motor) placement, small business insurance policy placement, large-scale, long-term storage application or archive and various tests of supervisor nodes and voting validation
- ▶ Software available for sharing with consortium members
- ▶ A project video, presentation, website and training materials

3.2 Methodology

The research process was divided into six stages, following Z/Yen's Z/EALOUS methodology.

3.2.1 Establish endeavor

In the first stage of research, the consortium members led by Z/Yen Group agreed on the scope, objectives and approach of the research. In particular, it was agreed that the research team would explore several architectures, including Z/Yen's InterChainZ, Ethereum and other variants. The research team

started approaching other organizations operating distributed ledger software. The consortium also agreed to contrast and compare selected distributed ledger software on performance, resilience and security by exploring how they worked in the set of four agreed “use cases:”

Global accountancy firm – identity validator: This use case demonstrated the distributed ledger functionality to be used by an identity validation service. The service will review and validate identity and financial information about high-net-worth individuals, adding it to the distributed ledger to confirm they have verified it. A third party, e.g., a bank or financial service provider, can be given secure access to the MDL to confirm that the individual’s information has been verified. This validation service will be useful to individuals who need to comply with AML or KYC requirements.

Corporate due diligence specialist – corporate credit: This use case demonstrates the functionality and storage uses that allow companies to use distributed ledgers to validate their identity and report on their finances. A trusted third party reviews the company information and adds it to the distributed ledger, thereby confirming they have verified the information. Potential creditors or business partners are provided with a public key, allowing them to either confirm that the information has been verified, or view the company information itself.

Insurance company – motor policy placement: This use case demonstrates how an individual or business seeking an insurance policy can store their insurance history and relevant data on a distributed ledger and share the key with an insurance company when applying for a new policy, or an endorsement to a new policy. New policy details can be added to the MDL allowing the policyholder to easily request new policies or updates.

Insurance company – small business policy placement: This use case examined how a corporate identity MDL could be used to place a small business policy. The core use case was to consider the interaction of an insurance MDL with a corporate credit MDL, with implied interactions with individual identity MDLs, e.g., a director joining or leaving the corporation.

3.2.2 Assess and appraise

The team and consortium members agreed on the use cases to be tested and what anonymized data could be supplied for the testing. In parallel, the team sought to approach other organizations known to operate distributed ledger systems in order to invite them to participate by providing their distributed ledgers for comparative testing. In the event, Bitcoin data was easily available for analytical comparisons and Ethereum had just launched a new system (Frontier) for which data was readily available. However, three other parties who claimed to have “open source” software proved, despite discussion, not to have software yet ready for comparative testing.

3.2.3 Lookaheads and likelihoods

The third stage of research centered on uploading data for each use case’s content MDL and consortium members were invited to explore their use case on InterChainZ. R&D focused on validating three separate architectures, including:

- ▶ All nodes – every node (aka server) can add to the MDL
- ▶ Master node – only the master can add to the MDL
- ▶ Supervisor node – the supervisor needs two other nodes to cosign in order to add to the MDL

An independent ICT expert subjected InterChainZ to a security review during the course of the research, concluding, “the system stacks up cryptographically, by which I mean you can use the system to create the kind of non-repudiatable proof you want.” However, the more important the system, the more attractive it becomes to attack.

3.2.4 Options and outcomes

In the fourth stage of the research, the team explored storage options and network architectures for InterChainZ. Each use case was expanded to contain not only a content MDL (with all the documents), but also a related identification MDL, with the team exploring different levels of interactions between the two MDLs. The team also sought to test the scalability of InterChainZ by increasing the number of servers across which the prototype runs.

3.2.5 Understanding and undertaking

The team collated preliminary findings stemming from previous stages, including issues and recommendations for future R&D.

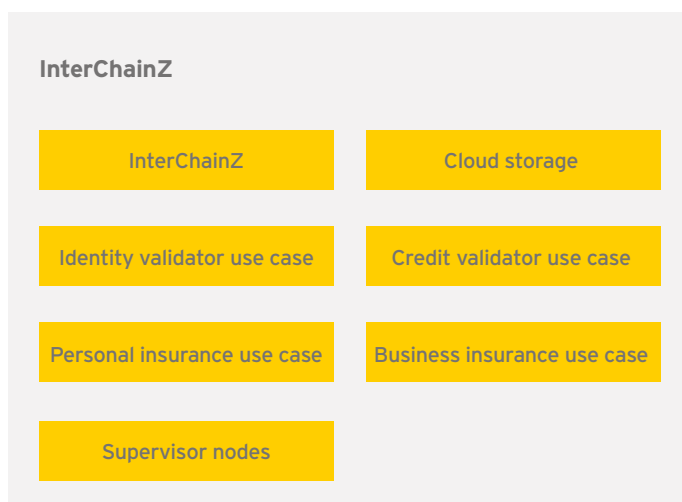


Figure 3: InterChainZ dashboard

A user guide was created and circulated to all consortium members. A sensemaking session was organized with the research consortium members to discuss the findings and recommendations and how these should be presented.

3.2.6 Securing and scoring

During this final stage, the team worked to finalize web-based materials including an overview of distributed ledgers, a user guide for InterChainZ, the overall findings, including related videos and graphs, and proposed recommendations for future research.

3.3 Technical work

At the top-level, InterChainZ provided access to seven basic “use cases”:

- ▶ **Deal room (for public demonstration):** single content/transaction MDL; all node validation
- ▶ **Credit validator use case (for consortium use):** single content and transaction MDL; all node validation
- ▶ **Identity validator use case (for consortium use):** split content/transaction MDL; all node validation
- ▶ **Personal insurance use case (for consortium use):** two MDLs, a customer and a company MDL – both of these MDLs are combined content/transaction MDLs; all node validation

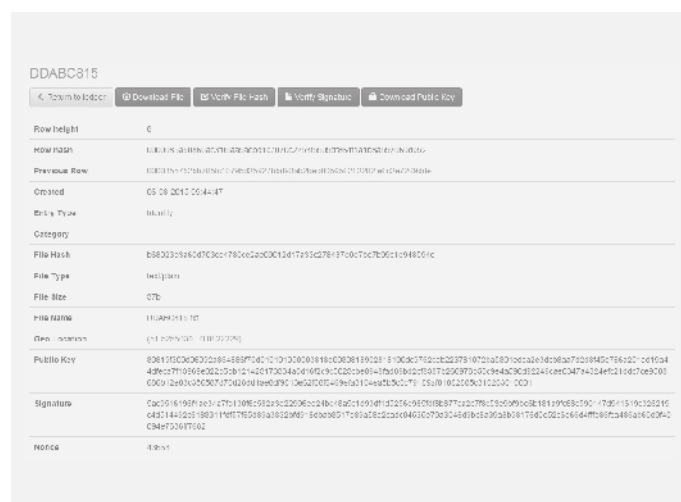


Figure 4: Screenshot of identity use case

- ▶ **Business insurance use case (for consortium use):** technically identical to personal insurance use case but uses MDLs distinct from the personal insurance MDLs
- ▶ **Cloud storage (for consortium use):** a single transaction MDL; files are stored separately using Amazon; files are encrypted first before being sent to Amazon; uses master node validation
- ▶ **Supervisor nodes (for consortium use):** another credit validator use case; single content/transaction MDL; uses supervisor node validation

InterChainZ identified a number of potential architectures to manage the addition of data to the MDLs:

- ▶ **Free-for-all nodes:** each and every server across which InterChainZ runs has the same level of access to the MDL and the same permission to add to the MDL
- ▶ **Master node:** one server is defined as the master and has permission to add to the MDL; all servers including the master can have access to the MDLs and their contents
- ▶ **Supervisor node:** any node that wishes to add to the MDL needs two other nodes to cosign; as with the master node architecture, all servers have the same level of access to the MDLs and their content
- ▶ **Majority nodes:** a simple majority (51%) of nodes live on the network must co-stamp any addition to the MDL; as with the

Option	How it works	Potential benefits	Potential risks	Further thoughts
Master	Specific node must approve all entries	<ul style="list-style-type: none"> ▶ Central ability to control ledger ▶ Straightforward to update approval rules ▶ Increased speed of entry to ledger as no need to wait for other nodes to be live ▶ Simple to implement 	<ul style="list-style-type: none"> ▶ Single point of failure – ledgers cannot function without it ▶ Remain reliant on single trusted third party 	See cloud storage demo for example
Supervisor	A number of specific nodes must approve all entries	<ul style="list-style-type: none"> ▶ Relatively straightforward to update approval rules ▶ Moderate speed of entry as only waiting for specific nodes 	<ul style="list-style-type: none"> ▶ Remain reliant on specific nodes being live ▶ More complex implementation – need to agree supervisors and fallbacks 	See supervisor nodes demo for example
Majority	51% or more of nodes must approve all entries	<ul style="list-style-type: none"> ▶ Not dependent on specific nodes to be available 	<ul style="list-style-type: none"> ▶ More complex to implement – e.g., to calculate how many nodes are live at any time 	To be further developed
Collective	All nodes must approve all entries	<ul style="list-style-type: none"> ▶ Increased certainty over entries – no partial approval allowed 	<ul style="list-style-type: none"> ▶ Requires all nodes to be live at all times ▶ Likely to impact performance while waiting for 100% approval 	To be further developed
Free for all	Any member of network can add to chain	<ul style="list-style-type: none"> ▶ Simple to maintain and implement ▶ Relatively high performance ▶ Does not require specific nodes to be live 	<ul style="list-style-type: none"> ▶ Lack of control over data entry 	See client use case demos

Figure 5: Architectural choices

master node architecture, all servers have the same level of access to the MDLs and their content

- ▶ **Collective nodes:** all nodes must co-stamp all additions to the MDL

4. Project learning

4.1 Terminology

Early in the InterChainZ project, it became apparent that the further the discussion moved away from Bitcoins and blockchains, the easier conversations became. Bitcoins and blockchains were burdened with too much baggage. Terminology is evolving rapidly, hence the team's focus on MDLs as the term of choice. Colloquially, the data structures were frequently referred to as "chains" or "chainz." Further, the team emphasized the "boring" nature of MDLs, and that "boring is brilliant." The technical focus might be on boring "ledgers," but the excitement is in the applications above.

4.2 Identity

It also became clear that "identity" issues are universal. One of the great advantages of doing consortium research was that the identity chains were both "use cases" and essential infrastructure that would have had to be built for anything else of substance. Distinguishing "identity" from "transactions" and "content"

made processing and distribution sense, at the expense of a bit more complexity in comprehension. While InterChainZ showed that MDLs can work together, and the project explored many different architecture possibilities, what was explored is certainly only a small portion of what is possible. One business area that could use more exploration is whether an MDL system is best as one MDL per entity (person, corporate) interacting with many transaction or content MDLs, or as a set of big MDLs (identity, transaction, content) for a process such as AML, leading to identity information replication on different processes.

4.3 Validation choices

Different business uses probably require different node structures. For example, the master node architecture would be appropriate where a regulator is confirming all transactions in a market as being from valid market participants. The supervisor node architecture might suit a small group of large organizations interacting with multiple smaller ones. While Bitcoin blockchain's "proof-of-work" validation approach is fascinating, one of the basic premises for InterChainZ was to focus on exploring "non-blockchain consensus or identity" MDLs, i.e., what benefits could be achieved when not using currencies or tokens. This decision provoked some external criticism, principally questioning whether there were benefits to MDLs without proof-of-work validation mechanisms.

		Who do I trust to maintain a truthful record?			
		A central authority	A group of known actors	A group of actors, some known	Nobody
What is the universe of "things" I need people to agree on?	Ownership of on-platform assets	Central bank, commercial bank		Ripple (XRP)	Bitcoin
	Ownership of off-platform assets	Custodian bank	Hyperledger	Ripple (Gateways)	Colored coins, Counterparty
	Obligations and rights arising from an agreement	Clearing house	Eris	Ripple (Codium)	Ethereum

Figure 6: Brown's categorization

Source: Richard Brown

	Permissionless	Permissioned
Explicit token	HashCash/proof of work	Proof of stake
No explicit token	*Magic*	Organization as a blockchain

Figure 7: Permissionless versus permissioned consensus and trade-offs

Source: Williamson (2015b)

Brown (2014c) has produced a categorization that starts to make sense of "truthful records" versus "how things are agreed." His diagram shows that there are a number of useful areas where different structures might apply.

The research partners, including the Alderney regulatory observer, contend that regulators are present in most financial markets. Thus, where regulators are prepared to co-stamp transactions, or support co-stampers who provided some trusted third-party elements, tokens are unnecessary. There is evidence of regulatory interest. From 9 July 2015 to 8 August 2015, the States of Jersey held a consultation on "Regulation of virtual currency." That consultation considered "whether there is a case for adopting a standard for distributed ledger technology and the possibility of potential future pan-Channel Island work in this area." In more detail, "whether regulation of the underlying 'distributed ledger' technology would be advantageous in providing confidence to the marketplace that the Channel Islands are suitable jurisdictions in which to conduct 'distributed ledger' technology-based business. A standard might involve registration, inspection, certification and periodical checking of the underlying 'distributed ledger' technology system sitting behind any particular business that

would use, develop or provide 'distributed ledger' technology" [States of Jersey (2015)].

Nick Williamson and others have introduced a terminology distinguishing "permissionless" ledgers that rely on tokens or incredulous amounts of trust, against "permissioned" ledgers where there are strong structures for multiple parties, e.g., regulators, or the ledger is within a single organization.

Further, token or coins are expensive. The process of solving the equations needed to maintain a token-based system consumes energy and slows transactions. The approximately 10 minute transaction window of Bitcoin and the 7 to 15 second window of Ethereum contrast strongly with the 3,000 to 5,000 transactions per second achieved using InterChainZ's "permissioned" ledgers, i.e., 106 times faster than Bitcoin.

4.4 Content chains

The project developed a number of MDLs that directly stored documents, as well as MDLs that only recorded the "hash" of documents. This led to the development of three conceptual MDLs, "identity chains," "transaction chains," and "content chains." Corporate and individual identity chains authorize access to a transaction chain. A transaction chain holds the core ledger records of all transactions, but only a hash of original documents. The content chain is an MDL holding all of the original documents. The content chain might be managed by a third party for storage and retrieval because of its size. This conceptual structure is quite flexible. The only technical difference between the chains is that the identity and content chains have a fixed-length hash field while the content chain has a variable length field.

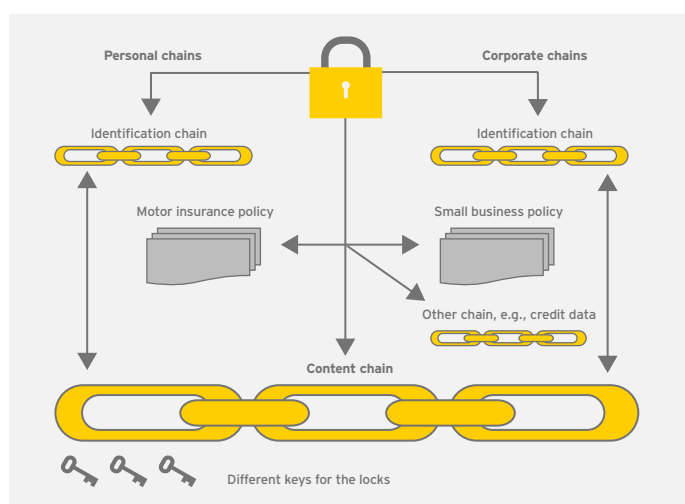


Figure 8: Overview of use cases working together

In testing, the content chains held a variety of documents, pictures, videos or spreadsheets, from a few thousand bytes up to 100 megabytes. In practice, the numbers are likely to grow rapidly. Just for the personal identity chain, a basic 100 nodes handling 1,000 clients would have a chain (excluding updates and changes) of approximately 75 gigabytes. Moving to a more realistic 500 nodes and 10,000 people gets to 3.75 terabytes, or 500 nodes and 10,000,000 people to 3.75 petabytes. Thus, the ability to segregate the large storage requirement, yet retaining the same MDL architecture, provides an ability to control this increasing size more smoothly. Further, most MDL benefits remain for a content chain under a managed service. Users can still copy it if they wish to. The function of adding new transactions to the content chain can still be transferred easily, preventing permanent centralized control of the content chain by a supplier.

4.5 Further research

At a basic level, the project showed that MDLs work and can work together, but a number of avenues are yet to be explored, and a lot of essential infrastructure is lacking. Further research could include:

- **Simplify:** market functions (order matching, margining, account functions, clearing, settlement, as well as possible uses of a token currency within exchange) and usability and

ergonomics to enhance the end-user experience (exploring the end-user experience by connecting to off-the-shelf wallets for cryptographic key management)

- **Automate:** facilities for automated creation of new mutual distributed ledgers (a parameter driven system providing options for permission management, proof-of-stake and identity settings, supervisor-master and other node settings, "voting" permutations, and peer-to-peer structure settings) and exchange functions (processes to make the basic interacting ledgers into a demonstrator of a full exchange, with numerous "use cases" therein, e.g., sharing identity functions with transactional functions and storing relevant documents securely and permanently)
- **Integrate:** integrity proofing (dynamic anomaly and pattern response additions, monitoring and testing facilities), content hash-addressable storage market (C#ASM) (extending the "identity," "transaction" and "content" chain thinking that emerged from InterChainZ into an indexable archiving system both as a ledger itself, but also supporting other ledgers) and data taxonomies, encryption levels and tracking (how feasible is it to have differently labelled categories and "data boxes" (e.g., health, car insurance, home insurance and driving record on a person's MDL) that can only be opened as a group, to encrypt levels with levels (first order health data perhaps before detailed data), to provide access records (who opened, when), and might homomorphic encryption have a role)
- **Control:** management and control features (management information, performance statistics, visualization) and documentation of standards for MDLs and legal entity identifiers

5. Project reflections

5.1 Everything needs identity and authentication

MDLs could transform the way people manage identities and personal information. Individuals could own their data and no longer need to trust third parties to store or manage their information. MDL identity schemes could empower people with personal data storage and management, permission frameworks for access by third parties such as banks or insurance companies, and even distributed reputation ratings. Such applications could reduce identity and fraud, increase confidence in products and lower rates thus increasing coverage. The concept of never losing data could materially alter the way society views identity, privacy and security.

Option	How it works	Potential benefits	Potential risks	Further thoughts
Single chain	All content, transactions and identification information is held on one chain	<ul style="list-style-type: none"> ► Straightforward data structure, easy to implement and to search ► Distribution – all data distributed throughout the chain thus reducing risk of data loss from a small number of nodes 	<ul style="list-style-type: none"> ► Volume – as chain grows it will require large storage capacity ► Performance – likely to impede speed of searches and access ► Regulatory – potential lack of oversight over sensitive personal information 	Useful for demonstration purposes and for smaller private chains
Dual chains	Separate transaction-content chain and identification chain	<ul style="list-style-type: none"> ► Maintains a simple link between data and content ► Allows for more options for storing sensitive content, e.g., in stand-alone chain infrastructure, or in tradition storage, e.g., local servers ► Lower volume identification chain reducing storage requirements and improving performance ► Facilitates giving access to subsets of data 	<ul style="list-style-type: none"> ► Slightly more complex structure requires security for both chains and links ► Regulators and customers may require additional audits to confirm links in place 	Need to develop protocols for linking data on chains and retrieving data from content chain
Many chains	Separate content chain, identification chain and transactions chains	<ul style="list-style-type: none"> ► As for dual chains, also allows an individual to link to different chains in different networks for different types of transactions, e.g., an insurance chain and a credit chain 	<ul style="list-style-type: none"> ► Increasingly complex structures may be harder to control ► Requires excellent data sharing protocols to validate data links to different chains networks 	Business case for additional complexity needs development, may be a longer term option

Figure 9: Categorization of chains – one or many chains

Identity is fundamental to money. The entry in any ledger is about people – A owes B. Thus, tokens of identity are the basis of currency. Søren Kierkegaard, “doubt everything,” reminds us that without risk there is no faith; there can be no faith without doubt. There can be no faith in the community without debt, thus credit and a form of doubt about future repayment are intrinsic to monetary systems.

Identity is not just physical, a DNA or retinal match. Identity is not just about ownership of bank accounts or assets. Our identities are the “chains of our lifetime,” binding our past and future with the now. For example, school grades, a driving record, tax payments, are all part of a chain of behavior entangled with a particular human body. Our identities encompass our relationships with other people and institutions. Our identities vary depending on who is identifying. The tax office probably has little interest in people’s driving records, but may care enormously about the days they spent out of the country.

Corporate identity is even more complex. The transaction “log” of a company could have constant entries – directors joining and leaving, any employee joining or leaving, purchase orders, invoices, payments, approved persons, inspections, annual reports, audit results, even continuous posting of sales and purchase ledgers, etc. If the transactions are authoritative enough, possibly co-stamped by corporate identity validators (e.g., the DueDil use case in InterChainZ), then perhaps dynamic credit or lending application might arise.

MDL technology and related applications could transform the way we manage digital identity (ID), personal information and history. An ID scheme relying on decentralized MDLs combining a public ledger of records with an adequate level of privacy could rival state-backed identity systems. A number of digital ID schemes are emerging, including OpenID Connect, a protocol combining an identity layer and an authorization server, which allows clients of all types (e.g., developers) to request and receive information about authenticated session and end users across websites and apps without having to own or manage

password files. Governments too are trying to set up digital ID systems and authentication processes. The U.K., for example, unveiled Gov.UK Verify in September 2014, a proposed public services identity assurance program that might use a network of trusted and vetted third-party providers instead of relying on a centralized database. Estonia has been operating a national digital ID scheme for a decade and is extending application to foreign nonresidents, which would in effect separate state-backed ID from location. Estonia claims that much of its architecture is comparable to the MDL approach.

The Peruvian economist, Hernando de Soto, points to the importance of widespread economic participation for prosperity and stability, and argues that inclusion starts with participation in an information framework that records ownership of property and other economic information. Once there is strong identity, then there is much stronger lending. The developing world is already a place to look for identity innovation. One such example emerges from Unique Identification Authority of India, which everyone in the identity world is watching as probably the largest identity project ever.

Creating a trusted and widespread digital ID system could be technically rather straightforward but socially difficult. Public Key Infrastructure (PKI) and digital certificates were all the rage in the 1990s. Many issues, not least commercial confusion, impeded public understanding. While PKI and digital certificates are functional, widespread use has evaded them, though they have niche applications, often in financial services. Social media networks are trying to make their accounts a form of ID though these generally fail to meet basic trust requirements as most are issued without verification.

It is probably not too much to assert that establishing an efficient identity system is the core global development challenge for MDLs. For the developing world, identity is fundamental to getting onto the ledger in the first place. For the developed world, efficient identity systems are fundamental to efficient financial and trading systems.

5.2 Data non-ownership

The persistence and pervasiveness of distributed ledgers make them ideal for providing a lifetime record. There is a swarm of trial applications being discussed, putting assets onto MDLs –

land and property, vehicles, ships, satellites, business ownership/incorporation/dissolution records, regulatory records, tax returns, building and other types of permits, court records, government/listed companies/civil society accounts and annual reports, etc. A swarm of other applications are putting data onto MDLs – contracts, passports and IDs, birth or death certificates, signatures, criminal records, high school/university degrees, professional qualifications, certifications, human resources records, medical records, accounting records, business transaction records, locational data, delivery records, health and safety inspections, genome and DNA, genealogy trees, etc.

An MDL identity scheme could take the form of an application hosted using identity validators (i.e., predetermined experts authenticating documents or information submitted) and identity brokers allowed to cross-reference information securely with other data sources (including governmental ones). The application could enable additional functions including personal data storage, authorized access frameworks for external providers or even reputation ratings. Combining authentication and personal data management functionalities with secure MDLs could lead to new frameworks for identity management. If successful, such identity schemes could remove government monopolies in managing their citizens' identities and data.

At a time where access and control over one's own data are becoming increasingly sensitive, empowering individuals to store, update and manage access to their data seems rather appealing. In InterChainZ, the identity validator is a "co-stamper" of data onto a personal or corporate MDL. The owner of the MDL can include what they like, but if they wish to get other people to accept the data's validity, it needs co-stamping. An identity validator might be a government, an accounting firm or a credit referencing agency.

A simple example might be that an accountancy firm needs to co-stamp the inclusion of an annual report on a corporate identity MDL before other parties would normally accept it. Another example might be that people go to an identity validator to encode biometrics, e.g., DNA, retinal scan, photo, facial scan, finger vein identification, thus time-stamping physical identity. Validators have no further access to the data. However, "the validated" can share the key to their identity MDL with other people and organizations. Others rely upon the fact that the data

has been co-stamped by a trusted third party.

InterChainZ provided only a single-level categorization, “entry type,” e.g., company accounts or health data. A robust system would need a much richer taxonomy, ideally one that could evolve. For an individual, this could be many layered, e.g.:

- ▶ Health: dental, physical, mental, exercise, emergency conditions and treatment records
- ▶ Insurance: home and contents, life, travel, etc.
- ▶ Driving record

The complexity is obvious if MDLs are going to be used at the individual and corporate levels for widespread use.

MDLs raise an interesting prospect that data may not be “owned” in future. Data might be pervasive, persistent and permanent, yet inaccessible to most, or with the loss of a key inaccessible forever. An identity MDL might have a firm “co-stamping” identity information, yet not having any record or future access. This has attractions for some applications and confidence that data is only accessible by the owner could be important. However, at the same time an MDL runs over traditional concepts of data ownership, such as where is the data. A strict answer to “who is taking care of my data?” on an MDL is difficult. To be fair, many cloud applications have the same problem. An MDL could both help or hinder new data protection requirements such as a “right to be forgotten.” Current EU regulations might make it difficult to structure MDLs in such a way that the data is not stored outside the E.U., though it may not be accessible outside the E.U. unless an E.U. individual provides their key.

5.3 10 billion and trillions selling it to the machine

Two inexorable trends increase the tensions in identity, globalization and population. In a globalized world approaching 10 billion people, transactional affordability is crucial to success. A few high-net-worth individuals may justify implementing a complex and costly identity scheme, but the promoters of expensive schemes would be pushing billions of potential customers to the side.

The increase in connectivity – seven billion phones for seven billion people, and internet-of-things devices estimated by Cisco to hit fifty billion by 2020 – will increase the number of

Box 3: IBM-Samsung

“IBM has unveiled its proof of concept for ADEPT, a system developed in partnership with Samsung that uses elements of bitcoin’s underlying design to build a distributed network of devices – a decentralized Internet of Things.

The ADEPT concept, or Autonomous Decentralized Peer-to-Peer Telemetry, taps blockchains to provide the backbone of the system, utilizing a mix of proof-of-work and proof-of-stake to secure transactions.

IBM and Samsung chose three protocols – BitTorrent (file sharing), Ethereum (smart contracts) and TeleHash (peer-to-peer messaging) – to underpin the ADEPT concept. ADEPT was formally unveiled at CES 2015 in Las Vegas.” [Higgins (2015)]

transactions severalfold. Further, global population estimates for 2050 circle around the 10 billion mark. The identity problems increase severalfold. Visa and MasterCard already process 10 transactions globally per person per annum, and they are just one type of international provider. If global payments over the decade come to resemble the U.S. today, with several hundred million online payments per day, we are well onto “tera-transactions-per-day” measures in the next decade.

Transactional affordability will drive a “many uses” approach to get the most out of an expensive process. Both high-net-worth and low-net-worth customers expect global identity, whether it is credit card authorization, payments or health records. Their demands will get stronger as they realize what can be achieved, rather than what has historically been put upon them. They will exclude service providers with onerous identity rituals such as KYC/AML. “Many uses” will in turn drive consolidation toward a few, competitive, global systems.

Leaving aside some interesting by-waters, such as a discussion of a technological singularity or techno-rapture (i.e., when artificial intelligence permits the machines to take charge), one interesting anecdote came up during InterChainZ. There was a discussion with a U.S. insurer about how to insure emerging electricity

company products. This insurer had been approached by U.S. energy companies about some of their new services, in particular, services that might offer lower electricity charges if consumers allowed the energy company to switch appliances off and on when needed for load reduction or load balancing. In the U.S., one large area for claims is the loss of freezer contents. The insurer realized that it could share data with the energy company so that, assuming two identical freezer units with different content values, a lower content value freezer would be turned off in preference to a high content value freezer.

Further, the insurer realized that someone coming home to a melted freezer might have three options: (a) claim on their domestic insurance, (b) claim from their electricity provider, and in turn indirectly on their commercial insurance, (c) make a fraudulent claim on their electricity provider. In each case, the complexity of proving the chain of commands to the freezer almost mandates an external, “unowned” MDL as a reliable source of records to make claims efficient and remove fraud.

Autonomous machinery will create enormous markets humans never see. To ensure appropriate management, including liability management, MDLs might be a core technology.

5.4 The Temple & the Souk

At a conference in Germany in 1997, Eric Steven Raymond described the struggle between top-down and bottom-up software design [Raymond (1999)]. He contrasted “happy networked hordes of programmer/anarchists [the bazaar] outcompeting and overwhelming the hierarchical world of conventional closed software [the cathedral].”

So what does the future hold for ledgers? It might be the “temple of financial services” against the “souk of the sharing economies.” In the temple, the high priests of the blockchain maximalists and the banking traditionalists wage a schismatic war over “the one true coin.” The banking traditionalists believe that these MDL fads too soon shall pass, leaving traditional banking intact. The blockchain maximalists, and adherents to some of the other blockchain services, believe that everything in financial services can be replaced. Each believes that only one ledger can prevail, or from the film *Highlander*, “there can be only one!”

Out in the souk of sharing economies, there is an explosion of vibrant stalls and frenzied groups of small shopkeepers engaged in animated discussions with clients about a myriad of ways of trading. Shopkeepers and clients are prototyping, experimenting and finally deploying hundreds to thousands of different distributed ledgers. These ledgers are often in the corners of wholesale finance, insurance-linked securities, OTC trading, registries or small exchanges. These small communities typically use private, permissioned, identity-authorized ledgers. Meanwhile, governments try to make taxing the church or the market less slippery, with some governments, such as the Channel Islands, exploring how to evaluate sensibly the hundreds of ledgers that may be brought to them for regulation.

While underdog supporters may root for the souk of sharing economies, there may be room for both. A sensible union would be a few, competing, “blockchain-type” services encircling the globe providing end-of-day validation and recording of transactions, while thousands of MDLs do the busy work of serving thousands of shared economies. In order to provide additional trust, the souks publish a hash of their MDL for additional proof of non-tampering, perhaps storing a daily or hourly hash in Bitcoin's blockchain, Ethereum or another high-trust, permissionless, token-earned MDL. In effect, the merchants of the souk bring their ledgers up to the temple to be validated and timestamped by whichever priests occupy the temple of financial services. It may not be orthodoxy, but it is not heresy either.

5.5 Karmic vertigo, sorcerers' apprentices, and evolution

In many ways, it is appropriate that InterChainZ is a Long Finance project. Long Finance asks, “When would we know our financial system is working?” The pervasive, persistent and permanent nature of MDLs means trying to design data structures that might have to last centuries. There is a parallel from 1999.

The Y2K problem (or millennium bug) began in the 60s, 70s and early 80s (sic – two digits) when computer programmers were chronically short of memory, disk space and processor speed. The differences between that period and today were large. The authors began programming in the mid-70s with a luxurious 4 kilobytes of memory on isolated laboratory mini-computers and are writing this article with gigabytes on networked PCs at home. Programmers were told that systems were being built for a finite period of time and, therefore, used a common trick of only

recording two digits for an annual date, which saved significant space on large files. Computations on those files depended on two digits being interpreted as “1900+ two digits” and often resorted to further efficiency tricks such as using 98 or 99 as special triggers or adding extra months and days that don’t exist. For instance, 98 might mean end of record and 99 end of file. Clearly, problems arose when the real 1998 or 1999 came along. The Y2K problem had an extra zing that 2000 was a leap year and that many programmers mistakenly thought it wasn’t (leap year in every year divisible by four, except when divisible by 100 unless divisible by 400).

A natural human response in such situations is to ask how this could possibly come about and who is at fault before getting on to what can be done about it. A first port of call is the programmers, clearly they built the systems using shortcuts that would not stand the test of time and now they have the audacity to charge for fixing it. However, these systems were almost always built for a finite period of time. In the 70s, this time period could be as short as two or three years or possibly as long as five or seven years before “we buy a software package,” “we move to a fully relational database,” or “we upgrade all our systems.” A next port of call is the accountants who left these systems off the books when they were key business assets, or failed to fund the asset maintenance costs that should have existed. However, accountants had, and have, great trouble getting sensible lifetimes and valuations for computer-based systems. In the event, and at some expense, these systems were successfully upgraded, but the lesson is that discounting the future too rapidly led to modest medium-term gains and long-term costs.

Virtual realist Jaron Lanier applies the idea of “karmic vertigo” to computer code: “The computer code we are offhandedly writing today could become the deeply embedded standards for centuries to come. Any programmer or system designer who takes that realization on and feels the full karmic burden, gets vertigo.” Stewart Brand (1999) provides some perspective: “The karmic view of the future can be as distorting as the discounted view. Instead of the reduced responsibility of discounting, karma can impose crushing responsibility, paralyzing to contemplate.”

MDLs create a big tension – how to build 100 years pervasive, persistent and permanent data structures and protocols that

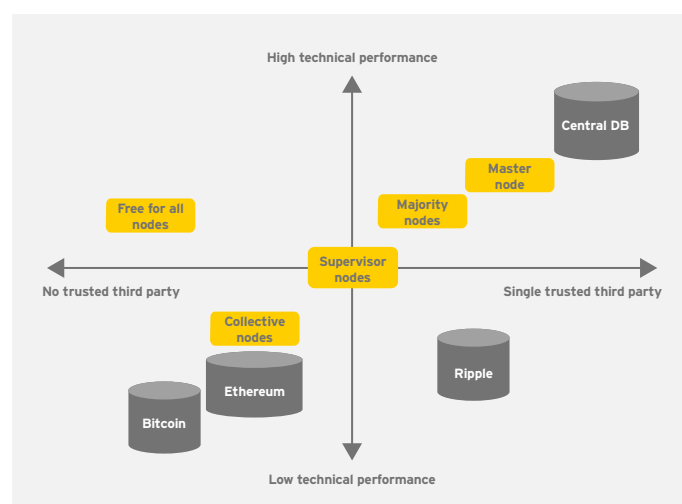


Figure 10: Low-trust architectures have significant performance costs

can evolve. Similar problems have arisen with Hypertext Transfer Protocol (http), with ICANN, and with Bitcoin itself, which in a “sign of the times” is fighting an internal battle to change its protocol to handle a wider range of transactions more swiftly. This short-long, need-for-evolution tension is a big point in favor of semi-centralized solutions such as permissioned ledgers. With a trusted third party and a governance structure, there is some ability to assure the permanence of records, while also being able to update and change entities.

MDLs are sorcerers’ apprentices. Once they have been set off, they are hard to rein back or change. For this reason, most people involved with InterChainZ believe that dumb contracts will be the most complicated thing done for some time. While smart contracts are certainly possible, they are not probable, principally because people are unlikely to believe that such contracts can always be safely executed at some point in the future. Interestingly, a full smart contract MDL is “Turing-complete,” i.e., can solve any computing problem, or very close to Turing-complete. A Turing-complete MDL could be a giant petri dish to every form computer virus or malware. Proving that a Turing-complete MDL is designed to achieve only its specified objectives is nontrivial. Thus, dumb likely precedes smart by some years.

5.6 Trust \approx efficiency

Bitcoin and Ethereum's ability to function in environments of low, zero, or even negative trust, attract attention, even envy. However, overcoming the lack of trust in those environments has a high technical performance penalty. If a "circle of trust" can be established, then transactions within such an environment have a performance advantage. This line of thinking has long been economically interesting (Coase and his followers). Figure 8 (page 50) attempts to place various types of technical approaches on a scale ranging from "no trust" to a single, central trusted third party.

Concepts of trust arise in many philosophical puzzles that range from Epimenides the Cretan's paradox of "all Cretans are liars" through to Kurt Gödel's Incompleteness Theorem. A paraphrase of Gödel's Incompleteness Theorem applied to trust might read, "We can never find an all-encompassing axiomatic system of trust, without recourse to systems outside it." It seems appropriate to conclude this report on MDLs with Long Finance's Zen koan – "If you have some trust, I shall give you trust. If you have no trust, I shall take it away."

Bibliography

- Acord & Equinix, 2014**, "Challenge to change part 1 – embracing the economy, people and the future of insurance," industry report, Equinix, 1-17
- Acord & Equinix, 2014b**, "Challenge to change part 2 – the impact of technology," industry report, Equinix, 1-18
- Acord & Equinix, 2014c**, "Challenge to change part 3 – the future of insurance," industry report, Equinix, 1-19
- Adams, J., 1995**, Risk, Psychology Press
- Allaire, J., 2014**, "Thoughts on the New York BitLicense proposal," Circle, 13 August (accessed 14 November, 2014)
- Andersen, G., 2015**, "A scalability roadmap," Bitcoin Foundation (Blog), 6 October (last accessed 29 September, 2015)
- Andreesen, M., 2014**, "Why Bitcoin matters," DealBook, The New York Times, 21 January, (last accessed 29 September, 2015)
- Antonopoulos, A. M., 2014**, Mastering Bitcoin, O'Reilly Media Inc.
- Aron, J., 2014**, "Bitcoin: how its core technology will change the world," New Scientist, February
- Back, A., M. Corallo, L. Dashjr, M. Friedenbach, G. Maxwell, A. Miller, A. Poelstra, J. Timón, and Pieter Wuille, 2014**, "Enabling Blockchain innovations with pegged sidechains," white paper, Blockstream, 1-25
- Bank of England, 2014**, "Quarterly bulletin," Q3.
- Bank of England, 2015**, "Bank of England research agenda," discussion paper, February
- Baranoff, E., P. L. Brockett, and Y. Kahane, 2014**, "1.3 attitudes towards risk," in Baranoff, E., P. L. Brockett, and Y. Kahane (eds.), Risk management for enterprises and individuals v 1.0, Flat World Education
- Bazdarevic, N., 2014**, "Notre sphère privée est morte: entretien avec Alexis Roussel," InvestNews, September, 20-22
- Benedict, K., and P. Abatan, 2014**, "Insurance disrupted – crowdsourced policies and social marketing," Cloud Computing Journal, 19 May
- Birch, D. G. W., 2015**, "What does cryptocurrency mean for the new economy," In handbook of digital currency, Academic Press
- Bitcoin Project, 2015**, "How does Bitcoin work?" Bitcoin Project, (last accessed 29 September, 2015)
- Bitcoin Wiki, 2015**, "Scalability," Bitcoin Wiki (last accessed 29 September, 2015)
- Blockchain Info, 2015**, "Size of the Bitcoin blockchain," Blockchain Info. (last accessed 29 September, 2015)
- Cooper, M., 2010**, "In search of the eternal coin: a long finance view of history," Long Finance, March, 1-30
- Bollen, R., 2013**, "The legal status of online currencies: are Bitcoins the future?" Journal of Banking and Finance Law and Practice 24:4, 272-293
- Brand, S., 1999**, The clock of the long now: time and responsibility, Basic Books
- Brown, R. G., 2014b**, "Cryptocurrency products and services will determine adoption of the currency – not the other way around," Richard Gendal Brown – thoughts on the future of finance, Blog, 5 October
- Brown, R. G., 2014c**, "The latest in cryptocurrencies," presentation at the Financial Services Club, 6 October
- Brown, R. G., 2014c**, "A simple model to make sense of the proliferation of distributed ledger, smart contract and cryptocurrency projects," 19 December – <http://gendal.me/2014/12/19/a-simple-model-to-make-sense-of-the-proliferation-of-distributed-ledger-smart-contract-and-cryptocurrency-projects/>
- Bruce, J. D., 2014**, "The mini-blockchain scheme," www.cryptonite.info
- BTC Guild, 2013**, "BTC's Guild's mitigation plan," Bitcoin Forum, 5 April (last accessed 29 September, 2015)
- Buterin, V., 2014**, "A next generation smart contract and decentralized application platform," white paper, Ethereum, Ethereum
- Buterin, V., 2013**, "What proof of stake is and why it matters," Bitcoin Magazine, 26 August

- Coinbase, 2014**, "Comments on proposed rulemaking regarding regulation of the conduct of virtual currency businesses – DFS-29-14-00015-P," San Francisco: Coinbase, 28 August
- De Filippi, P., 2014a**, "Legal framework for crypto-ledger transactions,"
- De Filippi, P., 2014b**, "Tomorrow's app will come from brilliant (and risky) Bitcoin code," *Wired*, March
- De Filippi, P., and R. Mauro, 2014**, "Ethereum: the decentralised platform that might displace today's institutions," *Internet Policy Review* (Alexandre von Humboldt Institute for Internet and Society), August
- Digital ID and Authentication Council of Canada, 2015**, "Building Canada's digital future," 6 May
- Downey, P., 2015**, "Registers: authoritative lists you can trust," *Government Digital Service Blog*, 1 September
- El Monayery, R., 2013**, "Insurance awareness," *The Macrotheme Review* 2:7, 147-155
- European Union (Parliament and Council), 2009**, "Directive 2009/20/EC on the insurance of shipowners for maritime claims," 23 April
- Faggart, E., "Bitcoin mining centralization: the market is fixing itself," Coin Brief, 18 June (last accessed 29 September, 2015)**
- Fargo, S., 2014**, "Falling Bitcoin price is the perfect storm for centralization of Bitcoin mining," *CCN*, 23 September (last accessed 29 September, 2015)
- FATF, 2014**, "Virtual currencies: key definitions and potential AML/CFT risks," Financial Action Task Force, June
- Franklin, B., 2012a**, "Future risk: how technology could make or break our world," Industry report, The Chartered Insurance Institute, 1-40
- Franklin, B., 2012b**, "Future Risk: insuring for a stronger world," Industry report, The Chartered Insurance Institute, 1-32
- GHash.IO., 2014**, "Bitcoin mining pool GHash.IO is preventing accumulation of 51% of all hashing power," *GHash.IO*. (last accessed 29 September, 2015)
- GitHub., 2014**, "Blockchain based proof of work," *GitHub*, March (last accessed 29 September, 2015)
- Gittleson, K., 2013**, "How big data is changing the cost of insurance," *BBC news*, 15 November
- Glick, B., 2014**, "GDS unveils 'Gov.UK Verify' public services identity assurance scheme," *ComputerWeekly*, 16 September (last accessed 29 September, 2015)
- Goldman, Sachs & Co., 2014**, "All about Bitcoin," *Top of Mind*, 11 March, 1-25
- Government of Jersey, 2015a**, "Views sought on virtual currency regulation," 8 July
- Government of Jersey, 2015b**, "Consultation on regulation of virtual currency," 9 July
- Grigorik, I., 2014**, "Minimum viable block chain," *Igvita*, 5 May (last accessed 29 September, 2015)
- Hajdarbegovic, N., 2014**, "IBM sees role for block chain in internet of things," *CoinDesk*, 10 September (last accessed 29 September, 2015)
- Hanson, H., K. Rajamani, J. Rubio, S. Ghiasi and F. Rawson, 2006**, "Benchmarking for power and performance," IBM Austin Research Lab, The University of Texas at Austin
- Higgins, S., 2015**, "IBM reveals proof of concept for blockchain-powered internet of things," *CoinDesk*, 17 January – <http://www.coindesk.com/ibm-reveals-proof-concept-blockchain-powered-internet-things/>
- Hope, B., and M. J. Casey, 2015**, "A Bitcoin technology gets Nasdaq test," *Wall Street Journal*, 10 May
- Houses of Parliament, 2014**, "Alternative currencies," *PostNote*, Parliamentary Office of Science & Technology, August
- IBM, 2013**, "Analytics: the real-world use of big data in insurance," industry report, IBM
- ID3, 2014**, "21 top Bitcoin and digital currency companies endorse new digital framework for digital identity, trust and open data," press release, 20 October
- International Business Times, 2015**, "Bank of England: Central banks looking at 'hybrid systems' using Bitcoin's blockchain technology," July 16
- Irrera A., 2014**, "UBS CIO: Blockchain technology can massively simplify banking," *Wall Street Journal Digits*, 27 October
- Jelf, O., and S. Seibold, 2015**, "Blockchain in the corporate environment has big potential, but faces implementation challenges," *Wall Street Journal CIO Report*, 27 July
- Kaminska, I., 2013**, "The problem with Bitcoin," *FT Alphaville*, 3 March
- Kaminska, I., 2015**, "On the potential of closed systems blockchains," *FT Alphaville*, 19 March
- Kaminsky, D., 2013**, "Let's cut through the Bitcoin hype: a hacker-entrepreneur's take," *Wired*, 3 May
- Knight, C., and A. Butler, 2004**, *Civilization one: the world is not as you thought it was*, Watkins Publishing
- Lake, P., and P. Crowther, 2013**, "A history of databases," in *Concise guide to databases: a practical introduction*, Chapter 2, Springer-Verlag
- Light, D., 2014**, "The internet of things and property/casualty insurance," industry report, *Celent*, 1-18
- Live Work Studio, "Insurance: nobody wants a claim," Live Work Studio (last accessed 29 September, 2015)**
- Mainelli, M., 2004**, "Personalities of risk/rewards: human factors of risk/reward and culture," *Journal of Financial Regulation and Compliance* 12:4, 340-350
- Mainelli, M., 2014**, "Infectious transactions from travels abroad," *IGTB*, June
- Mainelli, M., 2015a**, "The Temple & The Souk – the future of mutual distributed ledgers," *IGTB*, July
- Mainelli, M., 2015b**, "Stranger danger: how to unblock KYC and AML in banks," *IGTB*, August
- Mainelli, M., 2015c**, "Unblock the shared economy," *Duke Dialogue*, Lid Publishing, September
- Mainelli, M., and B. McDowall, 2014**, "Building bit – what's a poor government to do about AltCoins," *Banking Technology*, April, 30-33
- Mainelli, M., S. Rochford and C. von Gunten, 2011**, "Capacity, trade and credit: emerging architectures for money and commerce," report prepared by Z/Yen Group for the City of London Corporation, ESRC and Recipco, December
- McAleese, M., 2010**, President of Ireland, Remarks to the European Insurance Forum, RDS Concert Hall, Dublin, 30 March
- McKinnon, D., C. Kulman, and P. Byrne, 2014**, "Eris – the dawn of distributed autonomous organizations and the future of governance," *Humanity + Magazine*, 17 June
- McKinsey, 2011**, "Big data: the next frontier for innovation, competition and productivity," industry report, McKinsey Global Institute, 1-156
- McMillan, R., 2014**, "Hacker dreams up crypto passport using the tech behind Bitcoin," *Wired*, 30 October
- Meetup, 2015**, "Bitcoin meetup groups," September (last accessed 29 September, 2015).
- Mouqayar, W., 2015**, "The 3Ps of the blockchain: platforms, programs and protocols," 21 January – <http://radar.oreilly.com/2015/01/the-3ps-of-the-blockchain-platforms-programs-and-protocols.html>
- Nakamoto, S., 2009**, "Bitcoin: a peer-to-peer electronic cash system," White paper, 1-9
- NewsBTC, 2015**, "Deloitte report on central bank owned cryptocurrency," 12 July
- New York State Department of Financial Services, 2015**, "NYDFS announces approval of first bitlicense application from a virtual currency firm," 22 September (last accessed 29 September, 2015)
- New York State, Department of Financial Services, "Proposed New York codes, rules and regulations, Title 23. Department of Financial Services Chapter I. Regulations of The Superintendent of Financial Services Part 200. Virtual currencies," (last accessed 5 October 2015)**

- Nielsen, M., 2013**, "How the Bitcoin protocol actually works," Data-driven intelligence, 6 December (last accessed 29 September, 2015)
- OECD, 2006**, "The importance of financial education," Policy Brief, OECD, 1-6
- Palmer, D., 2014**, "Insurance industry 'behind' on harnessing big data," Computing News, 18 August
- Polemitis, A., 2014**, "Bitcoin series 24: the mega-master blockchain list," Ledra Capital, 11 March (last accessed 29 September, 2015)
- Prensky, M., 2001**, "Digital natives, digital immigrants," On the Horizon, MCB University Press, Volume 9, No 5. October
- PwC, 2014a**, "Stand out for the right reasons: how financial services lost its mojo and how it can get it back," industry report, PricewaterhouseCoopers LLP, 1-16.
- PwC, 2014b**, "Top issues: the insurance industry in 2014," industry report, PricewaterhouseCoopers LLP, 1-44
- Raymond, E. S., 1999**, The cathedral and the bazaar: musings on Linux and open source by an accidental revolutionary, O'Reilly Media
- Reitman, R., 2014**, "Beware the BitLicense: New York's virtual currency regulations invade privacy and hamper innovation," Electronic Frontier Foundation, 15 October (last accessed 29 September, 2015)
- Rosenfeld, M., 2012**, "Overview of colored coins," 4 December (last accessed 29 September, 2015)
- Schwartz, D., N. Youngs, and A. Britto, 2014**, "The Ripple protocol consensus algorithm," white paper, Ripple Labs Inc., 1-8
- Scott, B., 2014**, "Visions of a Techno-Leviathan: the politics of the Bitcoin blockchain," E-International Relations, 1 June
- Simon, G., 2000**, "Insurance: risk sharing," Presentation at the Stern School, New York University, 5 March
- Skinner, C., 2014**, "There is no next big thing... get over it," Financial Services Club Blog, 25 September
- Spencer, R., 2013**, "General insurance in the twenty-first century: meeting the challenges," CII Thinkpiece, May, 1-4
- Sporny, M., 2015**, "An introduction to credentials on the web (video)," YouTube.com, February
- States of Jersey, 2015**, "Consultation – regulation of virtual currency," part 7: distributed ledger technology standard," July – <http://www.gov.je/SiteCollectionDocuments/Government%20and%20administration/C%20Regulation%20of%20Virtual%20Currency%20Final%20Consultation%20Paper%2020150708%20GP.pdf>
- Swan, M., 2014a**, "Blockchain health – remunerative health data commons and HealthCoin RFPs," Institute for Ethics and Emerging Technologies, blog, 29 September
- Swan, M., 2014b**, "Blockchain: the information technology of the future," compiled by Bitcoin meetup, 1 October
- Swan, M., 2014c**, "Decentralised money: Bitcoin 1.0, 2.0, and 3.0," Institute for Ethics & Emerging Technologies, 11 November (last accessed September 29, 2015)
- Swanson, T., 2015**, "Consensus-as-a-service: a brief report on the emergence of permissioned, distributed ledger systems," 6 April
- Szabo, N., 1996**, "Smart contracts: building blocks for digital markets," Extropy, no. 16
- The Economist, 2014**, "Estonia takes the plunge: a national identity scheme goes global," The Economist, 28 June
- The Telegraph, 2014**, "Bitcoin exchange MtGox 'faced 150,000 hack attacks every second'," The Telegraph, 9 March
- Vasin, P., 2014**, BlackCoin's proof-of-stake protocol v2," white paper
- W3C, 2015**, "Identity credentials 1.0," Draft Community Group Report, 5 August
- Warren, J., 2012**, "Bitmessage: a peer-to-peer message authentication and delivery system," white paper, Bitmessage
- Williamson, N., 2015a**, "What is a blockchain?" 12 April – <http://blog.credits.vision/what-is-a-blockchain/>
- Williamson, N., 2015b**, "Permissionless vs permissioned consensus & tradeoffs," 14 April – <http://blog.credits.vision/permissionless-vs-permissioned-consensus/>
- Woo, D., I. Gordon, and V. Iaralov, 2014**, "Bitcoin: a first assessment," Bank of America Merrill Lynch, 1-10
- World Economic Forum, 2014**, "Managing the risks and rewards of big data," The global information technology report 2014: Chapter 1.5, World Economic Forum, 61-66
- Woskow, D., 2014**, "Unlocking the sharing economy: an independent review," UK Department for Business, Innovation and Skills, November
- Z/Yen Group, 2011**, "Capacity, trade and credit: emerging architectures for money and commerce," industry report, Z/Yen Group, London, UK: City of London Corporation, ESRC and Recipco
- Zerocash, 2014**, "How Zerocash works," Zerocash, 2014. (last accessed 29 September, 2015).

Moving mainstream: benchmarking the European alternative finance market¹



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² This benchmarking research was designed, carried out and authored by researchers at the University of Cambridge with support from EY and contributions from alternative finance industry associations.

Abstract

Since the global financial crisis, alternative finance – which includes financial instruments and distributive channels that emerge outside of the traditional financial system – has thrived in the U.S., the U.K. and Continental Europe. In particular, online alternative finance, from equity-based crowdfunding to peer-to-peer (P2P) business lending, and from reward-based crowdfunding to debt-based securities, is supplying credit to SMEs, providing venture capital to start-ups, offering more diverse and transparent ways for consumers to invest or borrow money, fostering innovation, generating jobs and funding worthwhile social causes.

Although a number of studies, including those carried out by the University of Cambridge and its research partners,³ have documented the rise of crowdfunding and P2P lending in the U.K., we actually know very little about the size, growth and diversity of various online platform-based alternative finance markets in key European countries. There is no independent, systematic and reliable research to scientifically benchmark the European alternative finance market, nor to inform policymakers, brief regulators, update the press and educate the public. It is in this context that the University of Cambridge has collaborated with EY and 14 leading national/regional industry associations to collect industry data directly from 255 leading platforms in Europe through a web-based questionnaire, capturing an estimated 85%-90% of the European online alternative finance market. This article presents the results of this study, conducted between October 2014 and January 2015.

³ Zhang, Z., L. Collins, and P. Baeck, 2014, "Understanding alternative finance – the UK alternative finance industry report," Nesta and the University of Cambridge: London; Zhang, Z., L. Collins, and R. Swart, 2013, "The rise of future finance – The UK alternative finance benchmarking report," Nesta, the University of Cambridge and UC Berkeley: London.

1. Introduction: research rationale, objectives and methodology

Although various forms of alternative finance have long existed, a combination of weaker financial institutions having been weakened by the financial crisis, the rise of disruptive disintermediation-enabling technology and underlying socioeconomic and cultural shifts, is challenging the paradigm of how finance will be provisioned in the future.

Several economies and industries, particularly in the U.S., Europe and the emerging markets, are already witnessing the emergence of new alternative financing channels and instruments outside of the traditional banking sector and capital markets. Examples of alternative finance are crowdfunding, P2P lending, third-party payment systems, small and medium enterprise (SME) mini-bonds, private placements and other “shadow banking” mechanisms, social impact bonds, community shares and alternative (virtual) currencies, such as bitcoin. This is the beginning of a broad and long-term structural change; for instance, studies suggest that direct European corporate lending, as a strand of the shadow banking industry, is worth over U.S.\$50 billion,⁴ while the alternative currency industry globally was worth U.S.\$60 billion in 2013.⁵

Within the alternative finance industry, taking a narrower definition, online platform-based alternative financing activities such as donation-, reward- and equity-based crowdfunding, P2P consumer and business lending, invoice trading and debt-based securities are burgeoning in Europe following the global economic downturn. There are now hundreds (if not thousands) of online alternative finance platforms in Europe that are facilitating transactions worth millions of euros every day for individuals and businesses alike. This new brand of innovative, decentralized and potentially disruptive alternative finance is supplying credit to consumers, providing early-stage investments to start-ups and growth capital to SMEs, stimulating regional economies and funding worthwhile causes. Crowdfunding and P2P lending are becoming financial as well as cultural buzzwords of today, capturing the public's imagination and the media's interest, as well as regulators and government attention. With institutional

investors starting to invest and diversify through these online platforms, corporates are beginning to experiment with various forms of crowdfunding and crowdsourcing, and banks themselves are getting involved in P2P or “marketplace” lending; alternative finance is indeed creating ripples and moving into the mainstream.

However, this increasingly important sector is critically understudied and often misunderstood. There is no universally accepted taxonomy in Europe to describe and distinguish between the various forms of alternative financing activity. There is little empirical-based research currently available to estimate the overall size of the European alternative finance market or the year-on-year growth of different market segments. Apart from the previous studies carried out by the University of Cambridge and its research partners (e.g., Nesta and UC Berkeley) in the U.K., no objective, independent and reliable research exists to scientifically benchmark and regularly track the development of key alternative finance markets in respective European countries.

This considerable gap in information and knowledge is unfortunate, particularly as this nascent alternative finance industry is growing swiftly, evolving rapidly and starting to be regulated across many European countries. It is in this context that the University of Cambridge has partnered with EY to carry out a pan-European, scientific and systematic benchmarking research to capture the size and growth of the online platform-based alternative finance market in Europe. This survey-based benchmark research collected aggregate-level market data directly from leading online alternative finance intermediaries via a secure web-based questionnaire. This study will provide a better understanding of this fluid and diverse market and, in turn, inform policymakers and regulators, the media and the general public, as well as update trade associations and key industrial stakeholders about the development and state of the European alternative finance market.

2. A pan-European study with a collaborative research strategy

In terms of research scope, as a pan-European benchmarking study, the research team specifically focused on online alternative finance platforms that are based in Europe and are facilitating funding for European individuals and businesses. Leveraging existing research relationships and extensive industry contacts,

⁴ Allen & Overy, 2014, “Funding European business: what's the alternative?” <http://www.allenoverly.com/SiteCollectionDocuments/Funding-European-Business-Whats-the-alternative.pdf>

⁵ McKee, J., 2013, “Redefining virtual currency,” Yankee Group, http://home.tapjoy.com/info/wp-content/uploads/sites/4/2013/05/RedefiningVirtualCurrency_WhitePaper-1MAY2013-v1.pdf

this benchmarking research aimed to capture 85%-90% of all online platform-based alternative financing transactions in Europe from equity-, reward- and donation-based crowdfunding, P2P consumer and business lending to invoice trading, debt-based securities, micro-financing and community share offerings between 2012 and 2014. In addition, wherever necessary and feasible, the online transactions of some of the international platforms that have significant activity (i.e., with over an estimated €15 million transactions per platform) in Europe were also included in the scope of the benchmarking research.

To meet the research objectives and ensure the consistency, rigor and validity of this pan-European study, the following benchmarking procedures were carried out by researchers based at the University of Cambridge from October 2014 to January 2015.

At the beginning of the benchmarking process, the research team compiled a list of 150 of the most prominent alternative finance platforms (according to estimated transactional volume) that are currently operating in Europe by leveraging publicly available information, existing industrial connections and conducting preliminary market research in key European countries. Through targeting these leading alternative finance platforms, our benchmarking study was able to capture over 85% of all online platform-based alternative financing activities in Europe for the last three years.

Given the scope and scale of this ambitious multi-country study, the benchmarking team adopted a collaborative research strategy to reach out to those leading European online alternative finance platforms. A great effort was made to forge a pan-European research consortium consisting of leading national and regional alternative finance industry associations/organizations, often headed by influential leaders and pioneers in the field. In the end, after intensive rounds of coalition building and partnership forming, the University of Cambridge worked with 14 research partners in Europe on this benchmarking study including: the German Crowdfunding Network, Asociación Española de Crowdfunding, Financement Participatif France (FPF), the Crowdfunding Hub, ANACOFI, Association Française de l'Investissement Participatif (AFIP), P2P Finance Association (P2PFA), the Nordic Crowdfunding Alliance, the European Crowdfunding Network, AISCRIS, the

European Equity Crowdfunding Association (EECA), the U.K. Crowdfunding Association (UKCFA), P2P Banking.com, the Collaborative Economy Center and the exclusive media partner, CrowdfundInsider.

Specifically designed for the European alternative finance market, our short online benchmarking questionnaire was effectively distributed through our national and regional research partners to their members and contacts in their respective European countries. Accompanying the launch of the survey were targeted press and social media outreach activities, with the benchmarking research press release being translated into five European languages (French, German, Dutch, Italian and Spanish) and featuring interviews with key people of each research partner featured on CrowdfundInsider, a popular global media outlet specializing in crowdfunding and P2P lending. To reach other leading online alternative finance platforms not associated with any organizations, or who were not responding to the survey request, members of the research team communicated directly with them by email or telephone, explaining our research objectives and asking for their cooperation individually. In the cases where primary data was not obtainable through the survey, secondary data, such as the platform's public data, annual reports and news articles was utilized to provide the best estimations wherever possible.

3. Data verification, anonymization, aggregation and analysis

In total, our European alternative finance benchmarking survey received 205 survey responses from platforms in 27 European countries. Combined with the 50 survey responses we have already gathered from the U.K. as part of our joint industry research with Nesta,⁶ this survey database represents the most comprehensive and up-to-date source of aggregate-level alternative finance data in Europe.

All individual survey data was then exported into an Excel sheet and methodically cleaned to ensure the consistency of data fields across all alternative finance platforms. Survey entries were then verified individually to identify likely errors or discrepancies. If a

⁶ Of the 205 benchmarking survey responses, 15 were from the U.K.-based online platforms and 190 were gathered from European online alternative finance platforms outside of the U.K. The 15 survey entries from the U.K.-based platforms were then combined with the 50 survey responses captured previously from the joint Nesta-Cambridge industry research to provide an updated dataset for the U.K.

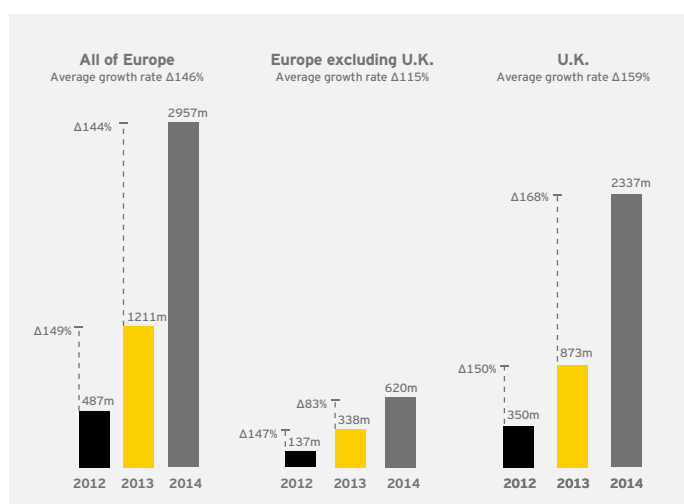


Figure 1: European alternative finance market size and growth rate (2012-14, € millions)

questionable data point was identified, the research team would then first cross-check the platform's website to find out necessary information and follow up with email communication if necessary in order to ascertain figures or correct mistakes. For two platforms that entered the benchmarking survey as alternative finance aggregators, their submitted numbers were broken down and significantly reduced against all the platforms' figures that they represented, and who also participated in the benchmarking survey. For platforms that have hybridized alternative finance models (e.g., facilitating both equity- and debt-based transactions), a detailed breakdown of transactions per model was obtained wherever necessary. For platforms that operate in multiple European countries, again communication was made to acquire accurate breakdowns in various jurisdictions wherever possible. For a number of global reward-based crowdfunding platforms that have facilitated significant transactions in Europe, manual and script-based scraping techniques were employed to gather the estimated volume (2012-14) for each of the 27 surveyed European countries in order to complete the online alternative finance database.

The cleaned and verified database was then fully anonymized by deleting platform-identifying information such as platform names, addresses and contact emails. Anonymized platform datasets were then manually aggregated by country, region (e.g., the

Nordics) and alternative finance models following our working taxonomy (e.g., P2P consumer lending) wherever necessary and possible, before detailed data analysis was carried out.

4. The size and growth of the European alternative finance market

The state of the European online alternative finance market is strong. Between 2012 and 2014, the surveyed 255 platforms in 27 European countries facilitated €4,655 million worth of funding to European consumers, entrepreneurs, creative artists, SMEs, social enterprises, renewable energy projects, community organizations and good causes. The overall European alternative finance market, including the U.K., grew from €487 million in 2012, €1,211 million in 2013 to €2,957 million in 2014, with an impressive average yearly growth rate of 146% (Figure 1).

The U.K., as an innovative leader in alternative finance, dominates the European market with some of the most advanced online platforms and sophisticated alternative finance instruments. Aided by a new, dedicated regulatory regime and a supportive government, the U.K. online platform-based alternative finance industry reached an impressive €2,337 million (£1.78 billion)⁷ in 2014 with a 168% year-on-year growth rate. The U.K. alternative finance sector increased its share of the overall European market from the 72% in 2013 to 79% in 2014.

Outside of the U.K., the alternative finance market is also flourishing, with France, Germany, the Netherlands, Spain and the Nordic countries recording the highest rates of growth. The European online alternative finance market, excluding the U.K., grew by 147% from €137 million in 2012 to €338 million in 2013. In 2014, although the growth rate for the overall market slowed to 83%, the European alternative finance market grew by €282 million to reach €620 million. The three-year average growth rate for the European market is 115%.

As the geographic distribution of surveyed alternative finance platforms illustrates, the online alternative finance markets are well developed in Spain (34), France (33), Germany (31) and the Netherlands (31), all with over 30 platforms surveyed. In addition, Poland (11) and the Nordic countries (13) also have a high number of active alternative finance intermediaries. In total, 190 leading

⁷ As noted in footnote 3

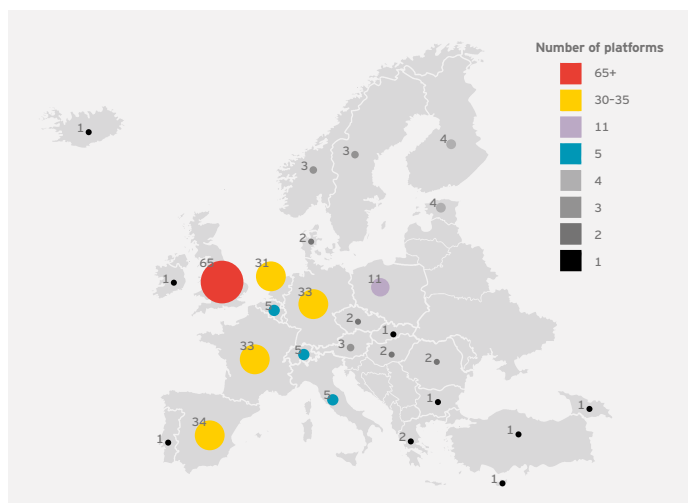


Figure 2: The geographic distribution of surveyed alternative finance platforms in Europe (by country)

platforms were surveyed in Europe outside of the U.K., which had 65 participating platforms in our benchmarking research.

The French online alternative finance market more than trebled from €23 million in 2012 to €76 million in 2013, then doubled again to €154 million in 2014, with an average growth rate of 167% over three years. In Germany, its alternative finance market grew from €31 million in 2012 to €65 million in 2013 and €140 million in 2014, with a very steady three-year average growth rate of 113%. In the Netherlands, the online alternative finance market reached €78 million in 2014 with 70% growth rate from €46 million in 2013; meanwhile, the Spanish market increased by 190% to a record €29 million in 2013 and grew by 114% to achieve €62 million a year later. For the Nordic countries, as a thriving regional block, its alternative finance market almost trebled to €94 million in 2013 from €32 million. Between 2013 and 2014, the Nordic growth rate slowed down to 36% to reach a total of €128 million.

5. The dynamics of the European alternative finance market

Over the last three years, online alternative finance platforms in the U.K. have accumulatively delivered €3,560 million-worth of funding to British individuals and businesses. Besides the U.K., the top five European countries in terms of accumulative alternative finance during 2012-14 are France with €253

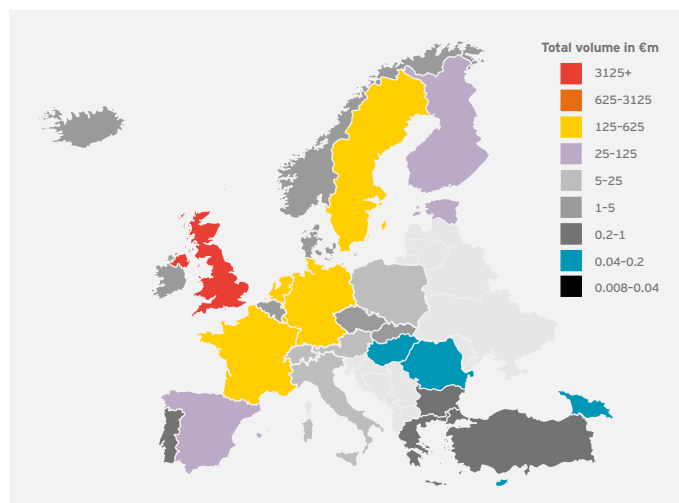


Figure 3: Comparative volume of alternative finance transactions in Europe (2012-14)

million, Germany with €236 million, Sweden with €207 million, the Netherlands with €155 million and Spain with €101 million. Collectively, these countries posted €952 million in alternative financing in the last three years, which is about 6.7 times more than the combined total volume of the rest of the 21 European countries added together (€142.21 million).

The concentration and uneven development of the European alternative finance market is also evident when comparing individual country transactional volume in 2014 alone. The order of the top six countries remains unchanged with the U.K., France, Germany, Sweden, the Netherlands and Spain in the lead group. Nevertheless, going down the ranking, Estonia (€22 million) overtook Finland (€17 million), while the Czech Republic and Slovakia leapfrogged Norway with €2 million and €1 million in 2014, respectively.

However, when we derived comparative volume of alternative finance transactions in 2014 by country per capita,⁸ the dynamics of the European markets altered notably. For instance,

⁸ The population estimations for each surveyed European country were obtained from http://en.wikipedia.org/wiki/List_of_European_countries_by_population, which sourced population statistics from yearly or monthly official estimates or the most recent census information. (accessed on 29 January 2015)

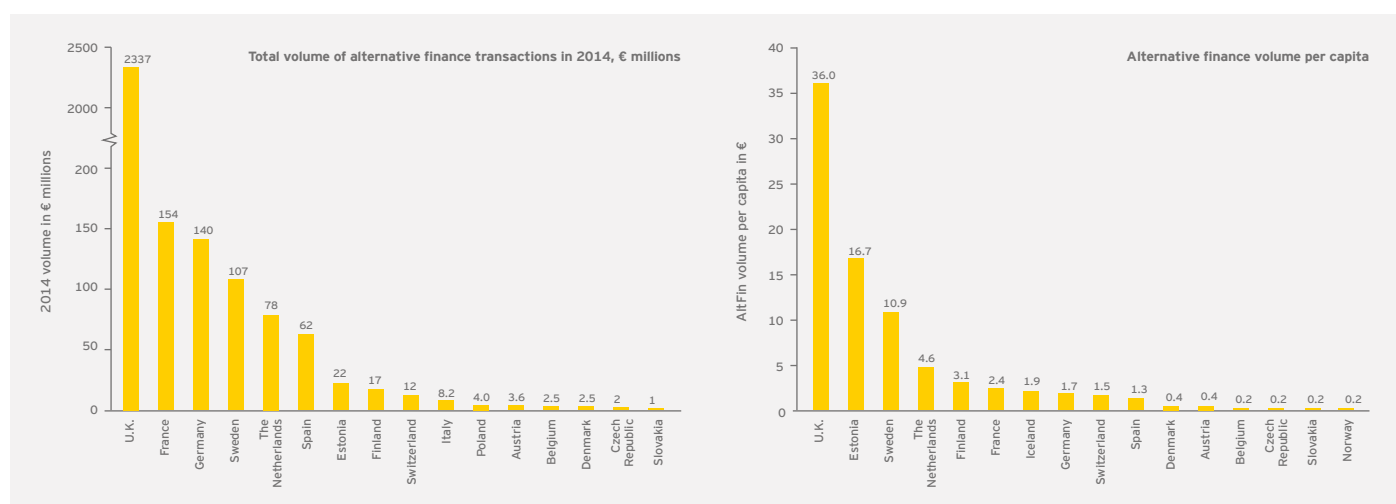


Figure 4: Comparative volumes of alternative finance transactions in 2014 (top 16 countries) - by country and per capita

Estonia, with a small population of just over 1.3 million, had an alternative finance volume per capita of €16.73 in 2014, putting it in second place behind the U.K. (€36 per capita). Sweden, with alternative finance volume per capita of €10.91, overtook France (€2.39 per capita) and Germany (€1.72 per capita) to rank third. Finland (€2.39 per capita), Iceland (€1.87) and Denmark (€0.44) all improved their comparative European ranking and highlighted the competitive edge of the Nordic countries in alternative finance. Notably, Central and Eastern European countries, such as the Czech Republic, Slovakia and Bulgaria also improved their comparative rankings in regard to alternative finance volume per capita in 2014. Italy, with €8.16 million total online alternative finance in 2014, slipped from the top 10 to rank 17th when it comes to per capita comparison. Spain, with a relatively large population of more than 46 million, also moved down the per capita ranking, with its neighboring country Portugal's comparative position remaining largely unchanged around 20th place.

6. The diversity of the European alternative finance market

This European benchmarking research largely utilizes the working taxonomy, which has been constructed and trialed in defining and

segmenting the U.K. alternative finance market from previous studies⁹ carried out by the University of Cambridge and its research partners. Following this taxonomy, it is encouraging to see that outside of the U.K., the European online alternative finance market has achieved strong and diversified growth across a wide array of models.

P2P consumer lending, whereby individual borrowers acquire mostly unsecured personal loans from a number of other individual lenders (often lending a small amount each) through an online “marketplace,” is the biggest segment in the European alternative finance market excluding the U.K. With an average growth rate of 113% in the last three years, the European P2P consumer lending market has developed rapidly from €62.52 million in 2012 to €157.14 million in 2013 and €274.62 million in 2014. This model of alternative finance offers access to comparatively low-cost consumer credit for borrowers (often with prime credit ratings) and competitive interest rates (in contrast to bank savings) to lenders and often has the benefit of combining

⁹ For P2P lending, the market is further segmented into P2P consumer lending and P2P business lending to reflect their distinctive funding mechanisms and financing purposes. There were no visible transactional activities recorded for revenue or profit sharing crowdfunding in Europe during 2013-14. All hybridized crowdfunding transactions on surveyed platforms were broken down and added into the total volume of other forms of categorized alternative finance models.

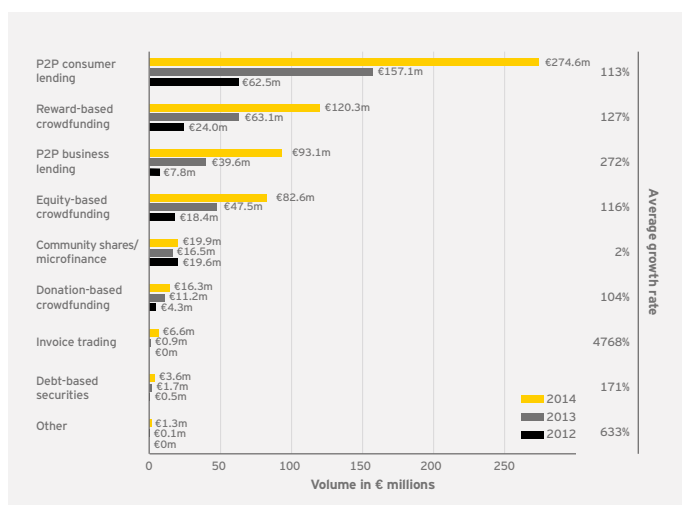


Figure 5: Alternative finance models in Europe (excluding the U.K.) volume in € millions and average growth rates (2012-14)

efficiency, speed and a relatively low-risk profile. The P2P consumer lending market is particularly strong in France and Germany, both with about €80 million in 2014, as well as in Nordic countries.

Reward-based crowdfunding, which, for many people, is synonymous with crowdfunding and online fundraising, has certainly captured the public's imagination and media attention in recent years across Europe. With €120.33 million raised in 2014 and €63.18 million recorded in 2013, reward-based crowdfunding is the second-largest sector within the European online alternative finance market (excluding the U.K.) with 127% average growth rate over the last three years.¹⁰ From aspiring entrepreneurs, creative artists, to high-tech firms, SMEs and even multinational corporations, individuals and businesses can

¹⁰ For reward-based crowdfunding, in addition to the survey data provided directly by alternative finance platforms, the research team also used both manual and script-based scraping techniques to estimate and calculate the size of the market for each European country surveyed. Wherever possible, most funded reward-based crowdfunding projects (typically all projects with more than U.S.\$1,000 total funding and funded between January 2012 and 6 January 2015) were manually scrapped from two well-known global crowdfunding platforms. The manually scrapped database was then cross-referenced with the data obtained through script-based scraping methods to achieve better estimations. The verified data was then added to the country's total volume in reward-based crowdfunding. For the number of ventures funded through reward-based crowdfunding, only results obtained from script-based scraping method were added to the total. 10% of those total ventures were then taken as an estimation for the number of start-ups and SMEs funded through reward-based crowdfunding.

leverage this model to acquire early-stage investments, presell products, obtain market validation and social proof, crowdsource creative ideas, engage customers, forge partnerships and build communities. In Spain, reward-based crowdfunding is the biggest online alternative finance sector with €35.1 million in the last year. This model is also well developed in France and Germany with €35.42 million and €29.82 million in 2014, respectively. Although it is a "classic" alternative finance model with its origin in Europe, reward-based crowdfunding has been spreading around the world and many global platforms now operate in multiple European markets.

P2P business lending, in contrast, is a relatively new alternative finance model in Europe but is developing rapidly in a number of key markets. It allows predominately small and medium-sized enterprises (SMEs) to obtain growth and working capital directly from a pool of online investors (both individual and institutional), bypassing a sometimes prolonged and uncertain bank-lending processes. This sector of the European online alternative finance market (excluding the U.K.) started with a very low base of €7.79 million in 2012, but expanded quickly to just shy of €40 million in 2013 and €93.1 million in 2014. Its average growth rate of 272% is the highest among major alternative financing models. For many SMEs, the speed with which they are able to obtain business loans, the often more flexible and attractive terms of financing (e.g., no penalty for early repayments on many platforms), as well as transparency and ease of use, are determining factors that make P2P business lending a viable business funding alternative. With the recent IPO of LendingClub and its notable SME financing partnership with Google, Alibaba and a growing trend of institutional lending (e.g., by HNWs, family offices, mutual funds, pension funds and hedge funds) on major platforms, the growth of P2P lending in Europe and its gradual institutionalization is likely to continue. For instance, P2P business lending is already the largest online alternative finance segment in the Netherlands with €35.32 million recorded in 2014. Nevertheless, in contrast with the U.K. alternative finance industry, where P2P consumer and business lending account for about 90% of the total market, P2P lending comprised 59% of the European market last year and was just shy of 65% accumulatively between 2012 and 2014.

Equity-based crowdfunding reached €47.45 million in 2013 and €82.56 million in 2014, excluding the U.K. figures. Although

this segment is very small in comparison with the total European early-stage investment market, which was estimated to be worth €7.5 billion¹¹ in 2013, equity-based crowdfunding is growing fast with a 116% average growth rate in the last three years. It enables European entrepreneurs and start-ups to raise early-stage capital in a transparent and perhaps more “empowering” online marketplace, directly from individual investors and, increasingly, angel groups and venture capital firms as well. There are several leading equity-based crowdfunding platforms now facilitating cross-border transactions and operating in multiple jurisdictions and which, in turn, allow investors to access deal flow from other European countries. Equity-based crowdfunding is well developed in Germany with €29.82 million raised in 2014 alone. Equity-based crowdfunding was also the third-largest market segment in France with €18.9 million in 2014, followed by the Netherlands (€11.16 million) and in Spain (€10.51 million).

Community shares and microfinance can facilitate hyper-localized and community-based alternative financing for local SMEs, social enterprises and community organizations by leveraging people's social and geographic affinities. These models have long existed in Europe and the development of web-based transactions and platforms are channeling financing activities from offline to online. On some European platforms, many of the funders are institutions and corporates, which offer great potential for matched funding. This segment of the market achieved just under €20 million in 2014. Donation-based crowdfunding, which enables donors to support charitable, social causes or civic projects for no financial or material returns, has been growing steadily with 104% average growth rate over the last three years to reach €19.91 million in 2014.

Invoice trading is a nascent online alternative finance model, which allows SMEs to sell their invoices or receivables to many individual or institutional investors at a discount for working capital. In contrast to the sizeable market in the U.K., the invoice trading model is underdeveloped in the rest of Europe, with hardly any transactions noted between 2012 and 2013 and just over €6.63 million in 2014. Debt-based securities, which is an alternative finance model that offers long-term investment

(normally 10-25 years) predominately for renewable energy firms (e.g., for financing wind farms or solar panel installations), has been growing fast with an average growth rate of 171% in the last three years, reaching €3.61 million in 2014. Other niche online alternative finance models, including SME mini-bond offerings and convertible loans, are essentially too small at the present time to warrant their individual categories. However, in future studies, a pan-European alternative finance industry study will, we expect, expand and modify the existing working taxonomy to accommodate new models (e.g., merchant cash advances or third-party payment systems for SMEs) and to reflect the fluid landscape of alternative finance.

7. The vitality of alternative finance for SMEs in Europe

Access to finance remains one of the most pressing challenges facing European SMEs today.¹² Studies have found that most managers of European SMEs feel that the availability of bank loans has not improved since the financial crisis and may even have worsened or deteriorated.¹³ The recent European Banking Federation's report¹⁴ also pointed out the fact that the “protracted weakness” of the European economy has led to a decline in the outstanding volume of bank loans to SMEs. This is particularly noticeable in countries that experienced the full brunt of the financial downturn after the 2008 financial crisis. For example, in 2013, the volume of bank loans to SMEs actually fell by a substantial €232 million; in particular, loans to nonfinancial corporations decreased by €99 billion in Spain and by €50 billion in Italy.¹⁵

Online alternative finance, especially P2P business lending, equity- and reward-based crowdfunding, and invoice trading, can be a viable and effective source of funding for start-ups and SMEs in Europe. Indeed, our research found that these forms of alternative finance provided €323 million to nearly 10,000 European businesses in the last three years. The volume of online alternative business funding has been increasing at about 168% year-on-year, from €29.11 million in 2012 to €95.98 million

¹² ECB-European Commission, 2013, “SMEs' access to finance survey 2013,” http://ec.europa.eu/enterprise/policies/finance/files/2013-safe-analytical-report_en.pdf

¹³ As above.

¹⁴ European Banking Federation, 2014, “2014 European banking sector facts and figures,” http://publications.ebf-fbe.eu/European%20Banking%20Sector%20Facts%20_%20Figures%202014#p=0

¹⁵ Ibid.

¹¹ EBAN, 2014, The European Trade Association for Business Angels, Seed Funds, and other Early Stage Market Players – Statistics Compendium for 2014.

in 2013 and to €197.93 million in 2014. Our data estimates that the number of start-ups and SMEs funded through online alternative finance platforms has been growing at an even faster average rate of 133% over the last three years from just over 1,000 funded firms in 2012 to reach 5,801 in 2014. The figures for the total amount of alternative business financing, and for the number of SMEs funded, were calculated by combining the volume of P2P business lending, equity-based crowdfunding, invoice trading and debt-based securities platforms, plus an estimated 10% (for both volume and number of businesses financed) from the reward-based crowdfunding sector. Given the prominence of the reward-based crowdfunding model in Europe and particularly in France, Germany, the Netherlands, Spain and the Nordic countries, we believe 10% is a conservative estimation given the large number of entrepreneurs, high-tech firms, creative organizations and social enterprises fundraising through both European homegrown and global reward-based crowdfunding platforms.

European online platforms can take some comfort from the rise of alternative business financing in the U.K. Also growing from a small base, fueled by the rapid development of P2P business lending and the invoice trading sector, the U.K. alternative finance market provided over £1 billion-worth of business finance to over 7,000 SMEs in 2014 alone, which is equivalent to 2.4% of the total national bank lending to SMEs.¹⁶ With the gradual expansion of the retail investor base and the influx of institutional investment into this type of financing activity, the P2P business lending, invoice trading and equity-based crowdfunding markets appear set to continue in the next few years. In turn, both the total volume and the number of SMEs funded through online alternative business finance platforms are likely to increase considerably in the short term.

8. The fundamentals of the European alternative finance market

There are three market fundamentals that this benchmarking research aims to highlight and examine: the number of total ventures funded and active funders, estimated percentages for cross-border transactions and the industrial perspectives of regulations.

8.1 The number of total ventures funded and the number of active funders

The socioeconomic foundation of online alternative finance is the direct connection, interaction and exchange between fundraisers and funders without the orthodox intermediation of traditional financial institutions. Consequently, the breadth and growth of individual, business and community participation and engagement with the sector is fundamental to the health and long-term sustainability of the alternative finance market. Therefore, although the aggregated data collected directly from the platforms in terms of total ventures funded (including all campaigns, personal and business loans and equity investment deals, etc.) and the total number of funders (including investors, backers, donors and lenders) are likely to be overestimated and inevitably involve some double counting, these statistics still provide useful insight into market fundamentals.

In 2014, over 348,241 ventures were fully funded through European online alternative finance platforms excluding the U.K. In 2013 and 2012, the figures were just 206,704 and 74,583 respectively, representing an average three-year growth rate of 123%. Notably, the growth rates slowed down from 177% between 2012 and 2013 to 68% between 2013 and 2014, suggesting that the average funding size of each venture might be growing. In terms of number of active funders, these online alternative finance platforms attracted and sustained more than 1.51 million active donors, backers and investors on their platforms in 2014 outside of the U.K. The figures for 2013 and 2012 are 898,330 and 421,741 respectively, realizing an average three-year growth rate of 91%. Even after factoring in overestimation and double counting, these numbers still reflect a growing market sector and an expanding funder base over time across Europe.

8.2 Cross-border transaction percentages

Cross-border transaction volume on European platforms is a key indicator of the alternative finance industry that has been closely watched and studied by policymakers and regulators at both national and supranational levels. However, gathering and analyzing reliable and meaningful cross-border transactional data is very challenging. This is partly due to the fact that the online alternative finance platforms themselves might not possess or collect such data, or that it cannot be readily extracted. The prominence of global reward-based crowdfunding platforms

¹⁶ Quoted from the Understanding alternative finance report (2014) and based on the Bank of England's Trends in lending figures [BOE (2014 October)].

in Europe also adds to the challenge of obtaining this data. Therefore, based on the data captured in our benchmarking survey, we feel that precise cross-border transaction volumes for each platform and, in turn, for each European country, cannot be reliably calculated at the present time. Nevertheless, the estimated cross-border transaction percentages (out of total funding) provided by the platforms offers some valuable insight for policymakers and regulators. In terms of inflow funds, which measures investor funding coming from outside a platform's home country, nearly 50% of surveyed platforms had no inflow of funding from other countries, while about 35% registered between 1% and 10% and roughly one in 10 of them indicated between 11% and 30%, which suggests a relative domestically oriented funding system. Our estimate of outflow funds (the measure of investor funding leaving the platform's home country) again suggests a relatively domestically oriented financing environment. Over 72% of platforms report no outflow activities at all and nearly 15% registered between 1% and 10%. However, a small minority of platforms, 5%, reported that their outflow is between 91% and 100%.

8.3 Industrial perspectives of regulations

The regulatory landscape of the European alternative finance market is fluid and multi-faceted. In some countries, existing regulations have been "stretched" to accommodate online alternative finance; in other countries, new regulations have put clear boundaries around the industry; in yet others, there has been little regulation. Although the industry's perception of alternative finance regulations is best understood and analyzed in the context of individual regulatory jurisdictions, it is still helpful to have a pan-European overview with the data from 190 surveyed European platforms. In our findings, it seems that, at least on a European level, the perception and attitudes toward both existing and proposed regulations are divided and highly varied. The pan-European response from the platforms reflects this variation. For example, while 18.42% of the respondents state that the existing regulations in their countries are adequate and appropriate, 21.05% argue that they are excessive and too strict. However, across Europe, 14.74% of the respondents in countries currently without dedicated regulations are actively calling for them, whilst 23.68% of the surveyed platforms suggested that the proposed regulations are excessive and too strict. In terms of individual countries, in France and the Netherlands, over 40% of surveyed alternative

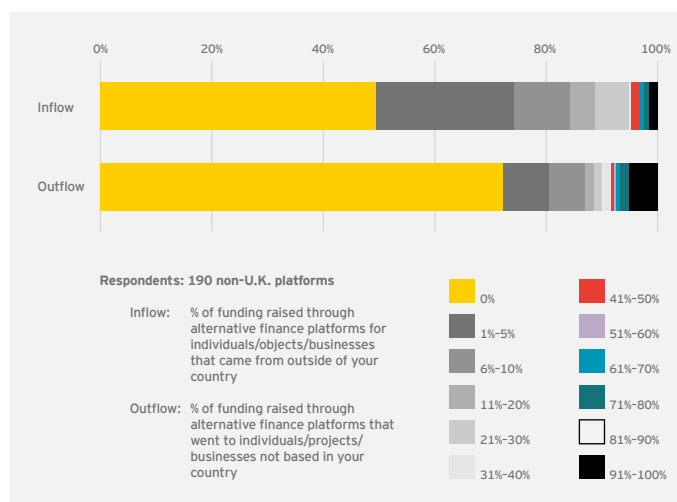


Figure 6: Cross-border transaction percentages for European alternative finance platform

finance platforms perceive the existing regulations to be adequate and appropriate, while very sizeable respondents in Germany (58.06%), Spain (52.94%) and the Nordic (36.46%) countries believe the proposed regulations in online alternative finance are excessive and too strict, indicating significant differences across European jurisdictions.

9. Market commentaries by alternative finance industry associations

A view from the field - France, by Marianne Iizuka¹⁷

The French crowdfunding industry started in 2008 with two platforms. In 2013, the first P2P lending platform was launched. Fast forward to January 2015, and France had 70 platforms, 36% of which were reward based, 9% donation based, 25% P2P and 20% equity crowdfunding based (according to Ahès consulting). Each month there are about four new platforms launched.

The French regulators, the AMF and the ACPR, issued rules and regulations for equity crowdfunding and P2P lending in France in October 2014. Both the French crowdfunding associations AFIP and FPF worked with the regulators during this process.

¹⁷ Marianne Iizuka is a European Commission ECSF Crowdfunding expert for the Anacofi and AFIP.

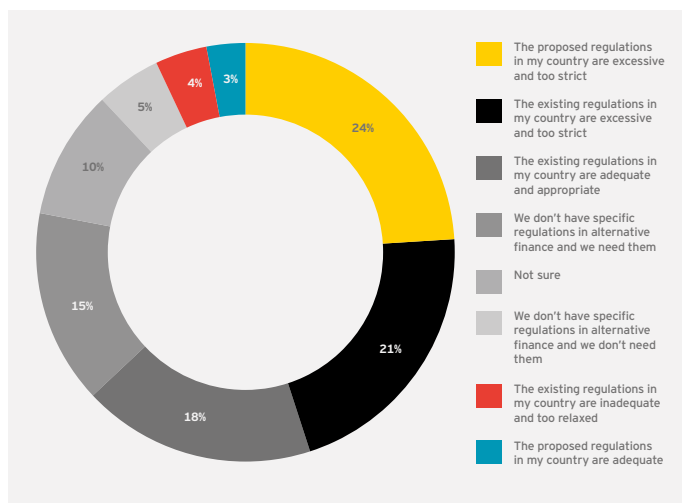


Figure 7: Industry perspectives on regulations in a European context

The new regulations allow crowdfunding platforms to operate within a bespoke framework and led to the creation of 20 new P2P lending platforms between October 2014 and January 2015.

The French Government has been strongly supportive of crowdfunding. It created a dedicated website for this industry, where major French crowdfunding projects are listed among many other activities in the industry. It also provided back-office support to some of them through the Public Investment Bank (BPI). Certain banks and insurers invested directly into platforms, or co-invested in crowdfunding projects during 2014. Two asset managers and several public institutions are also currently launching their own P2P lending platforms.

The French crowdfunding market is no longer a niche market. An overall ecosystem is evolving from this young industry. Consultants in crowdfunding, digital marketing agencies, training companies, payments systems and projects aggregators are offering their services to project owners. Specialized firms provide the platforms with their technology.

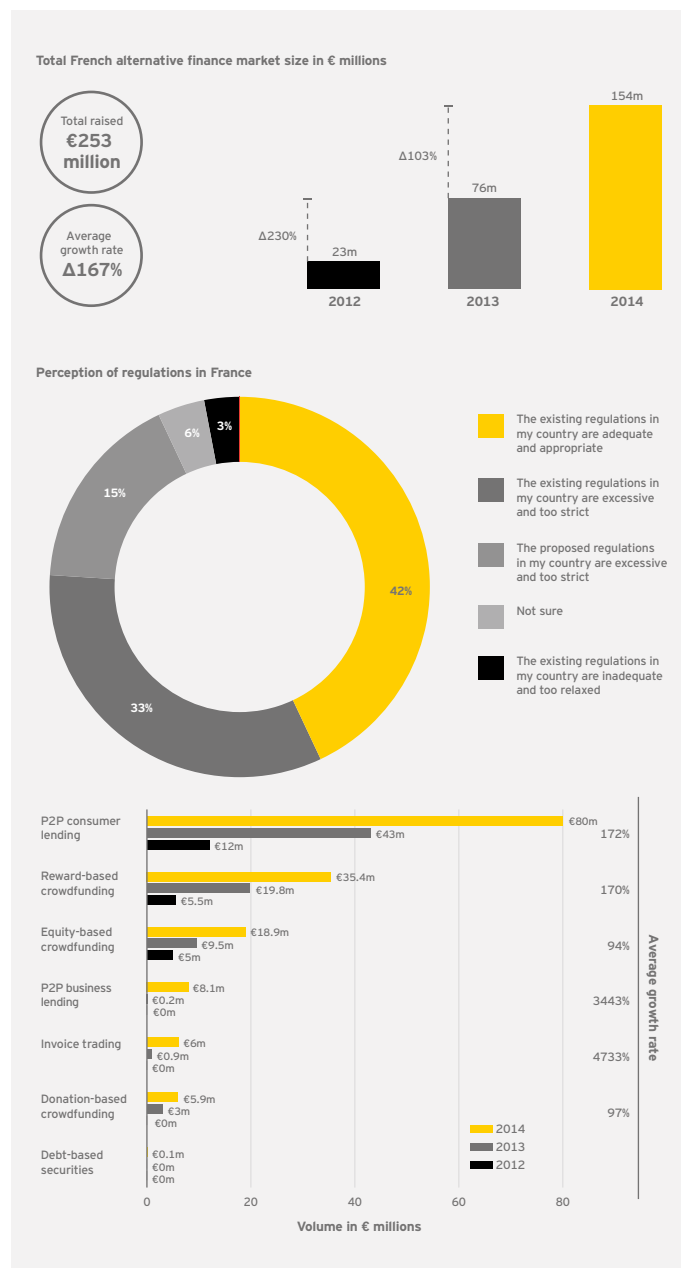


Figure 8: Alternative finance market snapshot for France

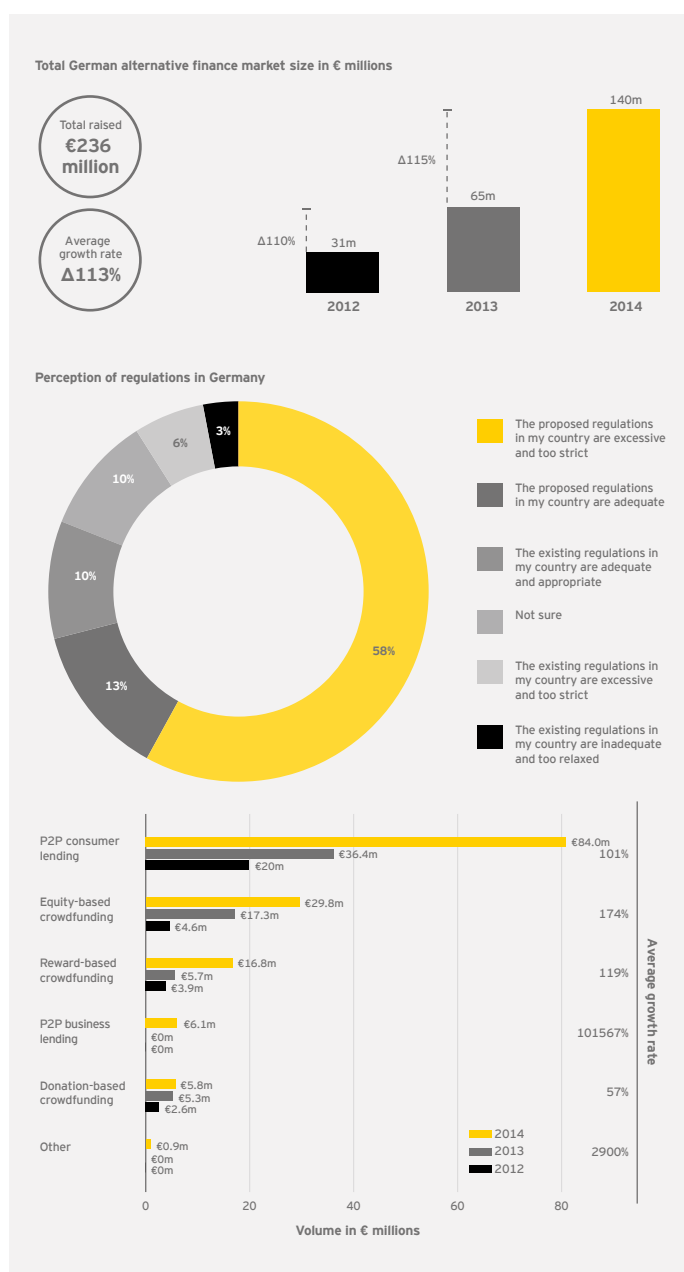


Figure 9: Alternative finance market snapshot for Germany

A view from the field - Germany, by Karsten Wenzlaff¹⁸

Crowdfunding in Germany started as early as 2006. The year 2010 saw a number of reward-based platforms gaining market share, while 2011 followed with a boost of equity-based crowdfunding platforms catering for start-ups and seed-financing.

Equity-based crowdfunding has been legal in Germany for some time. The large platforms have used a type of mezzanine instrument known as *Partiarisches Nachrangdarlehen* – or subordinated profit participating debt. This instrument allows investors to participate in the profits of the borrower. This form of subordinated debt instrument has thus far been exempt from having to publish a prospectus, and incurring the substantial costs of doing so, because interest is only paid if there are profits. The recently proposed government regulations closed this loophole and an exemption was created for online crowdfunding platforms. They also introduced a range of other proposed rules and requirements.

The proposed exemption allows crowdfunding projects up to €1 million to be published without an investor prospectus, as long as each investor is limited to a maximum investment of €1,000. This exemption is restricted to subordinated debt instruments. Further restrictions for investors are proposed, which will arguably reduce the access of retail investors to crowdfunding platforms in German. For example, if a platform wishes to allow investments above €1,000, it also has to ask the investor for an income statement, which in turn determines the amount that can be invested. The concern is that such complex regulation, which was adopted with reference to the U.S. JOBS Act, could make the German crowdfunding market less accessible since this is more costly to operate. I would argue that policymakers should instead look toward the U.K. or France as potential models.

The regulations also include a requirement for an investment products information leaflet (*Vermögensanlagen- Informationsblatt*), which is proposed to be manually signed and mailed by the investor, as well as rules on the advertising

¹⁸ Karsten Wenzlaff is the coordinator of the German Crowdfunding Network and a member of the European Crowdfunding Stakeholder Forum.

of crowdfunding projects online. For example, it is possible to advertise them in the printed press in Germany, but not in online media, on Facebook, Twitter or other social networks.

For P2P lending, the draft regulation states that loans to private borrowers should not be within the scope of the law if a regulated bank is an intermediary in the lending process and, thus, selling the loans from the borrower to the lender. Other forms of crowdfunding and collaborative finance, such as donation and rewards-based crowdfunding have been exempted from the new regulation.

A view from the field - the Netherlands, by Ronald Kleverlaan¹⁹

The Netherlands has a long history of innovation in the financial industry. A supportive regulator (AFM) and Ministry of Economic Affairs have contributed to a creative and innovative ecosystem for the launch of new alternative finance platforms in the last decade, many of them being the first of their kind in the world. There is significant innovation in hybridized crowdfunding models and innovative financial products, such as convertible notes and revenue-sharing models. Besides crowdfunding, other alternative finance initiatives are also quickly growing, such as credit unions and stock exchanges for SMEs. With over 100 alternative finance platforms, the Netherlands has the highest number of platforms per capita and this number is still growing, although the first signs of consolidation are being seen by platforms going out of business or being sold to competitors.

There is no specific crowdfunding regulation in the Netherlands. At the moment, 30 companies have a license or exemption to offer financial products through online platforms based on existing financial regulations. For investors, it is not permitted to either invest in more than 100 projects, to invest over €20,000 in equity through an online platform or invest over €40,000 in debt. For projects raising in excess of €2.5 million, a prospectus is required.

During the final months of 2014, the AFM carried out in-depth research of the crowdfunding market in consultation with major stakeholders in the industry. The draft version of the

proposed changes was published on 19 December 2014. The most important change is expected to be the introduction of new crowdfunding regulations for lending and equity, but the regulator does not appear to be pushing this at the moment, waiting instead for the market to mature before they introduce these new regulations. The Dutch Government is also promoting the alternative finance industry. The Ministry of Economic Affairs has funded some alternative finance companies directly and also financed a large public promotional campaign on crowdfunding, together with the Chamber of Commerce and crowdfunding platforms focusing on SME financing.

A view from the field - Spain, by Daniel Oliver²⁰

Spain is quickly embracing the collaborative economy as a new and important alternative to traditional economic models. This may seem surprising to those who think of Spain as an old-fashioned economy, and one where 80% of the country's SMEs funding comes from bank loans, but Spaniards are incredibly enthusiastic about new models of socioeconomic distribution.

The collaborative economy simply makes sense to many people, and some forms of it (like short-term apartment rentals or car sharing) have become an important part of making ends meet for Spanish families. Crowdfunding is playing an essential role in replacing public funding and grants, which have become increasingly scarce, and Spanish artists and designers have been forced to race up the learning curve in order to be competitive using donation- and rewards-based platforms.

As for investment crowdfunding, it is becoming a realistic alternative, but it still has to overcome the hurdle of skepticism from a population that has endured several major financial crises and scandals in recent years. However, loss of trust in mainstream institutions is arguably fueling faith in the sharing economy as an alternative model. Crowdfunding is gaining popularity and building a strong reputation, but is still, in my view, often misunderstood and underused.

Specific legislation has been introduced in relation to crowdfunding. This new legislation limits the use of equity and

¹⁹ Ronald Kleverlaan is the founder of CrowdfundingHub, the Dutch crowdfunding knowledge institute.

²⁰ Daniel Oliver is the President of the Spanish Crowdfunding Association, Board Member of the European Equity Crowdfunding Association.

debt crowdfunding to a maximum €2 million per project where non-accredited investors are involved, and €5 million where only accredited investors are included. It also places limits on the amount that each non-accredited investor can contribute. This effectively limits the role of crowdfunding to the SME sphere. Another concern is that the crowdfunding laws overlap with many other existing regulations, which is causing a certain amount of confusion.

A view from the field - the Nordic countries, by Dr Rotem Shneur²¹

Crowdfunding in the Nordic region has been growing at a fast rate in recent years. Currently, there are close to 20 locally anchored crowdfunding platforms operating in the region, the majority of which are very small and young companies that tend to specialize in reward and, to a lesser extent, donation-based crowdfunding formats.

These choices are unsurprising, as there are no significant regulatory constraints with respect to reward-based crowdfunding. If anything, recent news from Denmark suggest that a government fund (Markedsmodningsfonden) will actually match certain sums of successfully completed Danish reward-based crowdfunding campaigns that have been pre-approved prior to the campaign launch.

The situation is, however, different with respect to equity and lending crowdfunding, which are currently governed by legislation formulated well before the age of online alternative finance. In this respect, Nordic regulators have been quite passive in amending regulations out of concern for consumer protection, and remain expectant of new direction from the European Community as part of a European approach to the issue. Nevertheless, some local lobbying efforts for regulatory amendments with respect to equity-crowdfunding are evident in Denmark and Finland in particular. The latter is the only country in the region that has issued a formal stance on equity crowdfunding, classifying such platforms as financial service providers and, hence, in need of obtaining licenses to operate as

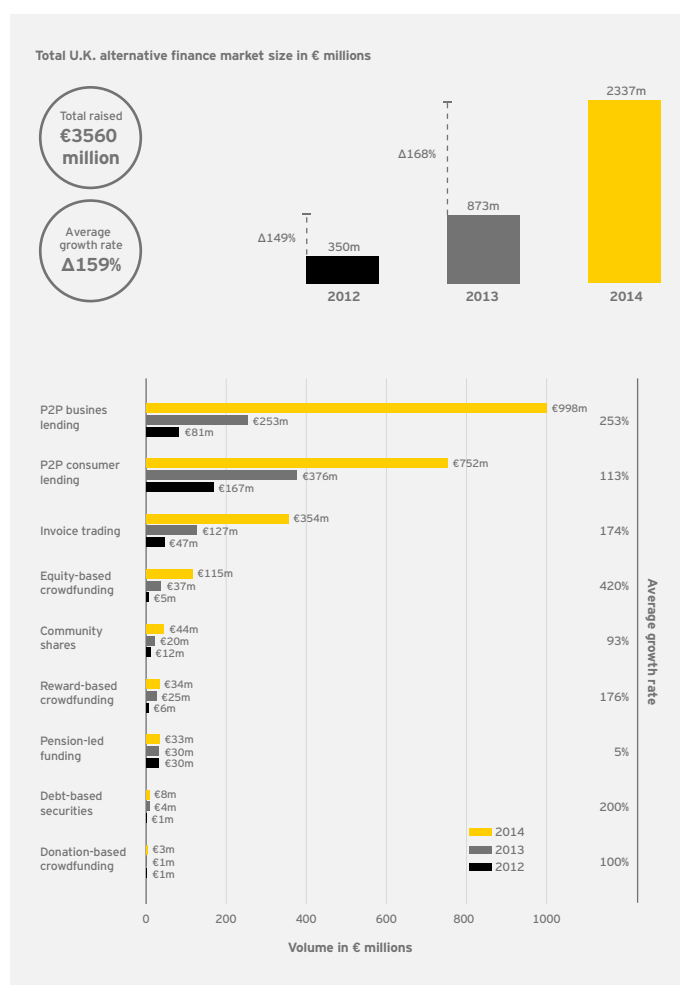


Figure 10: Alternative finance market snapshot for the U.K.

investment firms. A similar signal was also provided by Norway with respect to crowdlending, when it refused to allow the operations of a Nordic P2P platform in its territory without the firm first obtaining a license as a financial service provider.

Despite significant growth, crowdfunding as a concept remains relatively unknown and/or unclear to the majority of the public in the Nordic countries, a situation also prevalent among players in local entrepreneurial ecosystems. Hence, much of the market

²¹ Rotem Shneur is an Associate Professor at the University of Agder's School of Business and Law, Norway and he is also the Head of the Nordic Crowdfunding Alliance.

education effort falls on the platforms themselves and their network of advisors and supporters.

A view from the field - the U.K., Sam Ridler²²

P2P lending was founded in the U.K. in 2005 and is the leading source of online alternative finance for U.K. SMEs and consumers. In 2014, over £1.2 billion was lent to SMEs and consumers through U.K. P2P platforms. The industry created its own self-regulatory body, the P2PFA in 2011.

The U.K. has a legal definition of what constitutes a P2P loan (Regulatory Activities Order 36H). Further from 1 April 2014, the U.K. regulator, the Financial Conduct Authority (FCA), introduced a disclosure-based regulatory regime for P2P platforms to provide protection for consumer investors. Along with the requirement ensuring all financial promotions are fair, clear and not misleading, client money provisions and minimum capital standards are applied. Firms running platforms must also have resolution plans in place, which means that in the event of the platform collapsing, loan repayments will continue to be collected so lenders do not lose out.

In terms of support for the P2P sector, the British Business Bank and some local councils have put funds through several P2P platforms to support business lending. In the 2014 Budget, the U.K. Government set out the aim of including investing in P2P lending in the popular U.K. tax-free Individual Savings Account (ISA) scheme to give consumers more choice of investments.

As the P2P lending industry is still relatively young and growing, there are two key risks that could impact its growth and perception in the market. Firstly, reputational risks – an unscrupulous or fraudulent platform could cause investors and policymakers to lose faith in the industry. Secondly, excessive regulation could stifle its ability to compete with traditional financial services. Part of the function of the P2PFA is to help the industry minimize these risks by providing a forum for developing best practice.

10. Conclusion

Online alternative finance platforms are no longer the nascent, grassroots-led alternative to the traditional banking system that emerged in the aftermath of the financial crisis. From 2012 to 2014, transaction volume via online alternative finance platforms in Europe grew sixfold, from approximately €500 million to €3,000 million, and we project it will surpass €7,000 million in 2015. During the same period, the number of ventures funded by alternative finance platforms increased fivefold, from approximately 75,000 to 350,000, and engaged well over a million investors. The market is now attracting bigger, more sophisticated investors and this is likely to accelerate volume growth. Funds are flowing from institutional investors into P2P consumer loans, for example, leading to the creation of new investment-grade asset classes being packaged and financed in the traditional capital markets. This growth is also attracting the attention of potential entrants from outside the financial sector, particularly firms with expertise in social data analytics. An ecosystem of FinTech firms is emerging and providing tools and services to both alternative finance platforms and investors.

The market size and growth numbers for Europe as a whole, however, obscure dramatic variation in the pattern of alternative finance development between individual European economies. In 2015, the U.K. alternative finance market is projected to exceed €5,700 million, which is more than five times larger than the market volume projected for the rest of Europe, and the growth rate in the U.K. continues to outpace the rest of Europe. Italy is the fourth-largest country in Europe with a population similar in size to the U.K., but has little online alternative finance activity. There is a substantial body of academic research demonstrating the important role that access to finance plays in promoting economic development, which suggests that economies with low levels of alternative finance activity may be disadvantaged in trying to stimulate economic growth. Policymakers, therefore, may wish to reexamine the regulatory framework governing alternative finance activity in those economies where it appears to be a factor stunting development of the market, while of course balancing this against the need for investor protection.

²² Sam Ridler is the Executive Director of the P2P Finance Association (P2PFA).

While alternative finance is moving mainstream, there are a number of risks to its continued development. There is a clear need to strike the right balance between a regulatory regime aimed at facilitating market growth, and a regime that provides sufficient protection to investors. The alternative finance industry itself recognizes that the market will not develop if the platforms are not perceived as trusted intermediaries by investors and beneficiaries alike. The alternative finance associations in each country have taken a leadership role in encouraging their members to engage in commercial practices, like transparency, that help build confidence and trustworthiness. Our hope is that this article contributes to that effort by shedding light on this young industry.

FinTech in China: from the shadows?



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Abstract

In July 2015, China's peer-to-peer (P2P) lending platforms counted 2,136, with settlements of about RMB82.5 billion transactions in that single month, making it the country with the most P2P platforms in the world. As the sector went from one platform in 2007 to more than an estimated 2,000 platforms currently, the P2P sector went from too-small-to-care to too-big-to-fail, attracting a new level of regulatory scrutiny. Ultimately, this systemic shift offers China a regulatory and market reform opportunity with profound consequences for the country and the developing world. Indeed, the Internet Finance Guidelines released in July 2015 indicate that the country is creating both a financial market infrastructure and a regulatory framework that is built with financial technology (FinTech) in mind.

1. Introduction

In 1979, China began the transformation of its economy and modernization of its financial sector. However, ever since, its credit markets have suffered from allocation inefficiencies that particularly affect small and medium-sized enterprises (SMEs). In a time of slowing economic growth, this misallocation of capital has important implications, since SMEs represent 80% of the economic output of the country while they only receive 20% of the credit originated by banks. This mismatch has spurred the growth of the shadow banking industry in China, an informal sector performing credit allocation between lenders, trying to move liquidity from savings accounts with yields limited by restrictive rate ceilings² and non-state firms looking for the much needed capital to finance their growth. Since 2009, the authors argue that China's shadow banking industry has transited its activities toward P2P lending channels. In just a few years, new FinTech has allowed a trillion-dollar and decade-old industry to emerge at the beginning of the second decade of the 21st century.

In July 2015, China's P2P lending platforms counted 2,136, with settlements of about RMB82.5 billion (approximately U.S.\$13.4 billion) transactions in that single month.³ More worryingly, 130 closed between January and March 2015 and more than 1,250 are regarded at risk by local credit rating agencies.⁴ The speed at which this sector emerged has prevented regulators from drafting adequate legislation to ensure consumer and prudential safeguards, while at the same time, underpinning development of the market. However, in March 2015, the Chinese Banking Regulatory Commission (CBRC) announced the enactment of new capital requirements for P2P platforms. The sector went from light-touch regulation with low barriers to entry to one where actors may need to set aside more than RMB30 million in regulatory capital.⁵

This change of approach by regulators reflects that the P2P sector in China has reached systemic size. From 2007 to 2015, the sector went from too-small-to-care to too-big-to-fail.⁶ Yet, P2P lending performs an important allocation role, especially for SMEs that have constrained credit access. As a result, and going forward, a balancing act needs to be performed by the legislators and regulators.

Ultimately, this systemic shift caused by the P2P sector offers China a regulatory and market reform opportunity with profound consequences for the country and the developing world. Indeed, the Internet Finance Guidelines, released in July 2015, indicate that the country is creating both a financial market infrastructure and a regulatory framework that is built with FinTech in mind. China would effectively transform its last-mover advantage in the field of financial reform into a first-mover advantage,⁷ by setting global standards for financial market and regulatory developments that can be looked upon by developing markets in South-East Asia and Africa.

2. Banking in China

A discussion of the Chinese financial system necessarily starts by highlighting the role of the state. This is warranted by the function of the Chinese Communist Party (CCP) in the Chinese economy – it is at the same time “the regulator, the financier, the banker, the business man, the guarantor and the employer.”⁸

However, not all banks are state-owned. Indeed, Chinese banks have faced successive waves of reform. The start of this gradual process began in 1978 with the end of the mono-bank model,⁹ whereby the People's Bank of China (PBOC) comprised the entire banking system. Today, the banking landscape is composed of wholly-owned state banks,¹⁰ equitized commercial banks, local banks and joint stock commercial banks.¹¹ In 2007, four foreign

2 In practice, rates are often negative, since the interest payable is lower than the inflation rate.

3 Data is collected from www.wangdaizhijia.com, a Chinese website providing all sorts of information on P2P lending in China. For the P2P data, see <http://shuju.wangdaizhijia.com/industry-type-0-7-2015.html>.

4 Chen, J., 2015, “Internet loan alarms Dagong with 1,250 red flags,” Bloomberg, 13 March, available at <http://www.bloomberg.com/news/articles/2015-03-12/internet-loan-alarms-dagong-with-1-250-red-flags-china-credits>

5 Ren, D., 2015, “China mulls tighter rules on booming P2P lending business,” South China Morning Post, 17 April, available at <http://www.scmp.com/business/china-business/article/1744711/china-mulls-tighter-rules-booming-p2p-lending-business>

6 See Arner, D. W., and J. Barberis, 2015, “Regulation FinTech innovation: a balancing act,” 1 April, available at <http://www.law.hku.hk/aiifl/regulating-fintech-innovation-a-balancing-act-1-april-1230-130-pm/>

7 This idea is explored in more detail in *ibid*.

8 Cousin, V., 2011, *Banking in China*, Palgrave Macmillan Studies in Banking and Financial Institutions, 2nd edition

9 *Ibid*. 4.

10 The Agricultural Development Bank of China (ADBC), The China Development Bank (CDB) and the China Exim Bank (CEB).

11 Martin, M. F., 2012, “China's banking system: issues for Congress,” Congressional Research Service

banks¹² were the first to receive full licenses to freely operate within China,¹³ while most recently, following the introduction of a new deposit insurance scheme in 2015, we have witnessed the emergence of five new online banks owned by private capital (e.g., WeBank or MyBank from Tencent and Alibaba, respectively).¹⁴

Against this background toward a more heterogeneous and liberalized banking sector, state impact in many respects remains constant. The fact that 80% of bank CEOs and 54% of senior executives [Cousin (2011), p. 54] are CCP members and appointed by the CCP [Martin (2010), p. 26], provides some notion of the pervasiveness of state involvement in the banking system. Another statistic to help visualize the situation is biased credit allocation, benefiting mainly state-owned enterprises (SOEs). The latter account for only 35% of GDP and are responsible for 20% to 30% of overall economic growth, yet they capture more than 80% of all loans made [Cousin (2011), p. 84]. In this context, the rise of P2P platforms is enhancing the speed at which two main stakeholders are being disintermediated, namely the primacy of the formal banking system in originating loans, and therefore, by extension, the state itself and its capacity to use banks as policy tools.

2.1 Political intervention and the allocation of money

While the inclination of the state to control banks is by no means new and can be seen in other jurisdictions such as Japan, France and Germany,¹⁵ state interference causes a range of problems, ranging from inefficient credit allocation within the economy, accountability issues¹⁶ and even in some cases, financial crises. Indeed, part of the blame for the 1997 Asian Financial Crisis was attributed to “crony capitalism,” whereby loans were made on political considerations, as opposed to commercial sense.¹⁷

As it stands, Chinese banks today are in a hybrid position between making loans based solely on commercial logic on the one hand (and thus benefiting the non-state sector) and following directions that may only be based on political or personal motives, on the other [Martin (2010), p. 1].

This conflict in policy of loan allocation is echoed at the regulatory level. The PBOC – which was made responsible for the stability of the financial sector following the 1995 Central Bank Law¹⁸ – has a clear line in requesting that banks increase the availability of loans to SMEs [Cousin (2011), p. 124]. However, the CBRC, created in 2003, is more focused on the safety and soundness of individual institutions. As a result, it tends to focus on the avoidance of non-performing loans (NPLs).

The latest example of the impact of government intervention on shadow banking occurred in the wake of the 2008 global financial crisis (GFC) in the context of a massive Chinese economic stimulus. Indeed, the shadow banking sector was stimulated by a CNY4 trillion package (approximately U.S.\$570 billion) injected by the Chinese Government in an objective to prevent recession and maintain high levels of domestic growth.¹⁹ As government interventionism slowed down and the size of the stimulus package decreased, the public's demand for credit could not be satisfied by the regular banking system alone. This in turn increased the demand for banking alternatives and greatly boosted shadow banking activities.

In this respect, it is perhaps important to note that the development of the P2P sector in China, similarly to that in the U.S., witnessed an increase from 2008.²⁰ However, the difference is that while the U.S. was faced with an important credit supply shortfall, forcing people to seek alternative lending channels, China's P2P sector can attribute its growth to the fact that people were looking to maintain the situation of credit abundance that followed the stimulus program of the Government.²¹

12 They are: HSBC, Standard Chartered, Bank of East Asia and Citi.

13 Cheng, J., 2012, *China: a new stage of development for an emerging superpower*, City of University Hong Kong Press, 336

14 Xinhua, 2015, “Can private banks survive and thrive?” *China Daily*, 20 May, available at <http://www.chinadaily.com.cn/china/2015-05/28/content_20848289.htm>

15 Cox, S., 2012, “Pedalling Prosperity” *The Economist Special Report* (May 2012) available at: <<http://www.economist.com/node/21555762>> accessed 24 Aug 2013.

16 See 1.2)

17 Arner, D. W., 2007, *Financial stability, economic growth, and the role of law*, Cambridge University Press, 225

18 Bell, S., and H. Feng, 2013, *The rise of the People's Bank of China. The politics of institutional change*, Harvard University Press

19 Guo, L., and D. Xia, 2014, “In search of a place in the sun: the shadow banking system with Chinese characteristics,” *European Business Organization Law Review* 15:3, p. 398

20 Please refer to the graph capturing how 2008 marks a tipping point. Source: Renton, P., 2012, “Peer to Peer lending crosses U.S.\$1 billion in loans issued,” *Tech Crunch*, 29 May, available at <<http://techcrunch.com/2012/05/29/peer-to-peer-lending-crosses-1-billion-in-loans-issued/>>

21 Arner, D. W., J. Barberis and R. Buckley, 2015, “The evolution of FinTech: A new post-crisis Paradigm?” October

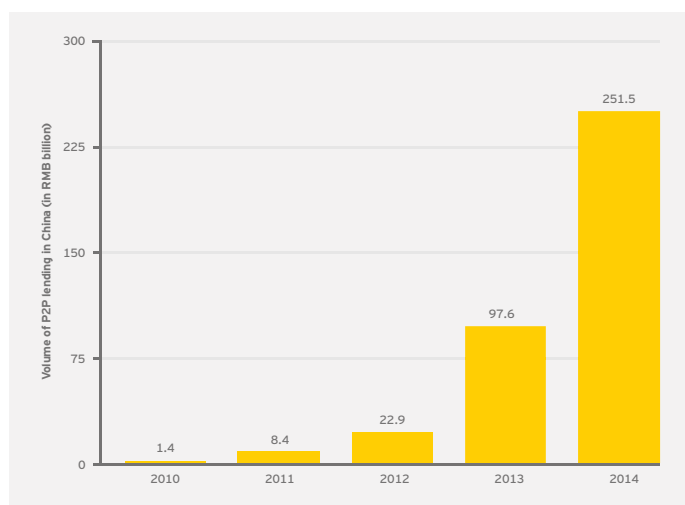


Figure 1: Volumes of P2P lending in China (in RMB billion)

Source: iResearch (showed during HKIFA conference)

2.2 Preparing for the necessary liberalization of finance

For many years, China was, therefore, in a situation where it had to strike a balance. On the one hand, it needs to maintain economic growth, which requires financial reform to better allocate savings into the financial system. On the other hand, the liberalization process must prevent the creation of various asset bubbles that would affect the real economy if they were to burst.²² This dilemma is reflected in the form of former Premier Wen Jiabao's demands for reform and PBOC Governor Zhou Xiaochuan's concerns regarding financial stability [Martin (2010), p. 44]. So far, the decision has been to compromise. Cousin (2011, p. 58) refers to an analysis conducted by McKinsey Global Institute in 2006, which estimated that the foregone GDP growth resulting from an inefficient financial sector was 13%.

It transpires that this “suboptimal” growth level is the result of a conscious choice. The factions that are prone to liberalization and the ones that prefer stability have “settled for a compromise: a slightly lower rate of growth, but more stability which do not put the financial resources unnecessarily at risk” [Cousin (2011,

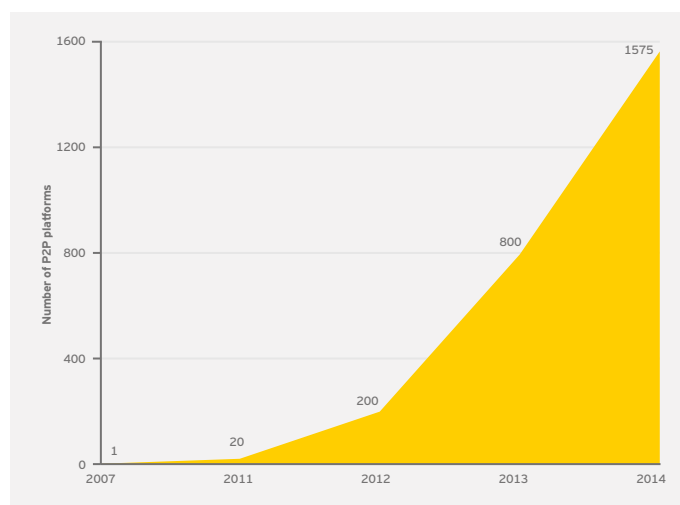


Figure 2: Number of P2P platforms

Source: wangdaizhijia.com, end of 2014

p. 58)]. However, as the economy slows down, the capacity of showing a suboptimal efficiency path for China's financial market is not sustainable. Indeed, it was pointed out that failing to adequately reform China's financial system could jeopardize future economic growth.²³

In other words, the combination of slower economic growth as well as the rise of P2P lending platforms in China is challenging the extent to which this balancing act can be maintained. The gatekeepers of financial liberalization, namely the state power to grant banking charters or various licenses, are losing their effectiveness. Since 2007, the barriers to entry into China's financial system have been bypassed by private individuals and internet finance companies [Arner et al. (2015)] delivering directly to the public and SMEs more than RMB251 billion of credit in 2014.

One may argue that this is nothing new, indeed the *raison d'être* of shadow banking is precisely that of providing financial products and services to the public outside of a traditional and supervised regulatory framework. As discussed in the

²² When credit becomes cheaper, the investment decision threshold of individuals and corporates also changes. As the cost of capital reduces, they are willing to take on more risky and low yielding projects that they may not have if the cost of borrowing was high. This in turn facilitates the appearances of a credit bubble, as it was seen in the U.S. subprime market.

²³ This idea is explored in more details in Zhou, W., D. W. Arner and R. P. Buckley, 2015, “Regulation of digital financial services in China: from last mover to first mover?” available at <ssrn.com/abstract=2660050>

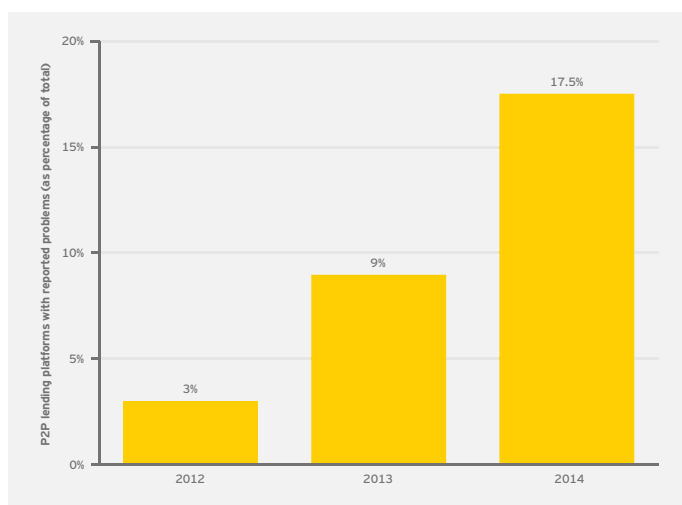


Figure 3: P2P lending platforms with reported problems (as percentage of total)
Source: wangdaizhijia.com (from HKIFA conference)

introduction, this industry has been operating in China for decades. However, this misses the point. The noteworthy aspect is to understand why this traditional and informal parallel banking system, that Tsai calls “back-alley banking,” has recently been able to come to the light.²⁴ In less than seven years, China has witnessed the emergence of more than 2,000 P2P lending platforms with a total loan origination capacity of RMB251 billion (Figure 1). To put this in perspective, in 2007, China only had one P2P platform (Figure 2). This exponential growth rate of the P2P industry in China has directly challenged the Government’s capacity to gradually implement liberalization policies within the banking sector. While the regulators, Government and SOEs were “crossing the river by touching the stones,” the private sector, led by internet finance companies, has been literally leapfrogging their traditional regulatory and banking counterparts.

One may argue that, irrespective of its origin, financial liberalization is positive since it is expected to both support growth and increase job prospects.²⁵ It needs to be remembered that the latest crisis has shown the negative effect of inadequate

regulation, which destroyed more jobs than those saved and created in the 1980s.²⁶

There is, therefore, value in government intervention that is highly targeted and precise. Even more so, because change within the financial sector will affect a fragile economic, social and political equilibrium. Indeed, even the P2P sector itself is currently experiencing an increased amount of defaults and closures, as can be seen in Figure 3.

While the initial spur of financial liberalization was driven by the crowd itself, as the industry increasingly creates a systemic risk within the financial system, this needs to be effectively addressed by the regulators. It is neither desirable nor possible for the P2P sector to continue its development in isolation from government policies and regulatory considerations. This is because the current positive economic impact brought about by efficient credit allocation can be lost as the industry creates systemic risk. Therefore, one can expect that this sector, which was thus far unregulated in China, will now be fitted within the broader context of financing within financial markets.²⁷ This forms the subject of the following section.

3. A window of opportunity

The misallocation of credit within the Chinese economy has been endemic for decades, and this has led individuals and corporate parties to create a parallel and unofficial network performing the credit intermediation that they were otherwise lacking. While these off-line networks were called “non-bank finance” prior to 2008, following the GFC, regulators have been increasingly focused on the potential risks of these sorts of activities as “shadow banking.” In the context of China, nonbank finance and shadow banking thus capture both the essential elements that we now see in P2P – the need for alternative forms of financing to support non-state growth, particularly among SMEs, while at the same time, addressing potential risks to consumers and the financial system.²⁸

²⁶ Ibid. 60.

²⁷ This relates to the creation of a tiered regulatory regime, topic covered by Zhou, W., D. W. Arner and R. P. Buckley, 2015, “Regulation of digital financial services in China: from last mover to first mover?” available at <ssrn.com/abstract=2660050>

²⁸ In other words, China is witnessing the rise of Shadow Banking 2.0. For more of the historical analysis on the use of technology within the financial services sector, please refer to Arner et al. (2015).

²⁴ Tsai, K. S., 2004, *Back-alley banking: private entrepreneurs in China*, Cornell University Press
²⁵ Avgouleas, E., 2012, *Governance of global financial markets: the law, the economics, the politics*, Cambridge University Press, 106

For the Chinese Government, the emergence of P2P lending offers a unique opportunity that solves a decade-old tension, which thus far prevented the formalization of the shadow banking industry.²⁹ As will be detailed below, the various routes toward market reforms had the potential to generate negative externalities that would outweigh the initial objectives. In essence, because both the shadow and the formal banking sector provide a vital lifeline of credit to SMEs and SOEs respectively, any financial market reform had the potential of disrupting a fragile equilibrium. More specifically, with respect to shadow banking, the fact that it was informal and “off-line” generated a level of information asymmetry that made it difficult to evaluate the potential consequences of bringing the sector to the light. Inadequate policy risked forcing the sector deeper into the shadows or simply impeding its much-needed function from an economic growth perspective.

Interestingly, as was seen in section 2, since 2008, the shadow banking sector has indeed been increasingly brought to light but not as a result of policy or regulatory actions. Instead, this is attributable to the increased academic, policy and market research attention as well as the result of technology. This is the critical element providing the basis for the authors’ submission. Namely, that shadow banks have been attracted to the light by the market share and efficiency gains brought by technology, as they move their operations from off-line to online models, which in turn gives a regulatory window of opportunity to reform this sector in a way that was not possible until now.

The positive impact of that transition is that not only has it removed the pre-existing information asymmetry that limited the possibility of government reform, but it has also constrained the capacity of the sector to move further back into the shadows. Indeed, SMEs and individuals who were former users of shadow banks and now borrowers or lenders of P2P platforms are unlikely to settle for the necessarily less competitive and transparent terms offered by the “off-line” shadow banks.

3.1 A regulatory approach

The risks caused by shadow banking are not novel and, in 2013, a survey reported that 63% of respondents expected that “shadow

banking [will] cause a crisis in China.”³⁰ As a result, the idea that shadow banking should be left free of government intervention is not viable. This is because there is an inherent risk of social unrest attached to a failing informal banking sector.³¹ This has led the Government to experiment, with limited success,³² over an extended period of time with various approaches of bringing the shadows to the light by regulating a sector that is by definition informal.

If it is true that some regions are more relaxed about letting informal banks operate within their jurisdictions with little or no control, this is because local officials view shadow banking operations as “a popular (minjian) form of grassroots credit.” This lenience can be regarded as “active non-action.” In other words, as long as the activities of the local informal operators do not disturb the economic, social and political climate, they are left untouched. In that respect, a regulatory official interviewed by Zhang confirmed this by characterizing the sector as “a tolerable nuisance.”³³

However, if this was about to change, we would witness an immediate crackdown on the sector. This happened in October 2012 when a default of informal banks in Wenzhou threatened to transform into a regional crisis [Martin (2012, p. 7)]. The event would perhaps have remained unnoticed if it were not for the fact that the potentially affected province, Zhejiang, is home to 55 million people, and also considered to be the historical capital of entrepreneurship in China. One should bear in mind the fact that three leading officials (then Premier Wen Jiabao, PBOC Governor Zhou Xiaochuan and then Finance Minister Xie Xuren) went there to personally witness the problem caused by informal finance, and subsequently called for the closure of those institutions.

30 Caixin survey, available at: <<http://service.caixin.com/pollcode/resulten/batch/576>>, accessed 27 July 2013.

31 Hsu, S., and J. Li, 2009, *Informal finance in China: American and Chinese perspectives*, Oxford University Press, 144

32 Yet, the difficulty of introducing comprehensive financial reform in the shadow banking sector is not exclusively confined to China. U.S. regulators have also struggled to provide for complete coverage of this sector, as seen by the sparse treatment of shadow banking in the otherwise extensive Dodd-Frank Act.

33 Zhang, J., 2013, *Inside China's shadow banking: the next subprime crisis?*, Enrich Professional Publishing, 91

29 This is illustrated in section 2.1

The above illustrates that government inaction is only acceptable up to a point.³⁴ Furthermore, because of the lack of regulation and transparency, this sector runs a high likelihood that operators will default on their obligations. An example of this is when Hehui³⁵ turned into a Ponzi scheme [Hsu and Li (2009, pp. 21 and 144)]. As such, it is expected that the inaction of the state could only be a temporary relief and not a long-term policy of the central or local authorities. Hence, reforming or banning informal banking appears a more likely course of action. Indeed, both solutions have been attempted in recent years.

The other corner solution – to simply shut down companies operating outside the law – had varied success, but a long history. Since 2002, more than 500 underground banks have been closed, out of which more than 100 had assets exceeding RMB200 billion [Martin (2012, p. 2)]. As for the individuals running those operations or benefiting from them, the most recent high-profile case concerns Zeng Cheng Jie, who was executed after being found guilty of “fraud in raising funds.”³⁶ Similarly, between 2011 and 2012, the CBRC forced more than 5,000 guarantee companies to shut down, while increasing regulation of the remaining enterprises [Zhang (2013, p. 84)].

However, there are a number of limitations in the ability of the Government to shut down the shadow banking sector. Because of the fact that shadow banking supplies credit to the SMEs that generated 80% of the country's economic output, any regulatory overkill may be destabilizing from a social, economic and financial perspective. While the financing mechanism used by SMEs is illegal, the positive externalities it creates in terms of employment and economic growth also need to be considered.

On the other side of the spectrum, one needs to consider that instead of fixing the symptoms of shadow banking, the Government may have more success in resolving the inefficiencies within the formal banking sector, especially given the far reach of government control within banks. In practice, this

revolves around liberalizing the formal financial sector. Yet, this move toward a more market-orientated financial system has its own limitations, three of which are highlighted.

First, the liberalization of market rates will have political repercussions in the sense that the state would lose its control over the financial sector, which it is reluctant to do, although it is now likely that this process will largely be complete by the end of 2015 [Cousin (2011, p. 10)]. Second, economically-speaking, if SOEs were to pay market rates, The Economist estimated that between 2001 and 2008, they would have suffered large losses, or even gone bust.³⁷ In other words, liberalizing interest rates would expose the misallocation of resources that has been occurring for decades now.³⁸ With the focus of the Xi-Li administration on restructuring of the economy, this is, however, now seen as a desired and necessary result, albeit one that must be managed carefully. Third, removing the limit on the deposit rate would erode banks' profit margins. This, in turn, has consequences on the ability of formal institutions to actually be able to themselves handle NPLs – as opposed to relying on state intervention as hypothesized earlier – because this profit margin enables banks to be easily recapitalized.³⁹ Nonetheless, as banks have become increasingly commercialized and combined with previous successful experiences in resolving NPL issues through asset management companies and deferred financing, this is now seen as less of an issue than previously. Most importantly, even if the liberalization of the traditional sector could be achieved without any of the above negative externalities, this would not necessarily imply the disappearance of shadow banking, which has now taken on a life of its own beyond its initial nascence in regulatory arbitrage.

Different factors play a role here, including the fact that the size of the loan requested by individuals or SMEs is too small to be profitable for larger entities. As such, banks are unlikely to offer small loans,⁴⁰ but assuming that they were to provide credit in the

34 With a similar point being made about P2P lending and the current increase in market risk it creates. Conceptually this goes back to identifying where the threshold is that justifies governments to dedicate resources to regulate activity within a given market.

35 A private money-lending association, and thus, part of informal finance.

36 China Daily, 2013, “Entrepreneurs face dilemma over funds,” 22 July, available at: <http://usa.chinadaily.com.cn/opinion/2013-07/22/content_16811976.htm>, accessed 24 August 2013.

37 Cox, S., 2012, “Pedalling prosperity,” The Economist Special Report, May, available at: <<http://www.economist.com/node/21555762>> 7, accessed 24 August 2013.

38 However, the benefit of liberalizing interest rates of loans is that SOEs will not borrow as much and thus free up the much-needed capital for SMEs [Zhang (2013, p. 104)].

39 Pettis, M., 2013, The great rebalancing: trade, conflict, and the perilous road ahead for the world economy, Princeton University Press, 95

40 Alexander, L. T., 2013, “Cyberfinancing for economic justice,” William & Mary Business Law Review, 4, 309, available at: <<http://scholarship.law.wm.edu/wmblr/vol4/iss2/2/>>, 319

first place, it would not be at a competitive, or even affordable, rate, as their due diligence costs would be very high. Moreover, pricing of loans is not the only factor, the fact that it takes on average four to six times longer to get approval for a loan via a formal institution, as opposed to the informal sector, gives the latter a strong competitive edge [Hsu and Li (2009, p. 21 and 133)].

3.2 The technological route

Importantly, the exponential growth of the P2P industry in China cannot be understood in a vacuum. Instead, it is hypothesized that the P2P boom in China is not only attributable to two factors. On the consumer side (whether lender or borrowers), individuals are benefiting from the same arbitrage opportunities (i.e., negative interest rate payable on current accounts moving excess savings toward P2P platforms yielding higher return). On the intermediary side, shadow banks have moved their operations online, being attracted by the lower overheads and broader market share they can reach by using online matchmaking platforms.

This is not to say that the P2P industry is only composed of old actors; undeniably there have been new players in the market that have no previous history as shadow banks. Indeed this is illustrated with two new players. Firstly, the most publicized example being AliFinance, part of the Alibaba Group, which has already originated 409,444 loans with an outstanding portfolio of RMB105 billion (approximately, U.S.\$17.2 billion). Secondly, and perhaps the most (in)famous illustration of a market overheating is Panda Firework Group Co., a listed fireworks manufacturer that totally changed its core business to become a P2P lending provider.⁴¹

Thus, until a detailed study examines the origins and sources of funds of all P2P platforms in China, it is difficult to determine whether it is a brand new industry or a new twist on the old shadow banking model.⁴² However, it is fair to assume that the P2P lending sector is primarily a source of funds that originates from, or would have otherwise gone to, shadow banks. Little distinguishes shadow banks and P2P lenders in China.

In both cases, they operate without a formal regulatory framework and perform an intermediation function between lenders and borrowers, the most noticeable difference being in the origination channel, which is predominantly online. Unlike the formal banking system, shadow banking, whether in its traditional or online form, relies on a different financial market infrastructure to fund and originate its loans. Guo and Xia (2014, P.395) point out the similarities in the financing mechanism of P2P platforms and shadow banks: "In the regular banking system, the whole process of credit intermediation takes place within one bank. However, in the shadow banking system, institutions coordinate to complete the intermediation chain. In this system, commercial banks and financial companies also originate loans, as in the regular banking system, but they do not hold the loans or bear the credit risks. [...]The shadow banking system does not rely on bank deposits to support its lending business. 'Shadow bank deposits' come from money market mutual funds (MMMFs)."

In addition, Guo and Xia (p. 402) pointed out that the borrowers who resort to the services of shadow banking or P2P lending providers are often individuals or entities who have had difficulty obtaining credit through the "normal" financial system.

Once one accepts the fact that shadow banking and P2P lending are the same industry but conducted via new channels, this opens an important regulatory window of opportunity to reform shadow banking in a way that was not possible before. In practice, the difficulty in reforming the shadow banking industry came from two elements: (1) high asymmetry of information limiting the capacity to evaluate the positive and negative externalities of any reforms and (2) irrespective of its unregulated nature and the risk it holds, the shadow banking sector performs an important credit supply role for SMEs.

For policymakers and regulators, this means that the capacity of reform is extremely narrow, with a high probability of the negative externalities outweighing the benefits of formalizing the sector. Yet, with hindsight, it might appear that this inaction has played in their favor and will ultimately allow them to better regulate the shadow banking sector.

⁴¹ <http://www.bloomberg.com/news/articles/2015-04-12/seeing-bang-for-buck-even-china-fireworks-makers-now-do-finance>

⁴² It is expected that Tsinghua University will conduct quantitative and qualitative research on the topic in 2016.

The authors' submission, and contribution to this topic, is that the (active?)⁴³ absence of regulation of the P2P lending sector had the effect of removing any barriers to entry. This has allowed platform operators, lenders and borrowers to quickly enter and make use of a market to a point that it now has reached more than 2,225 platforms and includes more than one million lenders.

As a result, between 2007 and 2014, P2P lending platforms have gained traction and market acceptance emanating from SMEs seeking credit and lenders looking for higher yields than those offered within the traditional banking sector. Importantly, the technological component of P2P platforms creates a competitive advantage vis-à-vis physical shadow banks that translates into better interest rates paid or charged to users of P2P platforms. Not only this, but the lack of physical location, beyond pure cost benefits, removes friction and increases ease of use for consumers. Consequently, while one may see shadow banks and P2P platforms as substitutes, the latter are clearly superior.

Since mid-2014, there has been an increase in consultation activity on the part of Chinese regulators to gradually consider the imposition of rules for P2P platforms.⁴⁴ Namely, these are meant to cover regulatory capital, licensing obligations as well as better loan origination and credit scoring mechanisms so as to avoid excessive credit creation. These upcoming obligations will necessarily increase the operating cost of P2P platforms,

reducing the cost-competitive benefit that they hold against physical shadow banks.

Yet, it is very unlikely that the future onus on P2P platforms would be so high that it turns into a regulatory overkill and makes this online business less economically viable than physical origination. Moreover, while certain actors may have been solely operating on the precondition that this sector remains unregulated, one may at most witness a concentration of players within the P2P space.

Even a reduction in the number of platforms is not expected to equate to a fall in the number of users. For example, between them, My089.com and LuFax have more than RMB30 billion in outstanding loans, or more than 10% of a market valued at RMB241 billion for 2014.⁴⁵ Furthermore, while internet finance players, such as AliFinance, tended to avoid their regulatory obligations on the basis that at their core they were not financial institutions, it is clear that in the last few months they have taken steps toward compliance and acquiring the necessary licenses to operate.

The outcome of the above analysis is that, if understood correctly, regulators in China may have willingly allowed for the unregulated development of the P2P lending sector. This then led to a mass market adoption that is hard to reverse due to the cost benefits for all the stakeholders, even after factoring for compliance costs. Furthermore, the scalability opportunity provided by the online business model of these "shadow banks of the 21st century" means that it becomes much more cost effective for regulators to supervise one institution with a critical mass of users (e.g., AliFinance has more than 400,000 borrowers) as opposed to a fragmented industry.

In other words, regulating the P2P industry appears to have been not only the most efficient way of handling the problem caused by shadow banking, but the only way to do so successfully. Whether or not this is the result of careful planning from policymakers or sheer coincidence, this is positive for China as a whole as it creates a framework around the P2P sector that plays a critical role in the country's financial market reform and economic growth.

43 Active or not, this point can be the one of discussion. Indeed, if active, it would have meant that both policymakers and regulators were the mastermind to let a sector remain unregulated in views of formalizing it in the future. This is perhaps giving too much credit to these bodies; however, in itself, this may not be surprising. China has already used its accession to the WTO as a way to bring back-door liberalization into SOEs. Direct reform, without having recourse to the WTO obligations, would have made the task much harder for political reasons. Second, again using a WTO analogy, China has revealed its capacity of playing a forward-looking chess game in the context of the card networks. In practice, this meant that China has allowed the UnionPay card network to grow by shielding it from the competition of its U.S. counterparts (e.g., Visa and MasterCard) and against WTO rules. China was aware of that but kept the infringing behavior up until the point of the WTO court judgment, confirming that this was the case. Importantly, China knew that it had a losing case but also knew that any damages to be paid are from the date of the judgment and don't back-date to the start of the infringing behavior. As a result, China has rightly "masterminded" the plan to grow the UnionPay card network and give a de facto dominant market share and its cost for doing so would be negligible (e.g., legal fees) as they won't include WTO fines. This analysis of the UnionPay case was made by Jane K. Wing in a 2012 seminar entitled: "The US-PRC UnionPay WTO dispute: bringing the back office front & center" available at <http://www.law.hku.hk/aiifl/wp-content/uploads/2012/05/ppt-ProfWinn-5Oct2012.pdf>

44 Mak, L., 2015, "Consolidation imminent as new rules hit China's P2P Sector," South China Morning Post, 12 August, available at <<http://www.scmp.com/business/banking-finance/article/1848743/consolidation-imminent-new-rules-hit-chinas-p2p-sector>>

45 Zhang, Z., 2015, "Overcoming challenges of internet finance innovation in Hong Kong," HKIFA, 28 May

4. RegTech: maximizing the benefits of FinTech

While sections 2 and 3 illustrated the regulatory and policy benefits of bringing the shadow banking into the spotlight, albeit indirectly, through P2P lending, the article now turns to the broader topic of regulatory added value in the context of FinTech.

This section, therefore, starts by introducing the concept behind Regulation Technology (RegTech) before focusing on the extent to which this is applicable to the Chinese P2P sector. The relevance of discussing RegTech echoes the fact that with the increased use of technology within the financial services industry, regulatory bodies have the opportunity to access a level of granularity in risk assessments that did not previously exist. Indeed, Andy Haldane, the ex-head of stability at the Bank of England, when discussing the future of regulation, shared his vision: "What more might be feasible? I have a dream. It is futuristic, but realistic. It involves a Star Trek chair and a bank of monitors. It would involve tracking the global flow of funds in close to real time (from a Star Trek chair using a bank of monitors), in much the same way as happens with global weather systems and global internet traffic. Its centerpiece would be a global map of financial flows, charting spillovers and correlations."⁴⁶

This vision of a data-led regulatory system is not new. In 2009, the SEC created the division for Economic and Risk Analysis, looking at driving data insight for better regulation. However, it seems clear that since 2007, there has been an increase in activity emanating from regulators, industry and academia alike on this topic. For example, in 2014 in Australia, the Center for International Finance and Regulation initiated a research project entitled Regulatory Analytics and Data Architecture (RADAR).⁴⁷ In addition, post-2007, Scott Peppet published a paper on "smart mortgages" whereby the use of data could limit default risks.⁴⁸ However, one needs to balance the opportunity opened by technology with some practical barriers to actual and successful implementation.

4.1 Compliance: an extensive case for automation

The financial sector has been the largest spender on IT systems for decades [Arner et al. (2015)] and this trend is unlikely to stop, especially in respect to regulatory and compliance spending. In the wake of the 2008 GFC, the regulatory onus and the level of scrutiny requested by regulators has dramatically increased. Indeed, regulators have moved toward a risk-based approach, where access to data is key to performing appropriate prudential supervision of the firm. This appears to be a natural move, so as to avoid the risks of regulatory capture that did occur in the run up to 2008.

This trend toward a data-driven regulatory approach is clear. For example, Gutierrez (2014) illustrated how data is playing an increasing role in ensuring that financial institutions are not only held accountable for their actions, but that their responsibility is quickly established.⁴⁹ For financial institutions, the above has translated itself into an immediate cost increase, be it from a capital (e.g., Basel III), operational (e.g., human resources) or penalty perspective. On the last point alone, since 2008, banks in the West have been fined more than U.S.\$242 billion⁵⁰ out of which U.S.\$2.3 is attributable to the Libor scandal.⁵¹

Arguably, both the industry and regulators have a common interest in fraud levels. For example, the investigation to uncover the chain of responsibility for Libor took months. In a similar fashion, it took years to fully appreciate the exposure of various counterparties during the GFC.

It is understandable that there has been an interest from various stakeholders to increase transparency and create firm monitoring processes. In June 2015, the Bank of England issued its Fair and Effective Market Review, looking at the role that technology may play,⁵² noting that: "Firms have started to make progress in response to the limitations of existing surveillance solutions,

46 Haldane, A. G., 2014, "Managing global finance as a system," Keynote address, 29 October, Bank of England, available at <http://www.bankofengland.co.uk/publications/Documents/speeches/2014/speech772.pdf>

47 Centre for International Finance and Regulation, "Regulatory data architecture and analytics" (2014-2015) available at <http://www.cifr.edu.au/project/T019.aspx>

48 Peppet, S. R., 2009, "Smart mortgages, privacy and the regulatory possibility of infomediation," University of Colorado Law Legal Studies Research Paper No. 09-13. Available at SSRN: <http://ssrn.com/abstract=1458064> or <http://dx.doi.org/10.2139/ssrn.1458064>

49 Gutierrez, D., 2014, "Big data for finance - security and regulatory compliance considerations," 20 October, available at <http://insidebigdata.com/2014/10/20/big-data-finance-security-regulatory-compliance-considerations/>

50 Mainelli, M., 2015, "RegTech - worthy of Investment," 24 June, available at <http://igtb.com/article/regtech-%E2%80%93-worthy-investment>

51 Touryalai, H., 2013, "Big banks fined \$2.3B over illegal Libor cartels, more fines on the way," Forbes, 4 December, available at <http://www.forbes.com/sites/halahtouryalai/2013/12/04/big-banks-fined-2-3b-over-illegal-libor-cartels-more-fines-on-the-way/>

52 Roxburgh, C., M. Shafik and M. Wheatley, 2015, "Fair and effective market review: final report," June, available at <http://www.bankofengland.co.uk/markets/Documents/femrjun15.pdf>

including the use of new technology and analytics which go beyond the key-word surveillance and simple statistical checks previously used by firms to detect improper trading activity as discussed earlier in this section.” [Roxburgh et al. (2015, p. 90)]

In particular, the Bank of England highlighted the following regulatory add values of specific technologies [Roxburgh et al. (2015, p. 91)]:

- ▶ **“Pattern analysis,”** which can be used to identify unusual patterns of activity, such as “spoofing” (placing an order and then cancelling it seconds later to encourage others to drive up the price of a particular asset), front-running and wash trades, using predefined patterns of trading behavior.
- ▶ **“Big data” techniques,** which typically use a far larger number of inputs than standard surveillance techniques, helping to straddle information silos. The algorithms used have the potential to detect a wider range of suspicious activity than pattern analysis, and can also be used to identify networks of trading and communications activity that may themselves identify vulnerabilities.
- ▶ **“Predictive coding,”** which looks to identify patterns of activity, such as unusual use of communication, non-routine patterns of leaving the office, non-completion of training, or missing mandatory leave, which may flag potential conduct concerns.
- ▶ **Digitalization of voice communications,** which some firms claim has the potential to be more effective than analyzing written communications.

As a result, the argument for cost reduction within the compliance sector has never been as strong, and RegTech never looked so beneficial for firms. Yet, one also needs to be balanced as to what is currently feasible when it comes to fully automating regulatory systems. In 2009, Cyras and Riedl⁵³ addressed certain technicalities of building IT systems that can automatically comply with rules and regulations.

Before looking at the (re)transcription of compliance obligations into IT processes, the first question is much more fundamental – how should financial technology itself be regulated?

⁵³ Cyras, V., and R. Riedl, 2009, “Formulating the enterprise architecture compliance problem,” available at <http://ceur-ws.org/Vol-924/paper14.pdf>.

To date, the debate, especially in Asia, seems to be more on understanding what is the best framework so as to provide the right balance between market innovation (e.g., which is seen as beneficial in the case of P2P lending in China) and market confidence (e.g., again the P2P sector has shown how it can destabilize markets, as shown with China’s recent stock market volatility).⁵⁴

Furthermore, while in the West, the topic of RegTech has been developed much more by regulators (with the U.K. Government dedicating a chapter of the Blackett Review⁵⁵ to the topic and Europe pushing toward increased data transparency with PSD2). In practice, there are still uncertainties, as reported by Brummer and Gorfine,⁵⁶ as to whether or not principle-based approaches are better suited than rule-based ones.

Consequently, it seems that while the rational and potential benefits of a fully data-driven regulatory system are clear,⁵⁷ the application in practice of such a system remains distant. Thus, and in the context of China, it is fair to say that while FinTech provides an efficient method to engage with the market reform process, neither the regulators nor the industry is ready to fully move compliance into the digital ages. However, and as it will be discussed in the following part, this is not to say that China may not export its FinTech innovation.

⁵⁴ Bloomberg, 2015, “Some Chinese take 22% margin loans to finance sock purchases,” 1 July, available at <http://www.bloomberg.com/news/articles/2015-06-30/hidden-china-stock-debt-revealed-in-online-loans-at-22-interest>

⁵⁵ Government Office for Science, 2015, “FinTech: Blackett Review,” 18 March, available at <https://www.gov.uk/government/publications/fintech-blackett-review>

⁵⁶ Brummer, C., and D. Gorfine, 2014, “FinTech: building a 21st century regulator’s toolkit, October, page 8, available at <<http://assets1b.milkeninstitute.org/assets/Publication/Viewpoint/PDF/3.14-FinTech-Reg-Toolkit-NEW.pdf>>

⁵⁷ Given the fact that the authors expect that wide adoption of RegTech in China is unlikely in the next five years, potential applicability in the context of P2P lending will not be discussed in length. However, on an introductory note and expanding on the theme of how shadow banks transited to P2P platforms, technology could be used to maintain certain benefits of physical networks and originations. Indeed, part of the low delinquency rates of loans made by informal networks can be explained by the social peer pressure emanating from the fact that the borrowers and lenders are from the same community. Furthermore, specific lending groups share not only capital but also expertise. Consequently, geographical proximity acts both as a deterrent for borrowers to default but also participate in the skill transfers necessary to improve the success of the enterprises financed by the loan. The platforms can consider using geo-location as provided by IP addresses of borrowers and lenders so as to geographically match these. Obviously, the limitation of this use of technology is that you arbitrarily limit the scalability benefit of the internet, since you select only local participants. From a regulatory perspective, doing the above would also increase concentration risks and perhaps consumer protection risks if the physical proximity favors the recourse of force for debt recollection. The benefit may, therefore, be in creating a balanced ratio between local and regional P2P lenders for a given borrower.

5. Conclusion

In closing, this section places the discussion of China's P2P sector within the broader context of the role FinTech plays in China's financial market development. This discussion matters because P2P advances the need to be understood as integral to China's objective of devising a framework that supports and supervises the development of digital financial services.

For China, the benefit of doing so is clear. As we saw in section 2, P2P lending opened a window of opportunity to regulate the shadow banking industry. Likewise, FinTech also opens the path for a gradual liberalization of the country's financial system. This is done by indirectly introducing competition (via the new private banks) and efficiency (via the use of technology) within a state-owned banking system hampered by legacy IT systems and behavioral biases that end up benefiting SOEs.

While still a work in progress, there have been noticeable developments. Since 2014, we can find a clear trend where the Government is actively promoting complementary, if not alternative, financial products and services aimed at SMEs and individuals. Indeed Zhou et al. (2015) reported that the introduction of the new deposit insurance system has allowed for the establishment of "five new private banks and approved the establishment of 13 privately controlled financial leasing companies and financial companies affiliated to corporate groups and 162 village and township banks with private sector taking a dominant share.⁵⁸" More recently, the largest landmark is, without doubt, the issuance of the Guidelines on the Promotion of the Healthy Development of Internet Finance⁵⁹ on 18 July 2015.

On the regulatory side, we also tend to see an important allocation of power. While traditionally the focus of the PBOC has predominantly been on systemic and liquidity risks, the CBRC instead is concerned with prudential and misconduct aspects [Guo and Xia (2014, p. 418)]. In the context of FinTech, it appears that it is for the PBOC to lead the regulatory activities encompassing digital financial services, which includes P2P

lending [for a classification of the sectors within FinTech, please refer to Arner et al. (2015)].

Looking ahead, it is important for China to reach the balance between supporting the efficiency brought by the financial technology sector, while framing this within a regulatory framework that maintains healthy competition and market resilience. To date, this appeared to have been the case. Even though P2P market growth has been explosive, the reform process engaged in by the recent consultation will favor market concentration as opposed to rupture. Not only this, but China has been able to both regulate the industry itself and settle it within a specific complementary role to banks.

Going forward, China is developing a tiered regulatory regime whereby individual FinTech companies can operate within their respective niche up to a certain threshold to be defined by total value of assets or payments processed. Beyond this threshold, a formal partnership with a bank needs to be considered. By doing so, the competitive and liberalization pressure brought by the FinTech sector is manageable, both for regulators and the incumbent financial institutions. This decision to move toward a tiered regime has consequences beyond China's borders. Indeed, worldwide, the FinTech industry is challenging traditional financial market infrastructure and preexisting regulatory frameworks, and P2P lending is spearheading this charge.

In the West, it is the market itself that is adapting to this shift. The P2P sector is essentially turning toward an "institutional-to-peer" system and allowing traditional banks to originate loans or deploy excess liquidity in a more effective way.⁶⁰ As an illustration, SoftBank Group Corp. recently led a U.S.\$1 billion investment in SoFi, an alternative finance provider that operates much like a traditional investment bank, as it securitizes every loan it makes.

However, China is formalizing this harmonious relationship between banks and FinTech players by creating a tiered regulatory regime. The U.K., which is often regarded as the most advanced jurisdiction in terms of FinTech regulation, has to its credit moved from a rule- to a principle-based approach, granting

58 Zhou, W., D. W. Arner, and R. P. Buckley, 2015, "Regulation of digital financial services in China: last mover or first mover?" September, available at < ssrn.com/abstract=2660050 >

59 Guan Yu Cu Jin Hu Lian Wang Jin Rong Jian Kang Fa Zhan De Zhi Dao Yi Jian (Guideline on the Promotion of the Healthy Development of Internet Finance), promulgated on 18 July 2015. The Chinese official version of the Guideline is here: http://www.mof.gov.cn/zhengwuxinxi/zhengcefabu/201507/t20150720_1332370.html

60 Thomas, Z., 2015, "Institutional investors eye P2P lending Platforms," 19 June, IFLR, available at <http://www.iflr.com/Article/3463890/Institutional-investors-eye-P2P-lending-platforms.html>

slightly more flexibility to new entrants. However, it has failed to define a framework of collaboration.⁶¹ China is increasingly at the forefront of regulatory developments within FinTech, signaling a dramatic change in the origin of where regulatory standards may emerge from.

However, as the country goes from duplication to innovation in terms of financial regulation, this creates a new set of risks (inter)nationally. The limited capacity of Chinese regulators to draw from international best practices increases their probability of developing inadequate regulatory frameworks, which may compromise financial market resilience.⁶² To the rest of the world and as Fareed Zakaria captured it, this means that “almost all problems spill over borders.”⁶³

In that context, the capacity of China to handle the growth and prevent the bursting of the P2P sector will serve as a strong indicator as to the country’s capacity to devise a forward-looking financial markets regulatory framework in the 21st century.

61 To some extent, this is not fully accurate. The FCA has recently engaged into a consultation for the feasibility of opening bank APIs to third parties. However, the actual outcome and date at which this will be implemented is likely to be much further down the line than what China will devise.

62 Lee, A., 2015, “Chinese deposit insurance to prompt FinTech innovation,” 2 April, IFLR, available at <http://www.iflr.com/Article/3441991/Chinese-deposit-insurance-to-prompt-fintech-innovation.html>

63 Zakaria, F., 2011, *The post-American world: release 2.0*, W. W. Norton & Co.; 2nd Revised edition, 34

Trends in cryptocurrencies and blockchain technologies: a monetary theory and regulation perspective



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Abstract

The internet era has generated a requirement for low-cost, anonymous and rapidly verifiable transactions to be used for online barter, and fast settling money has emerged as a consequence. For the most part, electronic money (e-money) has fulfilled this role, but the last few years have seen two new types of money emerge – centralized virtual currencies, usually for the purpose of transacting in social and gaming economies, and cryptocurrencies, which aim to eliminate the need for financial intermediaries by offering direct peer-to-peer (P2P) online payments. We describe the historical context that led to the development of these currencies and some modern and recent trends in their uptake, in terms of both usage in the real economy and as investment products. As these currencies are purely digital constructs, with no government or local authority backing, we discuss them in the context of monetary theory, in order to determine how they may be valued under each. Finally, we provide an overview of the state of regulatory readiness in terms of dealing with transactions in these currencies in various regions of the world.

1. Introduction

It has been 20 years since Bill Gates opined: “Banking is essential, banks are not.” The early 21st century has seen a proliferation of financial technology (FinTech) firms, providing a wide and varied array of services, from payments and local and international money transmission to financing through P2P lending and crowdfunding. Venture capital funding in the U.K. for FinTech-related business has increased to more than U.S.\$500 million in 2014, while the sector is estimated to contribute more than GBP20 billion to the economy.¹ Many countries have stated their intention to create an ecosystem in which such businesses can grow, which can only mean the continued growth of the sector in the foreseeable future.

In parallel to these innovations, which aim at reducing the friction of making payments and transfers in fiat currency, facilitated by e-money, there has also been a rise in the use of virtual and cryptocurrencies. While the former have traditionally been utilized only in virtual economies, such as those of an online game or community [Lehdonvirta & Castronova, 2014], the latter has entered the real economy also, see discussion in Peters et al. [2014]. The goal of the most successful cryptocurrency thus far, Bitcoin, is in fact in line with that of the companies mentioned above, i.e., reducing transaction costs, but with the additional aim of completely eliminating the need for financial intermediaries.

While one of the objectives of Bitcoin was to become a form of electronic cash for online payments, its main use thus far has been for speculation. However, this is beginning to change, and there are numerous emerging intermediaries that are beginning to operate within the Bitcoin network, which include exchanges, merchant processes and money transmitters. In fact, Bitcoin has been traded in various exchanges since at least 2010,² and it has experienced various boom-bust cycles in this time with regard to its exchanges with the U.S. dollar, U.K. pound, euro and other important fiat currencies. This price volatility is seen as an impediment to its more widespread use as a medium of exchange, and there have already been suggestions (e.g., by Brito et al. [2014]) for the creation of financial instruments to aid in the

reduction of volatility. Section 3 will highlight trends in price and trading volumes for Bitcoin over the past two years.

The main innovation of cryptocurrencies, such as Bitcoin, has been introducing technologies such as the blockchain, a ledger containing all transactions for every single unit of currency. It differs from existing ledgers in that it is decentralized, i.e., there is no central authority verifying the validity of transactions. Instead, it employs verification based on cryptographic proof, where various members of the network verify “blocks” of transactions approximately every 10 minutes. The incentive for this is compensation in the form of newly “minted” Bitcoins for the first member to provide the verification. The distributed ledger at the heart of the network could, of course, be used for a number of other use cases, such as smart property and smart contracts, and regulators have looked at such applications much more favorably than cryptocurrencies, though this is also beginning to change. We provide more details of such use cases and the potential of the blockchain in section 3.4.

Bitcoin in particular has had a fair amount of criticism questioning why its digital tokens, produced as a result of solving a computational problem, should have any value, especially when they are not backed by any authority, i.e., not fiat currencies. In section 4, we discuss this question in more detail from both the traditional metalist views on currency value generation and more recent (and perhaps less-orthodox) monetary theories, such as the Modern Monetary Theory (MMT), in this context. We discuss issues relating to monetary theory and resultant economic policy implications that may arise under each of these frameworks, if cryptocurrencies were to interact more widely with the real economy.

In this environment of fast-paced technological evolution, financial innovation is running ahead of regulation. For example, the transaction anonymity provided by transacting in the Bitcoin network is a clear driver for several operational risks, money laundering, fraud and legal risk, as discussed at length in Peters et al. [2014]. Government responses have been mixed, and while they want to be careful not to overburden the budding sector of financial innovation with excessive regulation and curtail growth in the area, there is a need to ensure that the new services are not used to circumvent regulation in traditional banking services. Section 5 will summarize regulatory interventions in some major economies.

¹ Investment Trends in FinTech report by SVB, available at <http://www.svb.com/News/Company-News/2015-FinTech-Report-Investment-Trends-in-FinTech/?site=U.K.>

² Mt. Gox was launched in July 2010, and was responsible for the vast majority of Bitcoin trading until 2013.

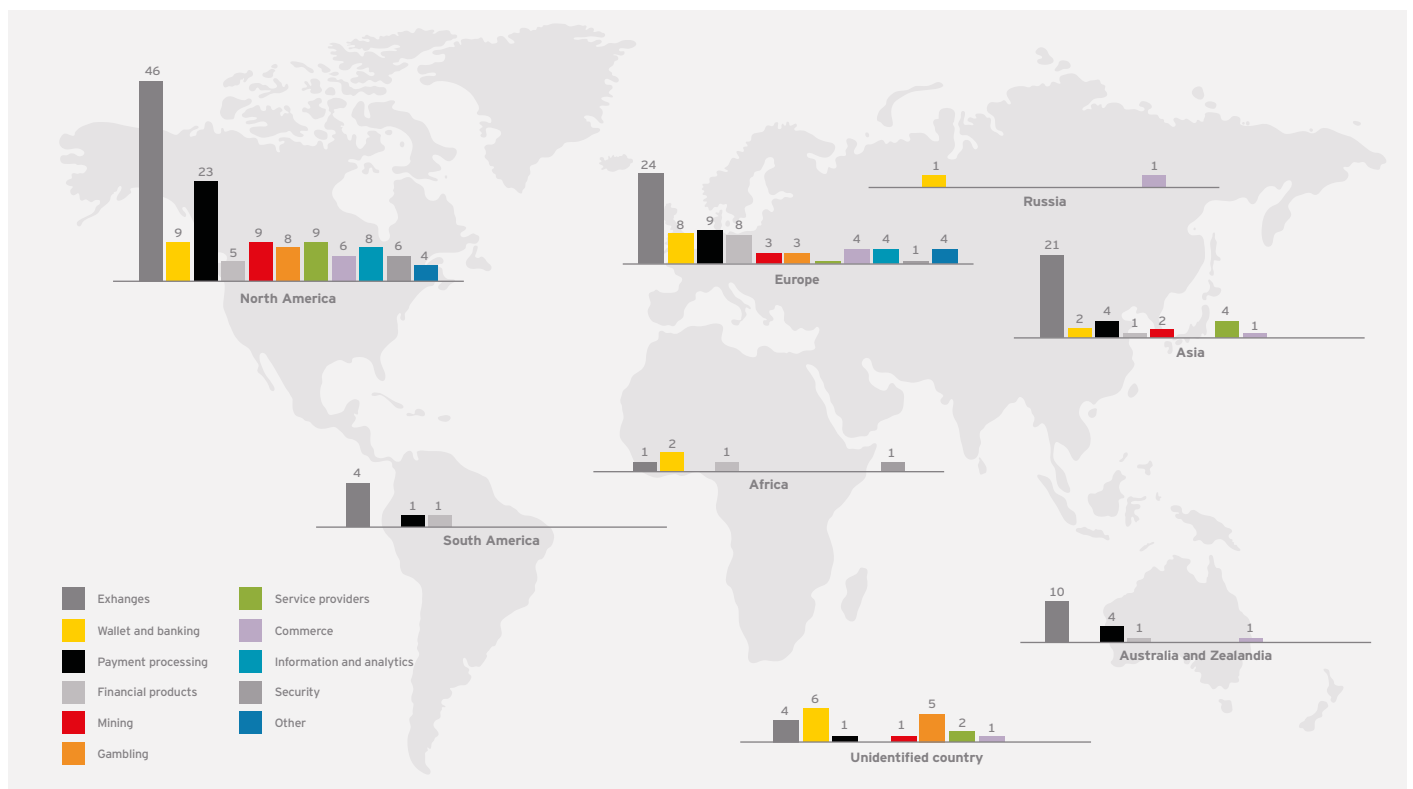


Figure 1: Location and industry for 318 start-ups in Bitcoin

Source: <http://www.creandum.com/318-records-and-counting-the-bitcoin-database-is-now-available-for-everyone-2/>

2. Physical and electronic forms of money, and the development of cryptocurrencies

In this section, we provide a brief overview of the historical context in which cryptocurrencies have emerged. We touch upon government-backed and commodity-backed currency and discuss the development of cryptographic protocols that enabled e-money. Finally, we describe the online communities that were first exposed to virtual currency and the differences between the afore-mentioned forms of money and cryptocurrency.

2.1 Fiat currency and e-money

We start with a brief definition of a fiat currency. The European Central Bank (ECB) defines fiat currency as any legal tender designated and issued by a central authority that people are willing to accept in exchange for goods and services because it is backed by regulation, and because they trust this central

authority. Fiat money is similar to commodity-backed money in this regard with respect to its usage, but differs in that it cannot be redeemed for a commodity, such as gold. The most common form of fiat currency backing is at the sovereign state's government level, but there have also been localized currencies or private monies. See discussion in Peters et al. [2014] for their use in local communities in the U.K. and Germany.

While one is most commonly accustomed to thinking about money in its physical form, only a very small fraction of a country's total money supply is typically in the form of notes and coins. In the U.K., this percentage is 2.1% of the GBP2.2 trillion total money supply [Lipsey & Chrystal, 2011]. This motivates the discussion of e-money, defined by Al-Laham et al. [2009] as a floating claim on a private bank or other financial institution that is not linked to any particular account. Under this rather general

definition, one can consider many different forms of e-money such as bank deposits, electronic fund transfers, direct deposits, and payment processors (including micro-payments).

Instead, we put forward the rather more narrow definition of e-money by the U.K. regulator (see Halpin & Moore [2009]):

“Electronic money (e-money) is electronically (including magnetically) stored monetary value, represented by a claim on the issuer, which is issued on receipt of funds for the purpose of making payment transactions, and which is accepted by a person other than the electronic money issuer. Types of e-money include prepaid cards and electronic prepaid accounts for use online.”

Typically, e-money is stored in the same unit of account as the fiat denomination used to obtain the e-money.

2.2 Cryptographically secure e-money

In the case of early forms of e-money, one may go back to the early 1980s where David Chaum (see Chaum [1988, 1985, 1992]) developed the concept of electronic cash under the view that for it to be useable in the real-world economy, it would require a token of money that would emulate physical currency, and most importantly, privacy feature to enable safely and securely anonymous payments. He developed such digital cash as an extension to the RSA encryption protocol used for most security purposes on the web at present, which led to the creation of the company DigiCash. Due to complications that arose with the central bank in Amsterdam where DigiCash was founded, it was decided that such currency would only be sold as a product to banks. This e-money attempt had a lot of promise, but it was unable to gain mainstream uptake in the end, due more to political and business-related issues.³

Following DigiCash, there was an explosion of small venture capital firms established to develop e-money systems, leading to the release of a key initial regulatory response to such e-money, the 1994 EU Report by the Working Group on EU Payment Systems, which was made to the council of the European Monetary Institute. After the release of this report, there were three notable front-runners that emerged, PayPal, Liberty

Reserve and E-gold, which was incidentally started by Nick Szabo, a former DigiCash employee and e-contract innovator.

While PayPal was careful to negotiate and avoid the challenges faced, by integrating into the monetary system in a manner deemed acceptable by central banks and regulators, the other two eventually ran foul of authorities in the U.S. due to the suspected nature of some clients that may have taken up these services for activities related to money laundering and criminal enterprise. These three early e-money systems primarily operated as centralized systems.

The impact of e-money on physical forms of currency has been discussed by Drehmann et al. [2002], while Sifers [1996] discusses policy concerns and regulatory issues. We will now be focusing on other electronic forms of money, which in contrast to e-money, are not digital representations of fiat money, but rather new forms of currency altogether.

2.3 Virtual currencies to facilitate online gaming economies

The 1990s saw the emergence of virtual currencies, typically currencies that were also centralized but restricted, at least in their early forms, to use in online messaging and virtual gaming environments. An early example was the Q-coin, which could be purchased from brick and mortar shops in China for use on Tencent's online messaging platform (Lehdonvirta & Castronova [2014]). Virtual currencies are now prevalent in massively multiplayer online games (e.g., World of Warcraft) or life simulation games (e.g., Second Life).

Where these currencies are used as the medium of exchange in an online virtual economy, they have similarities with their fiat currency counterparts. To start with, the currencies are typically used by the participants in the economy for the purchase of virtual goods and services. Secondly, the currencies feature a central authority, which similar to a country's central bank,⁴ can regulate the money supply in order to attain particular goals, such as controlling inflation or promoting economic growth. In particular, some platforms actively manage the monetary supply, increasing money supply through in game features, or reducing money supply through in game “sinks”, or desirable consumption

³ <http://globalcryptonews.com/before-bitcoin-the-rise-and-fall-of-digicash/>

⁴ The Money Supply, New York Federal Reserve, accessed 10 August 2015, available at <http://www.newyorkfed.org/aboutthefed/fedpoint/fed49.html>

items that remove money from the online environment (Lehdonvirta & Castronova [2014]).

The limited interaction of virtual currencies with the real economy stems from the fact that for many of these virtual currencies, the flows between fiat and the virtual currency are unidirectional, i.e., one can only purchase, but not sell the virtual currency [Peters et al., 2014]. For some environments, such as World of Warcraft, the developer Blizzard Entertainment actively monitors and polices the use of their virtual currency to restrict its use within the virtual economy and thus avoid any legal issues that may arise. There are a minority of cases, however, such as Second Life, whose developer Linden Labs does not oppose actively the exchange of the Linden dollar with real fiat currency. This has led to a bidirectional crossover between the virtual currency and real fiat currencies.

Virtual currencies cannot be fully considered as e-money since, because although they share some of its attributes, there is currently no legal founding to enforce the link between fiat physical money and virtual currencies, as there is in regulated electronic money transactions. In addition, virtual currencies are not stored in the same unit of account as any fiat currency that would preserve their worth.

2.4 Cryptocurrencies

Unlike such virtual currencies that are centrally controlled by a game designer or online platform operator, the development of cryptocurrencies has been such that they are typically not operated in a centralized manner. By far, the most widely known cryptocurrency is Bitcoin, introduced by Nakamoto [2008]. It is a “decentralized” currency, in that one does not need financial intermediaries in order to perform electronic transactions and it does not have a central bank or other authority in control of monetary policy.

Simply put, Bitcoin can be described as a decentralized ledger of transactions. The role of the verifying third party found in centralized systems is played by the Bitcoin network participants, who contribute computational power and are rewarded in the form of new amounts of cryptocurrency. Designed to be a currency for the internet, Bitcoin is not localized to a particular region or country, nor is it intended for use in a particular virtual economy. It is not backed by any local government or private

organization and is being circulated in the real economy on an increasing scale. Because of its decentralized nature, this circulation is largely beyond the reach of direct regulation, monetary policy, oversight and money supply control that has traditionally been enforced in some manner with localized private monies and e-money.

Bitcoin is certainly not the only cryptocurrency, and there are numerous papers discussing both identified weaknesses of the current protocol, as well as possible improvements to both centralized and decentralized currency architectures. See discussions in Eyal & Sirer [2014]; Barber et al. [2012]; Carroll & Bellotti [2015] and references therein. Other examples of decentralized cryptocurrencies include litecoin, which was originally based on the Bitcoin protocol and has a faster verification time; Ripple, which is a monetary system based on trust networks; Dogecoin; Monero; and Nxt.

2.5 The distinct nature of cryptocurrencies

To distinguish between centralized and decentralized currencies, one can consider, for instance, the definition from the central bank of Canada⁵: “Decentralized e-money is stored and flows through a peer-to-peer computer network that directly links users, much like a chat room. No single user controls the network.”

The ECB report on virtual currencies⁶ classified these currencies based on their interaction with fiat money and the real economy. Peters et al. [2014] proposed to extend this classification to include the existence of a central repository and a single administrator, where the absence of both means that the currency is operated via a decentralized network consensus-type administration. Decentralized virtual currencies are then termed cryptocurrencies, as the operation of these currencies is usually based on cryptographic proof provided by a network, rather than the existence of a trusted third party to verify transactions.

Differentiating between the different forms of virtual currencies is nontrivial as they are multifaceted in their attributes and interactions in the real economy. Several differences between

⁵ <http://www.bankofcanada.ca/wp-content/uploads/2014/04/Decentralize-E-Money.pdf>

⁶ <https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemesen.pdf?fe92070cdf17668c02846440e457dfd0>

centralized virtual currencies and cryptocurrencies were identified in Peters et al. [2014] and we briefly summarize some of these below:

- ▶ In terms of changes to their specification: in centralized virtual currencies, the specification can be altered by the controlling company, whereas in cryptocurrencies, the specification is agreed by cryptographic consensus
- ▶ In terms of their purpose and geographic area of operation, i.e. for use within an online community in the case of centralized virtual currencies, or in the wider economy, in the case of cryptocurrencies
- ▶ In terms of the existence of a centralized authority to exert control over issuance, monetary policy and administration of currency balances: in centralized virtual currencies, a central authority can step in to control money supply and reverse transactions at will. In cryptocurrencies, the absence of a centralized authority means that users control these aspects according to the computational power they contribute to the network. In addition, transactions are generally irreversible, as there is no authority to appeal to
- ▶ In terms of the flow of currency between users and the exchangeability of currencies with fiat
- ▶ In terms of the value generation mechanism, which will be discussed in detail in section 4

The distinct nature of cryptocurrency is apparent in its comparison to centralized virtual currency above, but also, as we will see here, to e-money. The issuance mechanism in Bitcoin is fixed, with the coin generation process and final available currency dictated by a mathematical protocol. E-money is intrinsically linked to the underlying fiat currency, whose issuance is controlled by a central banking authority. In addition, in the current absence of the requirements of “know your customer” that e-money transactions tend to require, one can have a more anonymous interaction with cryptocurrency. In general, it is acknowledged that anonymity is perhaps greater with cryptocurrencies, as not all companies directly follow the Financial Action Task Force standards with regard to customer identification.

Another key point that can distinguish the utility of crypto and virtual currencies relates to the environments they operate in. This is becoming an important feature in terms of accessibility;

at present, Bitcoin is limited to people with internet connections. This turns out to be significant as it precludes its widespread uptake in the third world and developing countries, where e-money has been very popular in mobile and paging service networks.

To conclude this section on the distinct nature of cryptocurrency, we also observe the comments made by Maurer et al. [2013] that in the case of Bitcoin, its code is its core. They state succinctly: “...the currency functions based on the trust its community of users place in the code and, as with all free and open-source projects, the trust they place in their collective ability to review, effectively evaluate, and agree as a group to changes to it.” This is clearly different from e-money, which involves trust in the central authority, government or state that backs the fiat denomination underlying the e-money.

2.6 Fulfilling the functions of money

Having described the historical context in which cryptocurrencies emerged, as well as the differences with other forms of e-money, we now analyze whether these currencies can fulfill the traditional role of money in an economy. A widely held view is that money should serve three distinct functions:

1. It should be generally accepted as a medium of exchange.
2. It should be a unit of account so that we can compare the costs of goods and services over time and between merchants.
3. It should be a store of value that stays stable over time.

Both the Bank of England⁷ and the central bank of Canada,⁸ using Bitcoin as a case study, found that cryptocurrencies do not currently fulfill these functions in the way that fiat currencies and e-money do. However, it is of course possible that in the future, a more widespread uptake in a particular cryptocurrency may lead it to it satisfying this criteria. This is not necessarily the view held in all jurisdictions throughout the world. We will discuss recent changes proposed to this view, for instance, in Australia, in section 5.

7 <http://www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2014/qb14q302.pdf>

8 <http://www.bankofcanada.ca/wp-content/uploads/2014/04/Decentralize-E-Money.pdf>

Separate from the functions of money, one can also explore particular qualities of money that make it suitable for facilitating transactions. In the case of commodity money, these include durability, value per weight unit (portability), and scarcity, and Graf [2015] argues that Bitcoin evaluates well on each characteristic. As these currencies were primarily oriented toward direct, online transactions, we can additionally consider the following qualities in the context, e.g., of online commerce [Drehmann et al., 2002]:

- ▶ They should be low cost.
- ▶ They should provide reliable security.
- ▶ They should offer a degree of privacy in transactions.

See further discussions on these points in Maurer et al. [2013].

The two further distinctive features of cryptocurrency such as Bitcoin, which is not readily replicated in fiat e-money, relate to its divisibility and fungibility; see discussion in Barber et al. [2012]. They note that one of the key practical appeals of, for instance, Bitcoin is "... the ease with which coins can be both divided and recombined to create essentially any denomination possible. This is an Achilles heel of (strongly anonymous) e-cash systems, because denominations had to be standardized to be unlinkable, which incidentally makes the computational cost of e-cash transactions linear in the amount. In Bitcoin, linkage is inherent, as it is what prevents double spending; but it is the identities that are anonymous."

We note that such cryptocurrencies as Bitcoin do not, however, have, compared to conventional fiat-backed e-money payment systems, a strict governance structure other than its underlying software. The implications of this are discussed recently by both Peters et al. [2014] and Böhme et al. [2015]. Without the lack of governance afforded by traditional fiat e-money payment systems, the Bitcoin network is unable to impose any obligation on a financial institution, payment processor, or other intermediary to verify a user's identity or cross-check with watch-lists or embargoed countries.

The implications of this for money laundering and money transmitter regulations are discussed in Brito et al. [2014]. Finally, it is clear that without central governance, one cannot impose any form of prohibition on sales of particular items.

This point is discussed by MacCarthy [2010], where they point out that traditional e-money and credit card payment systems regularly monitor and disallow a range of transactions that are deemed unlawful in the place of sale.

3. Trends in the usage of cryptocurrencies in the economy

The discussion in the previous section should highlight the much greater potential of cryptocurrencies for entering the real economy, compared to virtual currencies. We present in this section, summary statistics for the uptake of Bitcoin, the most popular cryptocurrency. We also discuss associated investment products, as well as views about the currency's potential use for facilitating criminal transactions.

3.1 Bitcoin trading by exchange and currency

Bitcoin is by no means the only cryptocurrency. CoinMarketCap⁹ lists 590 currencies, with a total market capitalization of U.S.\$4.5 billion. As Bitcoin accounts for more than 80% of this amount, we will focus on it to exhibit trends in cryptocurrency activity. Figure 2 shows the evolution of price, as well as traded volumes over a two-year period. It is interesting to note that while trading in Bitcoin was predominantly in U.S. dollars, it has now moved to being predominantly in Chinese yuan. This highlights Bitcoin's nature as both a highly speculative investment and as a tool for evading currency controls.¹⁰

The Bitcoin network relies on "miners", or members that contribute computational power to solve a complex cryptographic problem and verify the transactions that have occurred over a short period of time (10 minutes). These transactions are then published as a block, and the miner who had first published the proof receives a reward (currently 25 bitcoins). The maximum block size is 1MB, which corresponds to approximately seven transactions per second. In order to ensure that blocks are published approximately every 10 minutes, the network automatically adjusts the difficulty of the cryptographic problem to be solved.

Bitcoin mining requires specialized equipment, as well as substantial electricity costs, and miners thus have to balance their technology and energy investment so that their activities

⁹ <http://coinmarketcap.com/all/views/all/>, accessed 30/06/2015.

¹⁰ <http://www.ft.com/fastft/289502/bitcoin-still-gaining-currency-china>

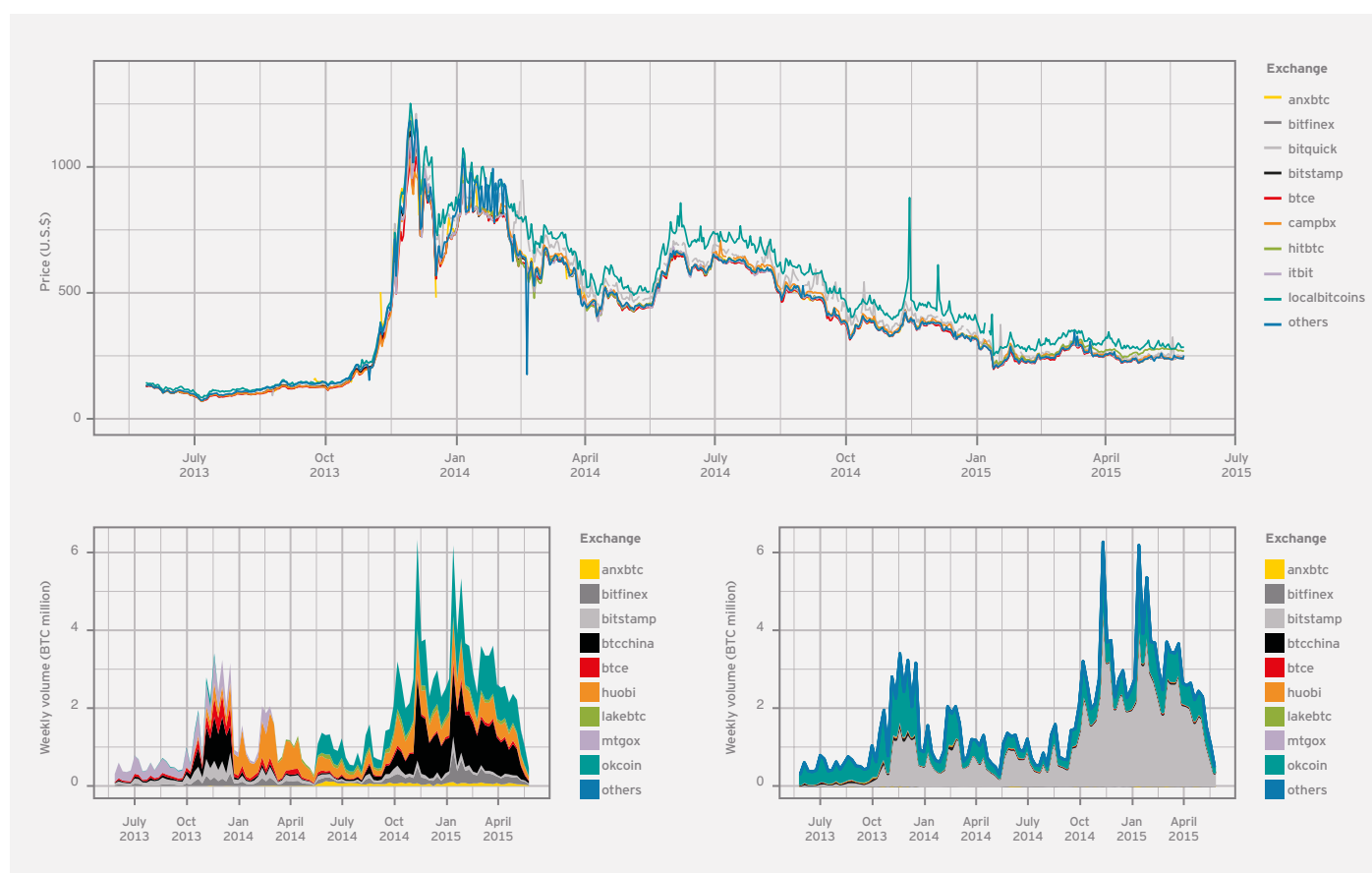


Figure 2: Price fluctuation of Bitcoin over time (top), traded volumes by exchange (bottom left) and by currency (bottom right)

are profitable. As the price of Bitcoin increased, miners invested in more hardware, increasing their computational capability. However, the Bitcoin network then increased the difficulty of the cryptographic problem, in order to keep blocks published in regular intervals. Figure 3 shows the evolution in both the difficulty of the cryptographic problem over time, as well as the block size. We note the exponential increase in the difficulty for a sustained period of time. As Bitcoin prices had been steadily declining in the latter part of this period, it is likely that mining became less profitable, which explains the plateau in difficulty.

With regards to the increase in block size, this corresponds to an increase in Bitcoin transactions over time. A block size of

0.4MB corresponds to approximately three Bitcoin transactions per second. A summary of other Bitcoin-related trends is also provided in reports such as those by Böhme et al. [2015].

3.2 Cryptocurrency real-world usage

The projected future use of cryptocurrencies such as Bitcoin, is discussed at length by Brito et al.[2014], with regard to securities, options, swaptions, forwards, bonds that may be developed going forward based on virtual currencies. ECB in its second report,¹¹ presents an overview of the actors, the different modes

¹¹ www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemesen.pdf

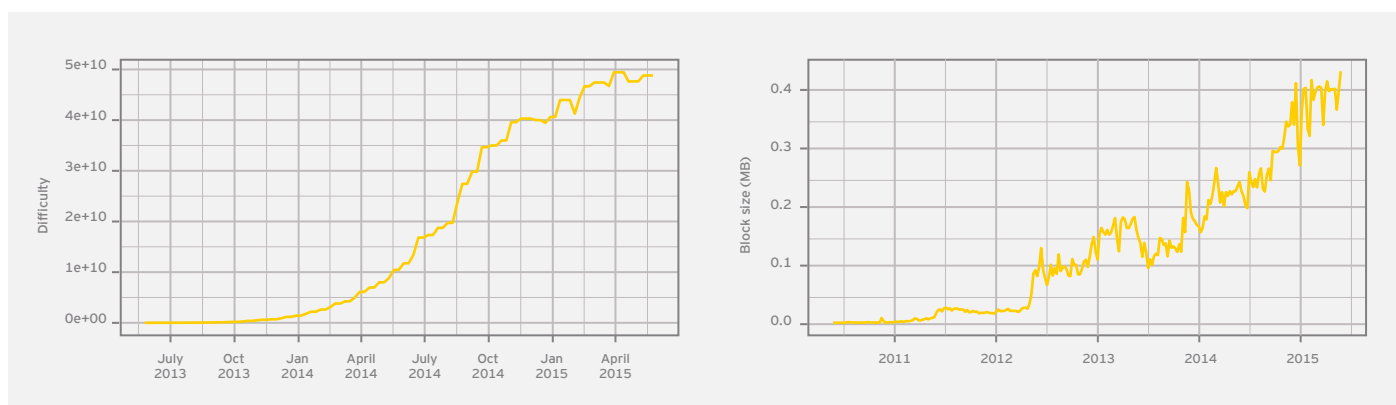


Figure 3: Difficulty

of operation and the different business models that originate from virtual currencies schemes. Measures of current usage for Bitcoin shows between 60,000 and 70,000 transactions daily, for a total transacted volume of between €15 million and €30 million, numbers which are somewhat insignificant compared to activity with existing payment solutions.¹² However, the ECB report highlights speed, cost and facilitation of cross-border payments as major advantages of virtual currencies.

The European Securities and Markets Authority (ESMA) has published a call for evidence on virtual currency investment products, as well as blockchain investment applications not involving virtual currencies.¹³ This interest of ESMA is much more narrow than that of other stakeholders, in that it does not seek to express a view of the desirability of using virtual currency in a payment system. Instead, it focuses on collective investment schemes (CIS) and virtual currency derivatives. In its preliminary work, ESMA has obtained data from six of 13 virtual currency CIS, which had approximately €246 million, with the largest accounting for almost half of this figure. Besides these schemes, ESMA also identified regulated European companies offering contracts for difference (CFDs) in Bitcoin and Litecoin, as well as binary options on either.

¹² Existing payment solutions include Visa, MasterCard, Paypal etc, and the ECB puts current daily non-cash payment transactions at 274 million.

¹³ http://www.esma.europa.eu/system/files/2015-532_call_for_evidence_on_virtual_currency_investment.pdf

3.3 Cryptocurrency as a means of facilitating crime

In its infancy, Bitcoin was associated with criminal activity through the online marketplace “Silk Road”, which operated on the Dark Web. Analysing eight months of data from this marketplace, Christin [2013] found that the majority of the 24,400 items sold on the marketplace were controlled substances and narcotics, with 112 sellers active throughout this interval. The total revenue from public listings in this time was approximately U.S.\$10 million. Silk Road was shut down by the FBI in 2013, while also seizing U.S.\$28.5 million in Bitcoin and arresting the marketplace's operator.¹⁴

Moser et al. [2013] provided the first thorough study of the potential for Bitcoin to be used as a money laundering tool. In particular, they investigated companies which provided anonymizing services for a fee, by “mixing” Bitcoin inputs from several participants, and generating new Bitcoin addresses to hold the outputs. They determined that some services were indeed effective for this purpose and concluded that because of this, it is unlikely that a know-your-customer principle can be enforced in the Bitcoin system.

In terms of real-world use in this context, an assessment of the National Crime Agency in the U.K. found that the majority of transactions for illicit purposes were actually of low value, and

¹⁴ <http://www.forbes.com/sites/andygreenberg/2013/10/25/fbi-says-its-seized-20-million-in-bitcoins-from-ross-ulbricht-alleged-owner-of-silk-road/>

there was little to suggest that digital currencies have been widely used in the context of money laundering. Although anonymity was identified as a potential facilitator of criminality, in reality to use many of the available digital currency services, users would have to register an (eponymous) account.

3.4 Other distributed ledger technologies

While HM Treasury and the Euro Banking Association (EBA) have been ambivalent toward Bitcoin in their recent reports, they have both recognized the potential of cryptotechnologies for other use cases. In particular, they have identified the distributed ledger at the core of the Bitcoin protocol, which achieves governance by consensus. While few concrete examples exist at present, Swan [2015] cites several examples of transnational groups that could use a governance structure, such as the Internet Standards group ICANN and DNS, thus avoiding the influence (political and otherwise) of certain groups that would occur when registering in particular jurisdictions. A more ambitious example is that of smart property, where potentially every asset could be encoded onto this ledger with a unique identifier, and thus all asset transactions could be confirmed and tracked via the blockchain.

As noted in Barber et al. [2012], the notion of scripting offered by cryptocurrencies such as Bitcoin is a highly useful and very innovative feature. It allows users to embed scripts in their Bitcoin transactions. This key feature is only just being recognized as a utility in its own right. It has been realized that at least in theory, as noted in Barber et al. [2012], this can lead to "... rich transactional semantics and contracts through scripts, such as deposits, escrow and dispute mediation, assurance contracts, including the use of external states, and so on."

The Bitcoin use case is one where the blockchain used is permissionless. "Permission" refers to the verifiers on the network, and in the case of Bitcoin, miners do not have to be authorized by a central authority before performing their mining activities. This is not the only model for a blockchain, however, and indeed the actors on the network who verify transactions can be subject to authorization, as well as legal accountability. The applications outlined in this section span both modes of blockchain operation.

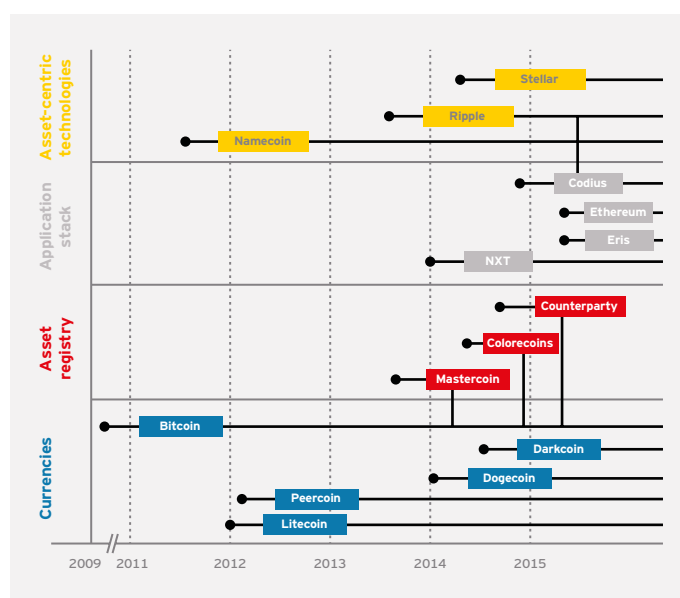


Figure 4: Four categories of cryptotechnologies reproduced from the EBA cryptotechnologies report.

In its report, the EBA¹⁵ presents an analysis of cryptotechnologies in four application areas, presented also in Figure 4:

- **Currencies** such as Bitcoin, Litecoin, etc.
- **Asset registries:** Similar to the smart property example mentioned earlier, ownership details would be recorded in the blockchain, and while physical assets could always be lost or stolen, the holder of an asset would not be able to claim ownership until it has been transferred via a blockchain transaction. However, because of the potentially large number of assets and associated details that could be recorded on the blockchain, this could create a large amount of traffic on the network. Bitcoin's 1MB block size caps the number of transactions at an average of seven transactions per second, and it is clear that a much higher number would be needed for the purpose of asset registration in certain areas (e.g., financial). A good example of a use case is that of Everledger,¹⁶ a ledger for the certification and transaction history of diamonds.

¹⁵ Available at https://www.abe-eba.eu/downloads/knowledge-and-research/EBA_20150511_EBA_Cryptotechnologies_a_major_IT_innovation_v1.0.pdf, accessed 29/05/2015

¹⁶ <http://www.everledger.io/>

- ▶ A laboratory first takes measurements of cut, clarity, size and other information and this is all stored on the blockchain.
- ▶ **Application stacks:** This application area aims to provide a platform for the execution of “complete applications on top of decentralized networks.” Examples include the smart contracts proposed by Eris Industries,¹⁷ which can automatically verify the interactions of the parties to the contract. With such contracts, there is the possibility of creating derivatives that settle automatically and reduce counterparty risk, such as the blockchain derivatives developed by Hedgy.¹⁸ There are several caveats to this application area also, however, as smart contracts will always be limited to the ability of the data to describe these interactions.
- ▶ **Asset-centric technologies:** These focus on digital representation of real assets on a shared, but not public, ledger.

4. Value generation in cryptocurrency

At first glance, it may be difficult to comprehend why cryptocurrency, as a purely artificial digital construct produced as a result of solving a computational problem, with no backing from a central authority, should have any value in the real economy. In this section, we will refer to a number of economic principles followed by associated monetary theories, in order to determine any elements that could explain the value of this digital resource. We note that we do not advocate one particular school of economic thought over another, but will rather discuss issues that may arise under a range of these different prospective analytical frameworks, if cryptocurrencies were to interact more widely with the real economy.

4.1 Cryptocurrencies as scarce economic goods and the potential of a “Deflationary Spiral”

Graf [2015] suggests that Bitcoin “meets key characteristics of a good, as defined in relation to action and choice.” It is in fact a scarce digital good, produced through a predetermined issuance process, and guaranteed not to exceed a certain quantity, as its protocol has a hard-coded upper limit of 21 million coins, a kind of asymptotic upper bound. While one is accustomed to think about goods and scarcity in a material sense, this of course does not have to be the case.

Consequently, it is then worth considering what the final means of value generation will be when the money supply, for instance in Bitcoin, is complete, either by means of exhausting the computational effort one is willing to expend in mining more coins or the actual total number of Bitcoins is produced. Unlike physical metal commodities, which are in unknown total supply, we argue that the knowledge of the total amount available will change the perceived value of the currency. Though physical metals may be scarce, the lack of knowledge of their total supply leads an ever more involved and expensive search for more, maintaining or increasing the worth of those currently in circulation. This will not be the case with Bitcoin. At which point, the argument of value maintenance for such a cryptocurrency must change to a different perspective.

Some economists, such as Paul Krugman¹⁹ observed the following possibility of deflationary pressure in cryptocurrency networks. Bitcoin’s capped total money supply could be viewed as a variation on Milton Friedman’s “k-percent rule” [Friedman, 1960]. This theory states that an optimal way to control inflation over the long term is for the central bank to grow the money supply by a fixed amount of k% each year, irrespective of the cyclical state of the economy. In particular, one should set the growth variable of k% at a rate equal to the growth of real GDP each year. This connection between Milton Friedman’s Nobel Prize-winning theory and Bitcoin practice was highlighted recently in Böhme et al. [2015], who argue that one can consider Bitcoin as a type of “... proposal to fix the annual growth rate of the money supply to a fixed rate of growth.” At the end of the mining process, when the total Bitcoin money supply is created, this would be equivalent to a k = 0 or perhaps a negative k if a large loss of money supply occurred due to theft, electronic storage corruption or damage to physical storage of a nontrivial portion of the total money supply.

Hence, one needs to consider what is an applicable monetary policy to deal with the situation that the size of an economy grows at a different rate to the quantity of money in that economy, in this case Bitcoins. Böhme et al. [2015] reiterate the views of Paul Krugman that “... the fixed slow growth rate of Bitcoin creates the possibility of deflation if Bitcoin was to be used widely...” They also note that there have been other

¹⁷ <https://erisindustries.com/>

¹⁸ <http://hedgy.co/>

¹⁹ <http://krugman.blogs.nytimes.com/2011/09/07/golden-cyberfetters/>

cryptocurrency extensions of Bitcoin proposed to overcome such potential problems. See discussion by, for instance, King [2013], which introduces primecoin with infinite money supply or the introduction of peercoin, which keeps $k\%$ around 1-2.

Barber et al. [2012] also discusses such issues, talking about a deflationary spiral that may arise from the capped money supply. We first briefly recall what a deflationary spiral is before discussing this in the context of Bitcoin.

A deflationary spiral refers to an economic development, where rampant deflation can eventually lead to the collapse of the currency. In general, deflation can be considered as a decline in the general price level. It can occur when the price of goods and services, as measured relative to a specific measure, begin to decline. This may not be due to the fact that the value of the goods and services themselves reduced, instead it can simply occur due to the fact that the value of the currency itself increased. So one can consider the spiral of deflation as arising in the situation that the value of a currency, relative to the goods in an economy, increases continually as a result of hoarding. In response, as the value of the currency relative to the goods in the economy increases, people are given an incentive to hoard the currency. This incentive arises from the fact that by retaining the currency, they aim to be able to purchase more goods for less money in the future. This becomes a vicious cycle as the lack of available currency in the economy causes prices of goods to decrease and this results in yet further hoarding.

Such an effect is a real condition that affects the fiat-backed fractional reserve banking system. There are two schools of thought as to whether such a deflationary spiral may occur for Bitcoin. One view is that it is not likely to occur in the case of Bitcoin, since it is argued that users in the real economy may not foresee a fixed cost (unit amount) that they must pay with Bitcoin. Therefore, if the value of the Bitcoins that they own increases, then one may expect that any future cost will take a proportionally smaller amount of Bitcoins. A consequence of this view is that there would, however, be no real fixed incentive to hold Bitcoin other than pure speculation. In addition, if the real economy that allows Bitcoin grows, then one would also expect the per-unit value of Bitcoin in such a perspective to proportionally increase. This view effectively perceives Bitcoin not as a debt but as an asset, and as such, under such a perspective,

one would expect that Bitcoins would only deflate in value when the Bitcoin economy is growing.

In Barber et al. [2012], they take this perspective and postulate on a setting in which Bitcoin usage has matured in the real economy, considering, for instance, a stable 1% of U.S. GDP transactions in Bitcoins and 99% in USD. They then argue that in such a setting, one may expect that the purchasing power of Bitcoin would still increase over time. The reason is that each coin will increasingly capture a correspondingly constant fraction of the country's growing wealth. They acknowledge that such a deflationary spiral may occur for Bitcoins and discuss potential for hoarding of such cryptocurrency. They argue that their appreciation potential will result in a user tendency to accumulate Bitcoins rather than spend them in the real economy. The consequence of this is that the incentives offered to groups that verify and validate Bitcoin transactions on the blockchain will reduce as there will be less Bitcoins in circulation. Hence transaction volumes naturally reduce resulting in a less profitable operating environment for verification of transactions. They aptly term this condition "bit rot."

The alternative economic perspective on how deflationary spirals may manifest is given by the argument that they occur when there is an incentive to hoard because of declining prices. The decline in prices will result in less available currency in the marketplace, which further perpetuates a decline in prices, and the deflationary cycle emerges. The website https://en.bitcoin.it/wiki/Deflationary_spiral discusses mechanisms under which a non-traditional deflationary spiral may arise in the Bitcoin network. It argues that once Bitcoin value stabilizes, there will always be the knowledge that the number of Bitcoins in the market is limited. Consequently, if the total value of all Bitcoin transactions completed increases in "real" terms, then there will continue to be price deflation. From this view, there can be an expectation of future deflation, which will result in a discrepancy in perceived values of Bitcoins depending on one's investment horizon. In the short term under this scenario, there would be an apparent over-pricing of Bitcoin, which may encourage alternative competition.

4.2 The metalist view

A range of authors have alluded to the metalist perspective on understanding the value generation mechanism for the Bitcoin

cryptocurrency, see discussions in Maurer et al. [2013]; Ingham [2004]; Blanchette [2011]. For instance, Maurer et al. [2013] discuss Bitcoin and the embracement of its users in a form of monetary pragmatism, and state "... Bitcoin enthusiasts make the move from discourse to practice in their insistence that privacy, labor and value are built into the currency's networked protocols. This semiotics replays debates not just about privacy and individual liberty, but about the nature of money, as a material commodity or chain of credits." They argue that Bitcoin embodies a form of "practical materialism," which is manifest in the form of a modern day digital metallism, an extension of the ideas of Ingham [2004] and his perspectives on "practical metallism."

Both Blanchette [2011] and Maurer et al. [2013] argue for a form of metalist monetary perspective on Bitcoin. The latter stating "... Despite the supposed immateriality of digital bits of information, matter itself is very much at issue with Bitcoin, both in how it is conceptualized and in how individual Bitcoins are mined ..."

Under the premise of a "metalists'" view of the value derivation of money, many would argue that value of cryptocurrencies may at present be derived from physical commodities consumed in the mining process utilized to obtain this increasingly scarce resource. For instance, several studies have argued that the price of cryptocurrency Bitcoin is related to the cost of maintenance, storage and electricity consumption required for the large server farms "virtual mines" utilized to create the Bitcoin currency, see discussions in O'Dwyer & Malone [2014]. In J.P. [2011], they argue that the material value of Bitcoin is not limited to the privacy feature offered by the cryptocurrency, they argue that it finds another feature that provides its value, the process of producing new Bitcoins known as mining which "mimic[s] the extraction of minerals [...]. As the most readily available resources are exhausted, the supply dwindles."

If one then continued the perspective of a metalist monetary theory for cryptocurrency, such as Bitcoin, then one could argue based on ideals expressed in Ingham [2000], where they consider money to be the consequence of rational agents that prefer to work with money, which is the most tradable commodity in the current real economy. Under this perspective, there is some notion that virtual and cryptocurrencies especially could maintain value after the mining process. For instance, if rational

agents in the economy began to prefer or value them more than other fiat-backed e-money substitutes. This could happen in a number of ways, for instance, rational agents may prefer the privacy features that the virtual and cryptocurrencies may offer in the digital economy more than other fiat-based e-money competitors. Another possibility may be that the blockchain technologies that act as ledger, for instance, in Bitcoin, may find widespread uptake as a means of virtual contract construction between different economies. Or as a third perspective, if virtual and cryptocurrencies found a wider market base in third-world countries by moving beyond internet-based services to mobile services, this may also maintain their value in the real economy.

4.3 The chartal view

Next we discuss some alternative monetary theory perspectives on cryptocurrencies such as Bitcoin. In particular, we consider the case of Bitcoin when the mining process is completed and all the money supply has been created. We then consider the chartalist perspective of where Bitcoin may derive its value. This is an alternative perspective to that of the metalist views expressed above that has not been discussed previously in the context of Bitcoin. Therefore, we find it interesting to open up this avenue of thought to more debate.

An alternative view to the metalist perspective can also be considered, where the value of Bitcoins may continue to be maintained. This alternative view would be based on a transition from the metalist perspective, post mining completion, to a chartalist's view. This view posits that money should not be studied in isolation from the powers of the state, i.e., the country that "created" and "controls" the money. In particular, under this perspective, money, in its general sense, is a unit of account created by a central (government) authority for the legal structuring of its social debt obligations.

Well before cryptocurrencies were conceived of, for instance, Knapp [1924] argued that all monies are chartal, and this can include cryptocurrencies, since all payments in the form of tax to the state or governing powers are measured in some unit of value. Furthermore, the state makes a decision "that a piece of such and such a description shall be valid as so many units of value." It is then irrelevant what this token or money manifests as since it is only a "sign-bearing" object that a state "gives a use independent of its material."

4.4 How do “outside monies” like virtual and cryptocurrencies fit into the chartal and modern monetary theory perspectives?

In this section, we delve in more detail into the importance of thinking about the role of such virtual and cryptocurrencies in aspects of monetary theory and monetary policies if they become more prevalent in the real economy. We contrast views formed based on fiat-backed e-money with how they may be affected in a real economy with both fiat and virtual or cryptocurrencies. In general, we will tend to raise more questions than we proffer solutions, though this is useful to open dialogue and ways of thinking about the challenges that may lie ahead.

In particular, we first recall that monetary theory is developed with the aim of understanding the most suitable approaches to monetary policy and how it should be conducted within an economy. It is suggested by such theories that a variety of different monetary policies may be employed to benefit countries, depending on their economy and resources. For most monetary theories, the core ideals relate to factors such as the size of the money supply, price levels and benchmark interest rates and how they all affect the economy through inflation, taxation, wage growth and unemployment levels.

It is the realms of economists and central bankers to execute the outcomes of such theories in practice. As stated, we would like to initiate some exploration of how virtual and cryptocurrencies, when mixed with fiat currency in the real economy, may alter traditional outcomes on policy decisions compared to fiat-backed money supplies.

There are many forms of monetary theories that have been developed by economists. Indeed we have seen brief discussions on metalist and chartal views already above. These include ideas of Fiat Debt-Free Money Reformers, Modern Monetary Theorists, Modern Monetary Realists, Post Keynesian Reformers, Islamic Banking Advocates, Social Credit Reformers, Land Reformers, Hard Money Reformers and Competing Currency Reformers. Recent, some would say unorthodox versions of such theories (Tcherneva [2006]), including variants such as Modern Monetary Theory (MMT) (Wray [1998b]) and Modern Monetary Realism (MMR), which were developments from early forms of Chartalism (Wray [1998a]) and prior ideas from Knapp [1924]; Forstater [1999] and functional finance theories of Lerner [1943]. Such

theories also are termed neochartalist approaches and “tax-driven” money, see discussion in Wray [2000]. All these theories revolve around the procedures and consequences of utilization of government-issued units of money often called fiat money, in the sense of the definition offered earlier.

A key premise of theories like MMT and the consequences of monetary policy that flows from these theories is the notion that governments have some level of control over the money supply and elasticity of money. So we wonder, what happens to such controls when other forms of currency, created outside of any sovereign state, start to interact in a given economy. Does this reduce the power of the state to enact policies based on the assumption of ultimate control of money supply, or does it act as a friction or damping factor on the utility of resulting policy levers when enacting policies assuming ultimate money supply controls are still relevant.

One can view money, in its general sense, as a unit of account created by a central (government) authority for the legal structuring of its social debt obligations. For instance, this may manifest between a population and a governing central figure in the form of taxation liabilities. In this setting, it is conceived by chartalists and many modern monetary theories that money then arises from the state as a form of tax credit that can nullify these taxation debts. This is in firm contradiction to other orthodox theories that followed from commodity-based currency views, such as gold standards, which view money more as naturally arising as a medium of exchange from the attempts of enterprising individuals to minimize transactions costs in barter economies.

No matter which view one prefers, it is interesting to question what implications may arise from interactions in such economies of non-government-controlled currencies, which are non-fiat such as virtual currencies and cryptocurrencies acting as truly “outside” monies. Before embarking on developing such questions for future consideration, we summarize a few key ideas from chartalist, MMT and MMR thinking, based on the account provided in Tcherneva [2006], where it is observed that in general, the following principles are considered by these theories. With each concept, we briefly pose questions relating to their applicability in the setting of an economy, which admit both fiat currency as well as virtual and cryptocurrencies.

- ▶ Dismissal of the view that money emerges naturally as a medium of exchange that enables the minimization of transaction costs among utility, maximizing rational agents in the real economy, due to their view that such notions lack historical support.
 - ▶ Is this view now valid for cryptocurrencies? Some would argue one of the key reasons cryptocurrencies are being adopted in the real economy at present is due to the very fact that they are providing a reduction in transaction costs for some agents in comparison to other fiat-backed e-money payment services such as Paypal, see discussions in Brito et al. [2014]. Perhaps, therefore, there will be some historical precedent for questioning this perspective further in the case of virtual and cryptocurrencies.
- ▶ One should study money in the context of institutions and culture with special consideration given to political and social considerations.
 - ▶ Certainly, the role of virtual and cryptocurrencies may fit into this perspective, in the sense that the context of their uptake in the real economy has historically certainly been a function of institutional influence from governments in the form of regulations and central bank policies. The role of virtual and cryptocurrencies has also been influenced by cultural and social considerations. To see this, one may consider, for instance, the rapid uptake of some virtual and cryptocurrencies in the U.S. and more recently in China, where in some cases, they are used as alternative means for transmission of assets with enhanced anonymity from central government oversights.
- ▶ Money is, by its nature, a credit-debt social construct. Furthermore, chartalists argue that social debt relationships may be ordered with the top of the hierarchy being the liability of the central authority, which they deem the most reliable. Neochartalists also argue that modern currencies are contained in a context of certain governing central or state controls: the ability to levy taxes on the population and economy; and the ability to decide what is acceptable for payment of tax liabilities. In this context, tax should be understood in a broader context of modern income tax, estate and commercial tax as well as any nonreciprocal obligation to the state, such as fines and fees.
 - ▶ We will address this point in section 4.5.
- ▶ Money functions as an abstract unit of account, which is used as a means of payment and debt settlement. Unlike orthodox monetary theories, chartalists distinguish between money-of-

account and money in the real economy, perhaps summarized by Keynes [1930] who argued that “money-of-account is the description or title and the money is the thing which answers the description.” With this view, chartalists see money’s function in the real economy as a medium of exchange is incidental to and contingent on its primary function as a unit of account and a means of payment of liability. Neochartalism generally views taxation not as a form of financing government spending but instead as a mechanism to create demand for the currency.

- ▶ We will address this point in section 4.5.

- ▶ Neochartalists believe that given the view that modern states or countries or unions have the monopoly power over the issue of their currency, i.e., sovereign currency control with no fixed exchange rates, dollarization, monetary unions or currency boards, they will not face operational financial constraints, though they could face political constraints. Furthermore, they consider that such states should consider borrowing as an ex ante interest rate maintenance operation, arguing that instead the taxation system is established as a means to creating demand for currency rather than financing of government spending.

Their perspective is such that, no entity, with the power to create and destroy money as they require, will need anyone else to assist in the ability to “fund” spending. However, even though deficits for the economy are not financially constrained in the typical sense, they are still subject to potential pressures from inflation rates and exchange rates, as well as other considerations such as access to available resources, capacity utilization, labor availability and external balance.

- ▶ Firstly, we discuss the issue of monopoly power over currency supply. To address this consideration, the question that may arise is whether or not the central bank or government can control the money supply and elasticity of such decentralized virtual or cryptocurrencies perhaps through accumulation of stored reserves raised through taxation. This would, of course, be assuming they were eventually allowed by governments as alternative forms of payment for tax liabilities alongside traditional fiat currency. If this were the case, then one would need to be very careful in the money supply management, since as noted previously too greater hoarding of these currencies, which are of bounded total money supply, may result in a deflationary spiral.

- ▶ An alternative perspective, which avoids the need for reserving of virtual or cryptocurrencies, in order to achieve control of the money supply, may also be possible for some types of virtual and cryptocurrencies. For instance, in the case of Bitcoin, instead of accumulating reserves, a government may alternatively take greater stakes in the network mining and transaction validation activities. A government's access to vast computing power, relative to most agents in the economy, puts them at a distinct advantage to gain sufficient computational power within such networks that any virtual or cryptocurrency with consensus network type protocol embedded in its code may be able to have; its core attributes modified by governments who earn sufficient voting rights. For instance, a government may gain sufficient control of the currency network to alter core features of the code, such as the finite money supply aspect, the mining rates and other key features related to the money supply. Perhaps, it may be argued that, in effect, this is the cryptocurrency equivalent of state central power over money supply.
- ▶ Secondly, we consider the issue of whether virtual and cryptocurrencies would result in a form of operational financial constraint for states and governments. In the case of decentralized virtual or cryptocurrencies, the operations required to gain some form of control or assert some form of management of the money supplies in the real economy may not in general be free from operational financial constraints. For instance, the actions mentioned above, such as reserving of virtual or cryptocurrencies, or more active control/"voting power" within the virtual network through enhanced mining or transaction processing activities, will be potentially expensive for the state to maintain and can be considered as a operational financial constraint on the actions they may wish to enact in their monetary and fiscal policies.
- ▶ Neochartalists also consider that when a state has a monopoly over the currency, it also has the power to set prices, including interest rates and how currency will be exchanged for other goods and services.
- ▶ So if one assumes that the state only has partial power over some aspect of a virtual or cryptocurrency through such means as discussed in the previous bullet points above, then an interesting question to raise is what implications does this have for the perspectives held by neochartalists on the ability of a state to set prices, interest rates and exchange

rates? These views are based on the premise that the state has monopoly power over the currency, and of course they will still maintain this over their fiat denominations. So the point of consideration is more whether an increased growth and uptake in the economy of virtual and cryptocurrencies, for which the state does not have monopoly control over the money supply attributes, will create a friction in their ability to set prices, interest rates and exchange rates?

4.5 Acceptance and legal tender

Many have argued against various aspects of MMT and related theories from a chartalist root. One of the key aspects they point to relates to the notions of legal tender. For instance, Schumpeter [1954] and Davidson [1972] emphasized legal tender laws as critical, where the state or government would issue a currency in terms of a unit of account and then pass laws to require adoption of that currency in designated public and private payments. This is a jurisprudence perspective of how currency can become valuable in a real economy. However, chartalists like Knapp [1924] took an alternative view that such laws would not suffice and that the state or government effectively establishes the money of account when it determines what will be "... accepted at public pay offices ... ," rather than through legislation.

Hence, we see that an important point to note, which is directly of consequence to understanding a chartalist's view of virtual currency and cryptocurrency, is to observe that the chartal nature of money and its acceptance in the real economy lies not in its acceptance in the form of a legal tender status but instead on its place in the hierarchy order of social debt relationships. This derives instead from the state's power to delegate taxes and dictate how and in what form of money such accounts will be paid.

Therefore, under a chartalist view on monetary theory, it is not a question of whether fiat currency is in direct competition with virtual or cryptocurrencies, but instead whether there will be sufficient demand from the public that will enforce the will of the public to push the state to accept such currency forms as means of payment of liabilities owed to the government. Should this occur, there will be an interesting circumstance arising, where one unit of account is established in a fiat currency that is under the control of the government, however, a second unit of account is from a decentralized money supply mechanism in the form

of cryptocurrency. We point out that it has potential to change dynamics in the supply and demand of fiat currency and should be considered further.

4.6 Competition between virtual/cryptocurrencies and fiat-backed currencies

Another interesting point to make that arises naturally from a chartalist view and relates to virtual and cryptocurrencies in regards to the concern some have raised about such monies competing and perhaps becoming a dominant unit of barter in an economy is that agents can never simply refuse to take a sovereign's money. That is, fiat currency is the key money to make payment for taxation liabilities, as long as there is always taxation present in the economy, which in some form relies upon the fiat currency more than the virtual or cryptocurrency. In this case, the fiat currency will always remain at the top of the hierarchy of social order in terms of debt relationships, see further discussion on this general view in Tcherneva [2006]. The only issue arising in such cases is again the fact that when virtual and cryptocurrencies are allowed into the economy to pay tax, they diminish the power of the state to possess and maintain unconditional control of the currency, that they would maintain if they only allowed for receipt of tax credit their own unit of money or fiat currency.

Consequently, another issue arises here that potentially complicates the above considerations. This is the one pointed out by Innes [2004], where it is argued that it is not only the requirement to pay taxes in any particular state mandated monies, but also the difficulty in obtaining these monies that provide the monies worth. To understand where this may pose a challenge to fiat currencies, one needs to consider the situation in which fiat money and virtual and cryptocurrencies are allowed in the economy (perhaps not as legal tender) but to settle tax debt in government offices. In this case, if it is perceived by the public that certain attributes, for instance, privacy features of virtual currencies or cryptocurrencies, are more valued than those of fiat-denominated e-money, then it may be conceivable that these would have preference in the economy. Now add to this the scarcity of such Bitcoin monies in terms of the hard limit on their physical creation, unlike government money, which is only really limited by inflationary pressures in the given economy and one has an interesting question to postulate relating to which form of currency and in what conditions would maintain the top hierarchy

in terms of social debt settlement unit.

4.7 Not high-powered money and yet somehow explicitly liability free?

Consider the context of a modern economy with a fractional banking system in place. In such an economy, a bank recognizes that it is safe to issue deposits to an amount that is some multiplier of its actual physical reserves since it may be reasonable to expect that only a small fraction of depositors will try to "cash out" deposits, redeeming them for reserves. Then, under the setting in which a reasonably stable deposit multiplier is established as a function of the ratio of reserves held against deposits, the supply of deposits will be determined by the quantity of loans demanded and the quantity of reserves supplied. One can then consider the role of governments in controlling this process; they are effectively able to exert some measure of control by deciding what should form the basis of reserves and also by establishing a legally required reserve ratio. At some stage, this corresponded to the gold standard and nowadays has moved instead to government fiat money, sometimes known as a form of high-powered-money. Since the government has the ability to control the fiat money supply i.e., a seigniorage in the real economy, they naturally obtain a level of control in the economy since banks will continue to have a demand for such currency in order to increase the value of their loan books, which is constrained by their ability to accumulate reserves and a reserve ratio condition on lending.

Hence, a modern economy revolves around a money supply that consists of bank deposits plus the portion of high-powered money created by government that is not held by banks as reserves. Even though the banks may exert some level of control on the amount of fiat money held by the general public by adjusting interest rates on deposits to induce them to deposit or spend fiat money, the government with its control of high-powered money supplies to banks and its setting of reserve ratios, exerts exogenously a pressure on banks and ultimately the money supply.

Hence, another point worth questioning is the role of these exogenous currencies such as virtual and cryptocurrencies, which are not created by central banks or private banks. Somehow, they are liability-free in some sense and yet they may not be considered in the neochartalist view as high-powered monies, issued by central banks for spending in the private sector to

fuel taxation generation and value creation in fiat currency. Unlike the view that although banks can also create money, their creation is a “horizontal transaction” since such created credit or money does not increase net financial assets as these assets are offset by liabilities. However, this is not the case with virtual and cryptocurrencies. In addition, if they were allowed as monies to make payment for taxes and fines from a given government, their legal power to discharge debt would increase their worth. This may cause a friction with the fiat-denominated e-money system, since unlike fiat e-money, which is issued or controlled by the government where it can issue its own currency at will, subject to a public liability in the country’s accounts, appearing as a deficit in the country’s accounts, it has no control over the issuance of the virtual or cryptocurrencies except that which it may exert, should it store significant reserves of such currencies in the central bank. This may, therefore, in principle, should virtual currencies become more mainstream, act as a problem for the universality of the policy tool that governments have utilized for years based on their universal monopoly of money creation that regulates inflation and unemployment.

In continuation of the above lines of questioning, one would wonder about the government or state’s ability to utilize money creation and taxation to control the rate of spending in the economy and, therefore, the ability to fulfill, as Lerner [1943] puts it, “... to fill its two great responsibilities – the prevention of depression, and the maintenance of the value of money.” If virtual currency or cryptocurrency were to be admitted as viable tender to pay tax to the government, such currencies may diminish the standard monetary controls available to the government, since currency creation is no longer the sole mandate of the government. It would, therefore, require some form of symbiotic relationship with the fiat money supply and the virtual or cryptocurrency supply to maintain the status quo – a fact that has not been lost on central banks over the years as early forms of e-money and non-fiat currencies arose.

One last point to make about the notion of liability in the case of virtual and cryptocurrencies is perhaps that they are implicitly creating liabilities. This can be seen in the case that in the creation of such currencies through the mining process, the mines require utilization of resources, loans/credit agreements with banks in creation of resources required to run and set up such mines, meaning the creation of such currency, though

explicitly seems liability-free, is actually implicitly not free of liability.

5. Views on cryptocurrency from a regulation perspective

Given the importance of understanding the role of cryptocurrencies in the monetary system highlighted above, we now turn to another core element that must be considered, should such currencies be utilized increasingly in the real economy – the role of regulation. A detailed account of several aspects of regulation response to cryptocurrencies can be found in Peters et al. [2014].

Even before the advent of cryptocurrencies, there have been concerns about how centralized virtual currencies may limit a country’s ability to control inflationary pressures. The Chinese Q-coin was adopted widely as a form of payment by online entrepreneurs, i.e., outside the online messaging environment which it was created for. The Chinese central bank, citing concerns about an increased money supply outside of its control, as well as a difficulty in imposing taxation, enacted limits in the issuance of these currencies (Lehdonvirta & Castronova [2014]).

A number of regulators around the world have been devoting an increasing amount of attention to virtual and cryptocurrencies in recent years. Mitchell [2014] outlines the responses of several regulators, from which one can observe that there are both varied interpretations of cryptocurrency (e.g., as e-money, private money,²⁰ as a commodity or private property, or as a private unit of account), which informs their treatment from a taxation perspective also. In most regulatory responses to virtual currencies in Europe, Bitcoin has not been found to fulfill the criteria or definitions of a currency. Sweden, however, has required virtual currency exchanges to register with the financial supervisor, while Germany and France have declared that certain Bitcoin-related activities are subject to authorization. There is no unified approach to regulation of such virtual currencies as payment services within the EU, and ECB has not expressed any intention to amend the current legal framework to incorporate such considerations. We will discuss in a little more detail the recent responses of the ECB and the U.K. HM Treasury, who

²⁰ Bitcoin has been recognized by the German Finance ministry as a unit of account, and is thus treated as a type of private money. <http://www.spiegel.de/international/business/germany-declares-bitcoins-to-be-a-unit-of-account-a-917525.html>

have both conducted surveys about the use, benefits and risks of virtual currencies, as well as the New York Federal Reserve's recently released detailed regulatory framework.

In November 2014, HM Treasury in the U.K. issued a call for information, attracting more than 120 responses from diverse participants, including banks, payment service providers and digital currency developers. Results were published in March 2015.²¹ Benefits of digital currencies include lower costs and faster, 24-hour processing availability, particularly for cross-border transactions. The risk side of these advantages are limited controls over transactions, theoretically allowing very large international transfers, with no capacity for the authorities to freeze or reverse payments, given the irreversibility of transactions in virtual currencies.

The ECB has been actively considering monetary policy implications resulting from the introduction of centralized virtual currencies and decentralized cryptocurrencies since at least 2012. In its first report,²² it noted that both virtual currencies and cryptocurrencies fall under the responsibility of central banks, due to the characteristics shared with payments systems, it highlighted the lack of supervision and concluded that they did not pose a risk to financial stability. In its more recent study,²³ it suggested that due to its high price volatility and low acceptance rate, the Bitcoin could not be, yet at least, regarded as a full form of money from an economic perspective. The ECB revised its definition of virtual currency as "a digital representation of value, not issued by a central bank, credit institution or e-money institution, which, in some circumstances, can be used as an alternative to money."

Despite the slow uptake of virtual currencies, the ECB also has stated its intention to monitor possible threats to monetary policy and financial stability, in the case where virtual currencies gain mainstream acceptance. It suggests that this would be possible for a new generation of virtual currencies, which address current technical weaknesses and are geared towards a more mainstream, less technologically minded audience.

With regards to enacting regulation, the U.K. Government has thus set out a series of steps, which will include AML regulation pertaining to digital currency exchanges in the U.K., to ensure that law enforcement bodies have the capabilities required to combat criminality in the digital currency space. More interventionist, maybe than its European counterpart, the New York Department of Financial Services (NYDFS), has recently released the BitLicense Regulatory Framework, after approximately two years of consultation.²⁴ The regulation sets out definitions for virtual currencies activities, which include:

- ▶ Receiving virtual currency for transmission or transmitting virtual currency,
- ▶ Storing, holding or maintaining custody or control of virtual currency on behalf of others,
- ▶ Buying and selling virtual currency as a customer business,
- ▶ Performing exchange services as a customer business,
- ▶ Controlling, administer or issuing a virtual currency.

Any individual or corporation engaged in the aforementioned activities is required to obtain a license to do so. This entails the completion of a lengthy application form²⁵ and a U.S.\$5,000 fee. The regulation is far-reaching and there have already been firms that have either withdrawn their New York operations, or shut down altogether, citing excessive compliance burdens.²⁶

The Law Library of Congress has compiled a list of regulatory responses besides the ones detailed above.²⁷ Outside of the EU and the U.S., regulatory activity regarding cryptocurrency usage has mostly been limited to warning about its nature as a non-state-backed currency and its price volatility. There are a number of exceptions, however, as China has banned financial institutions from handling Bitcoin, while Japan has stated that "due to their intangible nature and reliance on third parties," Bitcoins are effectively not subject to ownership, and thus are not covered by existing regulation.²⁸ On the other hand, the Australian Senate will effectively put forward recommendations to treat Bitcoin as

21 https://www.gov.U.K./government/uploads/system/uploads/attachment_data/file/414040/digital_currencies_response_to_call_for_information_final_changes.pdf

22 <https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemes201210en.pdf>

23 www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemesen.pdf

24 The final text of the regulatory framework is available at <http://www.dfs.ny.gov/legal/regulations/adoptions/dfs200t.pdf>.

25 http://www.dfs.ny.gov/legal/regulations/vc_license_application.pdf

26 <http://cointelegraph.com/news/114623/bitlicense-doing-its-job-eobot-becomes-3rd-firm-gone-from-new-york>

27 <http://www.loc.gov/law/help/bitcoin-survey/regulation-of-bitcoin.pdf>

28 <http://www.japantimes.co.jp/news/2015/08/06/national/crime-legal/bitcoins-lost-in-mt-gox-debacle-not-subject-to-ownership-cla#.VctCRLwy3CK>

money, as treating Bitcoin as a tradable commodity would have created a double taxation effect.²⁹

A common theme in recent regulatory responses is that they have identified that more promising perspectives of virtual currencies may actually lie in the technology they use, i.e., the distributed ledger technologies introduced in section 3.4. The term “virtual currency scheme” also encompasses the technologies and mechanisms used for the operation of transactions in the currency. The U.K. Government, while identifying barriers that would prevent digital currencies from gaining widespread acceptance, has also identified the associated blockchain, or distributed ledger technology as having promise for the future of payments. Following the survey of HM Treasury, it has set out a series of recommendations to provide funding to research bodies to explore opportunities for digital currency technology.

6. Conclusions

Our report highlights current trends in the virtual and cryptocurrency space, from a number of different perspectives. The first is the emergence of such currencies, given the historical context of fiat money and the advent of cryptographic protocols that enabled e-money. We show that from this perspective, virtual currencies emerged to serve the need of particular niches of online gaming and social communities, while cryptocurrencies sought to have a wider reach, and become the de facto currencies of the internet.

Given these goals and the much greater probability for decentralized cryptocurrencies to start entering the real economy, we focus on these to present current usage trends. Though to date, even the most popular cryptocurrency, Bitcoin, has not gained widespread acceptance, while its use as an investment product has also remained low. It is believed that this will change as a greater understanding of these cryptocurrencies occurs by regulators, exchanges and businesses in the economy. We hope to have contributed to this discussion by highlighting several aspects of monetary theory and the role of virtual and cryptocurrencies in such theories.

Finally, we summarized current regulatory responses, showing the varied reaction to Bitcoin, from outright bans in China to effective treatment as money in Australia. The decentralized nature of the currency means that there is limited effect any single jurisdiction can have on the operation currency itself, and the focus is on companies providing services in the field. Given the borderless nature of Bitcoin, however, it is difficult to see how regulators can prevent companies taking advantage of regulatory arbitrage, by setting up in jurisdictions with less restrictions.

²⁹ <http://www.reuters.com/article/2015/08/05/us-australia-bitcoin-idUSKCN0QA0TS20150805>

References

- Al-Laham, M., H. Al-Tarawneh, and A. Najwan, 2009**, "Development of electronic money and its impact on the central bank role and monetary policy," *Issues in Informing Science and Information Technology*, 6, 339-349
- Barber, S., X. Boyen, E. Shi, and E. Uzun, 2012**, "Bitter to better how to make bitcoin a better currency," *Financial cryptography and data security*, Springer, 399-414
- Blanchette, J-F., 2011**, "A material history of bits," *Journal of the American Society for Information Science and Technology* 62:6, 1042-1057
- Böhme, R., N. Christin, B. Edelman, and T. Moore, 2015**, "Bitcoin: Economics, Technology, and Governance," *The Journal of Economic Perspectives* 29:2, 213-238
- Brito, J., H. Shadab, and A. Castillo, 2014**, "Bitcoin financial regulation: securities, derivatives, prediction markets, and gambling," *Columbia Science & Technology Law Review* 16, 144
- Carroll, J. M., and V. Bellotti, 2015**, "Creating value together: the emerging design space of peer-to-peer currency and exchange," *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing*, ACM, 1500-1510
- Chaum, D. L., 1985**, Cryptographic identification, financial transaction, and credential device, U.S. Patent 4,529,870, July 16
- Chaum, D. L., 1992**, "Achieving electronic privacy," *Scientific American* 267:2, 96-101
- Chaum, D. L., 1988**, Blind signature systems, U.S. Patent 4,759,063, July 19
- Christin, N., 2013**, "Traveling the Silk Road: A measurement analysis of a large anonymous online marketplace," *Proceedings of the 22nd international conference on World Wide Web*. International World Wide Web Conferences Steering Committee, 213-224
- Davidson, P., 1972**, "Money and the real world," *The Economic Journal* 82:325, 101-115
- Drehmann, M., C. Goodhart, and M. Krueger, 2002**, "The challenges facing currency usage: will the traditional transaction medium be able to resist competition from the new technologies?" *Economic Policy* 17:34, 193-228
- Eyal, I., and E. G. Sirer, 2014**, "Majority is not enough: Bitcoin mining is vulnerable," *Financial Cryptography and Data Security*, Springer, 436-454
- Forstater, M., 1999**, "Functional finance and full employment: lessons from Lerner for today," *The Jerome Levy Economics Institute Working Paper*
- Friedman, M., 1960**, *A program for monetary stability*, Vol. 541, Fordham University Press, New York
- Graf, K. S., 2015**, "Commodity, scarcity, and monetary value theory in light of bitcoin," *Prices & Markets* 3:3, 52-69
- Halpin, R., and R. Moore, 2009**, "Developments in electronic money regulation-the Electronic Money Directive: A better deal for e-money issuers?" *Computer Law & Security Review* 25:6, 563-568
- Ingham, G., 2000**, "Babylonian madness: on the historical and sociological origins of money," *What is money* 1, 16-41
- Ingham, G., 2004**, "The emergence of capitalist credit money," *Credit and state theories of money: the contributions of A. Mitchell Innes*, 173
- Innes, A. M., 2004**, "The credit theory of money," *Credit and state theories of money: the contributions of A. Mitchell Innes*, 50
- J. P., 2011**, "Bits and bob," *The Economist*, <http://www.economist.com/blogs/babbage/2011/06/virtual-currency>, June
- Keynes, J. M., 1930**, *A treatise on money*: in 2 volumes, Macmillan & Company
- King, S., 2013**, Primecoin: cryptocurrency with prime number proof-of-work, July 7
- Knapp, G. F., 1924**, *The state theory of money* [1905]
- Lehdonvirta, V., and E. Castronova, 2014**, *Virtual economies: design and analysis*, MIT Press
- Lerner, A. P., 1943**, "Functional finance and the federal debt," *Social research*, 38-51
- Lipsey, R., and A. Chrystal, 2011**, *Economics*, OUP Oxford
- MacCarthy, M., 2010**, "What payment intermediaries are doing about online liability and why it matters," *Berkeley Technology Law Journal* 25, 1037
- Maurer, B., T. C. Nelms, L. Swartz, 2013**, "When perhaps the real problem is money itself: the practical materiality of bitcoin," *Social Semiotics* 23:2, 261-277
- Mitchell, K., 2014**, "Bitcoin from the beginning: financial law," *Without prejudice* 14:2, 61-62
- Moser, M., R. Bohme, and Breuker, D., 2013**, "An inquiry into money laundering tools in the bitcoin ecosystem," *eCrime Researchers Summit (eCRS)*, IEEE, 1-14
- Nakamoto, S., 2008**, Bitcoin: a peer-to-peer electronic cash system
- O'Dwyer, K. J., and D. Malone, 2014**, Bitcoin mining and its energy footprint
- Peters, G. W., A. Chapelle, and E. Panayi, 2014**, "Opening discussion on banking sector risk exposures and vulnerabilities from virtual currencies: an operational risk perspective. Available at SSRN 2491991
- Schumpeter, J. A., 1954**, *History of economic analysis*, Psychology Press
- Sifers, R. W., 1996**, "Regulating electronic money in small-value payment systems: Telecommunications Law as a regulatory model," *Federal Communications Law Journal* 49, 701
- Swan, M., 2015**, *Blockchain: blueprint for a new economy*, O'Reilly Media, Inc.
- Tcherneva, P. R., 2006**, "Chartalism and the tax-driven approach to money," in Arestis, P., and M. Sawyer (eds.), *A handbook of alternative monetary economics*, 69
- Wray, L. R., 1998a**, "Money and taxes: the chartalist approach," *Jerome Levy Economics Institute working paper*
- Wray, L. R., 1998b**, *Understanding modern money: the key to full employment and price stability*, Vol. 26, Edward Elgar Cheltenham
- Wray, L. R., 2000**, "The neo-chartalist approach to money," Available at SSRN 1010334

Financial regulation of FinTech



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Abstract

Effective financial regulation is clearly crucial to innovation and the future success of the financial services industry and, in specific, FinTech.¹ There are also unprecedented opportunities for reforming regulation and also creating new businesses in the process. Examples include: using “big data” regulatory online reporting and analytics to streamline reporting; and stimulating a new generation of “RegTech” companies to provide the regulatory/compliance software. This paper reviews the current regulatory pressures faced by the financial services industry, and discusses new “big data” approaches to regulating financial companies. Three actions are highlighted: a) an open-source platform for FinTech regulation, b) a regulatory XML to help standardize reporting and c) an overarching international standards body. Lastly, we examine responses by the U.K. Financial Conduct Authority (FCA), such as Project Innovate.²

1 FinTech: Financial technology is a line of business based on using software to provide financial services, such as peer-to-peer and crowdsourced services.

2 Financial Conduct Authority, Project Innovate, <https://innovate.fca.org.uk/>

1. Introduction

The popular Alex cartoon in the Daily Telegraph often focuses on Mega Bank and its battles with the Financial Demeanour Authority. This is reflective of the growing agreement across financial services and Government that the burden of (U.K.) financial regulation needs reform.

Financial regulation faces a myriad of pressures. These include political pressure to curb excesses (e.g., Libor, PPI); increasing E.U.-centric regulations (e.g., MiFID II); individual firms being simultaneously regulated in multiple jurisdictions and with multiple frameworks; institutions being asked to produce escalating amounts of financial, risk and compliance data (e.g., stress testing). The perception that regulatory data is being requested “speculatively” and not being analyzed by the regulators; the need to improve regulators’ tools and infrastructures. The requirement for flexible regulation of new global alternative finance entrants, such as PayPal, Apple, Facebook, Amazon, etc.; and importantly balancing FinTech innovation with regulation (e.g., payday loans, peer-to-peer, crowdsourcing).

This situation is both a challenge and an opportunity. A challenge to make financial regulation and reporting transparent, efficient and effective; but an opportunity to apply the innovative FinTech paradigms and big data analytics to regulation and compliance. It is also an opportunity as demonstrated by the FCA Project Innovate to engage with the FinTech community in automating regulation and compliance. Regulators also need state-of-the-art reporting and analytics infrastructures. They would also benefit from engaging with the academic community in regulatory and policy research, such as agent-based “policy modeling” of proposed regulations.

However, the situation in the U.K. is complicated by the reality that regulation is increasingly an E.U. and international process, based on the recent standards reform legislation and that capital flows generate cross-border risk.³

2. International regulatory standards, harmonization and reporting

As discussed above, financial regulation is becoming increasingly complex and intrusive, with major financial institutions facing multiple regulatory jurisdictions, and regulators requesting increasing amounts of granular data from firms. This data will ultimately allow us to understand systemic risks – how entities in financial systems are exposed directly and indirectly to one another via similar exogenous factors and directly via financial instruments referencing those same institutions. Moreover, the data should allow analysis of the degrees to which institutions react to regulation and how these reactions propagate through financial markets.

The complexity of regulation comes at a price, with financial institutions burdened by stringent and detailed requirements that discourage innovation in new financial products. (Consequently, firms may choose to relocate.) The added complexity and stringency in financial regulation also raise an important consideration in the continuing support for the U.K.’s new finance technologies (FinTech) – namely the challenge of balancing the need to encourage but also regulate the emerging new finance industry and the emerging technology industry designed to support financial markets. Examples are blockchain and digital currencies. Likewise, if the current trend in financial regulation continues, nonbank entities will spring up to do things that major institutions cannot or choose not to do.

There is general agreement⁴ that U.K. financial regulation would benefit from the application of automated reporting and advanced analytics to compliance and risk measurement. Arguably, a key ingredient in moving forward is standards.

2.1 Open-source regulatory platforms

In domains such as health care, open-source platforms are increasingly popular for sharing data and analytics tools. Healthcare examples include OpenMRS (<http://openmrs.org/>) and Open mHealth (www.openmhealth.org). In general, open source refers to any program whose source code is made available for

3 E.U. financial regulation: http://ec.europa.eu/budget/biblio/documents/regulations/regulations_en.cfm. List of financial regulatory authorities by country: https://en.wikipedia.org/wiki/List_of_financial_regulatory_authorities_by_country

4 Financial futures, U.K. Government Office for Science Blackett Review. Also see, Houstoun, K., A. Milne, and P. Parboteeah, 2015, “Preliminary report on standards in global financial markets,” working paper: <http://www.swiftinstitute.org/wp-content/uploads/2015/05/Report1-11th-May-2015.pdf>

use or modification as users or other developers see fit. Open-source software is usually developed as a public collaboration and made freely available.

An open-source platform for financial regulation could be instrumental in establishing a new relationship between the regulators and the regulated. The open-source part might provide an XML-based system architecture and database infrastructure for streaming reporting data to the regulator, and software companies can provide commercial apps for analytics and visualization that would be available to all parties. A FinTech regulatory platform is a good starting point, given the requirement for flexible regulation of new and evolving entrants.

2.2 XML financial standards

Central to reporting are XML financial standards.⁵ A key question is whether an existing XML is usable for regulatory reporting.

Financial XMLs include:

- ▶ **eXtensible Business Reporting Language (XBRL)** – XML specification that describes financial information for public and private companies and other organizations
- ▶ **Financial Information eXchange (FIX) Protocol** – XML specification for the real-time electronic exchange of securities transactions (e.g., Algorithmic Trading)
- ▶ **Financial products Markup Language (FpML)** – XML specification for swaps, derivatives and structured financial products
- ▶ **Interactive Financial Exchange (IFX)** – XML specification for electronic bill presentment and payment, business-to-business payments, business-to-business banking (such as balance and transaction reporting, remittance information), automated teller machine communications, consumer-to-business payments and consumer-to-business banking
- ▶ **Market Data Definition Language (MDDL)** – XML specification to enable interchange of data necessary to account for, to analyze and to trade instruments of the world's financial markets. MDDL seeks, through definition of common terms, to provide a standard vocabulary so that market data may be exchanged unambiguously between exchanges, vendors, redistributors and subscribers

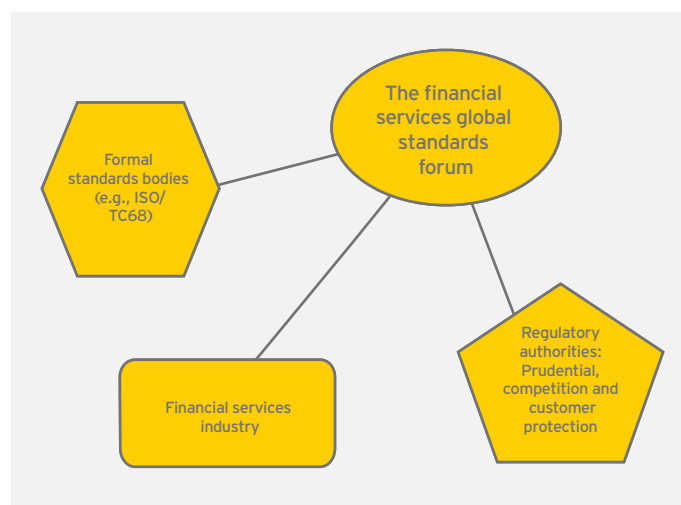


Figure 1: Recommended institutional structure to promote standard

Source: Houston et al. (2015)

- ▶ **Open Financial Exchange (OFX) XML Schema** – XML specification for the electronic exchange of financial data between financial institutions, businesses and consumers via internet

2.3 Standards body

Finally, in financial services, there are no overarching technical bodies playing a role in standards-setting [Houston et al. (2015)], like that played by the Internet Society and W3C, the IEEE or to GS1. There are cooperative arrangements, such as the FIX Protocol Ltd and SWIFT, but they are limited to particular aspects of financial transactions, mostly in trade execution, payments and settlement instructions. With regard to regulation, as discussed above, major international institutions have more than 60 individual “supervisors,” each with significantly different data and reporting frameworks.

A report for the U.K. Government Office for Science recommends an institutional structure (see Figure 1) to promote standards.

This is an opportunity for the U.K., however, it is important to factor in the role that E.U. legislation plays. Much of the data now required, and the templates and means for its transmission, are mandated in E.U. law. This means that any agenda for regulatory reform ultimately needs to take place at the E.U. and

5 http://www.service-architecture.com/articles/xml/finance_xml.html

international level. There are reasons data has taken on the significance it has as a regulatory tool and the requests for data are only likely to expand to embrace FinTech, alternative and shadow banking. That said, the U.K. can still play a major role in promoting automated regulation.

3. Regulatory barriers to financial innovation

A number of reports have been published addressing regulatory barriers to innovation,⁶ putting innovation at the heart of regulation⁷ and the requirement for regulatory toolkits.⁸ Most of these focus on FinTech and regulatory support for innovation. As discussed below, the FCA has responded very positively by launching Project Innovate and calling for input. FCA ideas under consideration include “financial sandboxes” to test new financial concepts with the general public.

Many financial institutions and FinTech companies are discouraged from innovation and entrepreneurship firstly by the time and cost of registering and complying with regulations; and secondly by the potential consequences if they don't [Houstoun et al. (2015)]. This is especially onerous for FinTech start-ups that need to complete registration before they have properly developed and road-tested their business model. In response, the FCA is providing “fast-track” registration schemes for start-ups with whom it is engaged.

In a wider context, the U.K. Government has launched a number of digital services and is still building others in the context of its Digital Transformation Project. HM Treasury is working on developing an open standard API for banks. In May 2015, the European Commission launched a Digital Single Market Strategy.

4. RegTech vision

Rapid improvements in technology are enabling financial services' business models that were simply not possible 15 to 20 years

ago. However, these innovations in finance operate within a regulatory system that is struggling to keep pace.⁹

In response, regulators, such as the FCA, are starting to establish a new relationship with the financial services industry, including FinTech companies, telling them what they wish to achieve. Then the companies can respond with how they will deliver the regulatory requirements. This is likely to involve the better use of technology to support people processes, including the real-time analysis of transactions: online registration, international standard data formats, standard (risk-weighted) asset indices, automated reporting, open-source compliance systems and “big data” analytics.

PayPal advocates the use of a new decision-making model – which it calls **SMART Governance** – to better deliver the goals underlying (payments) regulation in a manner that benefits government, consumers and industry. SMART Governance combines the use of technology and data with a collaborative and iterative process to measure performance of covered entities, creating a better-informed regulatory development process.

To quote PayPal, “Technology and data make up the engine of this new model, but collaboration, innovation and experimentation are the key to unlocking insights from the data; it is the application of these insights that will result in better regulation. We are calling for the application of **Dynamic Performance Standards**, regulatory policies that measure results, that iterate based upon new data and new insights arrived at through a collaborative process. Performance standards have failed to become the dominant regulatory paradigm in part because industry found them overly static and carrying too much regulatory risk in exchange for too little real-world flexibility. Dynamic Performance Standards utilize modern data analytics techniques, iteration and collaboration to overcome the traditional shortcomings of performance standards.”

What they and others are all proposing is applying the online, FinTech and big data revolutions to regulation, risk and compliance. Most organizations consider “big data” as collecting comprehensive data on “customers” and applying analytics to improve customer service. In fact, what we should be seeking

6 Financial Conduct Authority, call for input: Regulatory barriers to innovation in digital and mobile solutions, <http://www.fca.org.uk/static/fca/documents/call-for-input-regulatory-barriers-to-innovation.pdf>.

7 Regulatory barriers to FinTech innovation, <http://fsregulation-risk.com/2015/06/19/regulatory-barriers-to-fintech-innovation-our-response-to-the-fcas-call-for-input/>

8 PayPal, 21st Century Regulation putting innovation at the heart of payment regulation, https://www.paypalobjects.com/webstatic/en_US/mktg/public-policy/PayPal-Payment-Regulations-Booklet-US.pdf.

9 Financial futures, UK Government Office for Science Blackett Review.

Rules-based regulatory regimes		Principles-based regulatory regimes	
Potential positives	Potential negatives	Potential positives	Potential negatives
Certainty and predictability, including with respect to future enforcement	Check-the-box forms of compliance that strategically evade the underlying purpose of the regulation	Executive-level management involvement in incorporating regulatory principles into business models	Uncertainty and the risk of unpredictable post hoc application or arbitrage
Clear communication of steps for compliance	Higher internal costs of compliance	Flexibility and innovation in the face of “rapidly changing environments”	Concerns over fairness/bias in application
Ensures specific behavior	Deterrence with respect to innovation	Speed in the regulatory process	Inadequate deterrence of specific problematic behavior or activities
Uniform treatment of regulated entities	Frequent disconnect between the purpose of the regulation and the actual regulatory outcomes	The centrality of guidance and evolving norms/best practices	Over-reliance on current norms and practices
	Obsolescence		

Table 1: Rule-based versus principles-based regulatory regimes

Source: Brummer and Gorfine (2014)

is “data-driven” regulation. By analogy, “if Google was asked to manage regulation, how would they operate?”

5. 21st century regulatory toolkits

Besides new forms of thinking about today’s regulatory approaches, especially for FinTech companies, regulators also need new approaches that automate online reporting and analytics. Hence, the proposal above of an open-source regulatory platform.

Brummer and Gorfine (2014)¹⁰ contrast rules-based vs. principles-based regulatory (PBR) regimes (see Table 1).

They review a number of proposed PBR approaches:

- ▶ **Dynamic Performance Standards** – a collaborative approach combines the use of technology and data to measure the performance of regulated entities
- ▶ **Algorithmic regulation** – a similar approach to Dynamic Performance Standards focusing on outcomes that use data science to analyze impact
- ▶ **Lean regulation** – inspired by the “learn start-up” model popular with entrepreneurs, this approach might be described as regulators and FinTech collaborating to deploy iterative regulations through pilots and trials

In summary, all of these approaches lead to:

- ▶ **Agile regulation** – a collaborative and PBR approach to regulation, where the regulator says what they wish to achieve, and the financial or FinTech community responds with how they propose this is achieved
- ▶ **Automated regulation** – the RegTech online, big data and data science paradigms are applied to regulation, starting with FinTech
- ▶ **Open-source regulatory platform** – the open-source part might provide an XML-based system architecture and database infrastructure for streaming reporting data to the regulator, and software companies can provide commercial apps for analytics and visualization that would be available to all parties

6. FCA Project Innovate

The FCA is to be congratulated on launching Project Innovate¹¹ to ensure that their regulatory regime supports the development of innovative products and services that can improve the lives of consumers. Quoting from their website: Regulatory barriers, both in the U.K. and at E.U. level, can distort competition and discourage new entrants to the market, denying consumers the benefits of both new services or improved services from current

¹⁰ Brummer, C., and D. Gorfine, 2014, “FinTech: building a 21st century regulator’s toolkit,” Center for Financial Markets, Milken Institute.

¹¹ Financial Conduct Authority, Project Innovate feedback from consultations (www.fca.org.uk/static/documents/feedback-statements/fs-14-2.pdf) and next steps (<https://innovate.fca.org.uk/innovation-hub/project-innovate-next-steps>).

providers. Project Innovate seeks to identify barriers to innovation and works to resolve these without compromising the standards of consumer protection.

So far, the FCA has pursued:

- ▶ The **Innovation Hub** that helps new innovative businesses gain access to fast, frank feedback on the regulatory implications of their concepts, plans, and choices
- ▶ The FCA has tackled **structural issues** that innovators told them impede the progress of their propositions toward the market

Next steps for FCA FinTech support are:

- ▶ **Fast-track authorization** – businesses that have engaged with the FCA Innovation Hub will subsequently be assisted through a fast-track authorization process with help to internationalize their business
- ▶ **Themed support** – the FCA will launch a series of (technology) themed support weeks for their stakeholders
- ▶ **RegTech** – encouraging the adoption of new technologies (and new companies), to support the delivery of regulatory requirements
- ▶ **Regulatory “sandboxes”** – as set out in the Budget, the FCA is exploring the feasibility of regulatory “sandboxes” (cf. Phase III clinical trials) where new products, services and delivery models can be safely tested with customers

The FCA is also working closely with the new U.K. payment systems regulator (PSR), which has a statutory objective to promote innovation in payment systems. The PSR is currently in the process of setting up a “payments strategy forum.” The forum will deliver strategies for industry collaboration to promote innovation for the benefit of service users. In its spring policy statement, the PSR also outlined measures to improve both direct and indirect access to payment systems, which should benefit smaller, innovative payment service providers.

7. Conclusions

As discussed above, the challenge is to apply in an agile fashion the online and big data paradigms to regulation and compliance.

Regulation and compliance

Harmonizing financial regulation across multiple jurisdictions, and creating new automated reporting and analytics standards has the potential to improve the financial services industry efficiency, reduce systemic risk and deliver economic benefits:

- ▶ **Regulatory policy modeling** – use of emerging techniques such as agent-based modeling to simulate the likely impact of new policies before legislation (e.g., MiFID II, EU FFT) and the practical impact of existing regulation, including conflicts between regulators
- ▶ **Reporting standards** – developing common (XML) compliance tagging and reporting standards across multiple jurisdictions so as to support calls for the mandatory sharing of information between regulators with overlapping jurisdictions
- ▶ **Harmonization** – integration of national, European and global financial monitoring systems
- ▶ **Systemic risk tools** – encouraging the U.K. academic community to investigate a range of mathematical techniques for risk, which could yield important tools for the regulators

Grand challenges

- ▶ **Open-source regulatory platform** – Open-source software is a popular vehicle for supporting innovation. One possible initiative that should be beneficial for the FinTech community would be an automated registration and open-source regulatory reporting system supported or certified by the FCA that would speed up registration and reporting for new start-ups in financial services
- ▶ **Financial “weather forecasting” system** – Another suggestion is the development (for the BoE/PRA) of a national financial monitoring system for forecasting systemic risk in the U.K. banking system. (cf. the data network and forecasting models operated by Met Office in Exeter or the European Centre for medium-range weather forecasts in Reading.) In fact, the feasibility of such a system has been shown, albeit on a small scale, by the Bank of Mexico, which does the clearing for Mexican financial institutions and has developed a system for monitoring systemic risk based on “principle components analysis” (PCA)
- ▶ **Financial data research facility** – Finally, the academic community need access to real-world financial data to support their research. Three classes of financial data are required:

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- ▶ **Public domain data sets** – this comprises publically accessible data (e.g., social media, economic) and contributed anonymized data.
 - ▶ **Commercial data** – a U.K. WRDS,¹² a secure centralized U.K. data facility (a U.K. equivalent of the excellent Wharton Research Data Services) comprising commercial data from key data providers (Thomson Reuters, Bloomberg, Markit).
 - ▶ **Proprietary data sets** – most important is highly secure access to sensitive data sets and streamed real-time data owned by regulatory and industry partners; initially on-site.

In summary, individually our regulators, financial institutions, FinTech companies, training companies and universities are world-class; the challenge is in getting them all to work together to improve financial regulation.

¹² Wharton Research Data Services (WRDS) <http://wrds-web.wharton.upenn.edu/wrds/>

Building consumer demand for digital financial services – the new regulatory frontier



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Abstract

Digital financial services (DFS) are held out as key financial solutions for improving financial inclusion. However, targeted end users often offer little in the way of obvious profitable opportunities and so market forces alone are not enough to ensure the supply of services and products that match end users' means, needs or wants. As a result, DFS in emerging markets may suffer from limited uptake and usage, with little effect on financial inclusion. In emerging markets, financial regulators have been focusing on supporting the success of DFS largely through institutional and regulatory framework efforts. This article argues that financial regulators must first work to understand and build consumer demand for DFS rather than purely focusing on developing enabling regulatory frameworks. This requires a change in mindset for financial regulators, who are more familiar with promoting financial stability, safety and efficiency. In this article, we explore this changing role for financial regulators. We recommend that regulators particularly focus on building consumer demand through promoting partnerships in DFS as a means of promoting financial inclusion. We highlight that partnerships introduce collaboration risks and heighten consumer risks; requiring regulators to adjust regulatory frameworks to ensure such risks are identified and mitigated.

1. Introduction

Financial inclusion is considered an important means for alleviating poverty and promoting a country's broader economic development; hence, it is now receiving greater attention from international financial regulators. This heightened importance of financial inclusion for economic development is resulting in a change in the role of financial regulators. Historically, banks have innovated in pursuit of higher profits and the role of a financial regulator has been to maintain the safety and soundness of the financial system. However, promoting financial inclusion requires promoting the provision of financial services by banks and new players to customers who may offer little in the way of profitable opportunities. In this environment, market forces alone cannot be expected to deliver the products to match end users' needs and wants. In promoting financial inclusion, financial regulators must work to minimize the gap between what market forces provide and what end users need, can afford and want.

This responsibility to promote financial inclusion is a relatively new and different role for financial regulators and requires a change of their mindset. To assist in navigating through this new regulatory frontier this article recommends that, in promoting financial inclusion, financial regulators must sharpen their focus on understanding and building consumer demand for DFS.² Regulators are already focused on designing enabling regulatory frameworks to accommodate new players and innovative DFS; largely because DFS have been held out as key innovative solutions to improve financial inclusion. However, building consumer demand is also critical to the success and sustainability of DFS ecosystems; end users' needs and desires must be a key focus. Without focusing on consumer demand, DFS will suffer from limited uptake and we may be left with sophisticated frameworks for overseeing and regulating DFS but little DFS to regulate.

Of course, the focus on consumer demand is merely one aspect of a successful DFS ecosystem. Providers will also need to design highly efficient DFS systems with such low transaction costs

that business can be done profitably.³ However, exploring all the factors that drive the success of DFS ecosystems is beyond the scope of this article.

Instead, we explain the importance of financial regulators understanding and building consumer demand, so as to encourage sustainable DFS ecosystems that can improve financial inclusion. In understanding and building consumer demand, financial regulators will be able to intelligently direct industry efforts toward encouraging sustainable DFS ecosystems that improve financial inclusion. In particular, we recommend regulators turn their attention to partnerships in the DFS space as a way to build consumer demand; that is, partnerships between payments providers, banks, microfinance institutions (MFIs) and mobile network operators (MNOs). Such partnerships are fast emerging as a principal way to build consumer demand in the DFS space and a path toward successful sustainable DFS ecosystems.

Financial regulators must be ready to identify and assess the risks from prospective partnerships and adjust regulatory frameworks, so that they are open to the benefits of partnerships and responsive to the risks. It will be critical to ensure financial safety and stability is maintained alongside greater financial inclusion. We highlight two areas for regulators to focus on in their approach toward the identification, assessment and mitigation of risks arising from partnerships in DFS:

1. Collaboration risks
2. Consumer risks that arise due to a greater range of product offerings available via a mobile phone

Our analysis of these risks arising from partnerships is at an elementary stage. We will conduct further analysis and research in this area with the objective of improving existing knowledge and awareness of the regulatory challenges arising from partnerships in DFS.⁴

2 Digital financial services (DFS) is a term increasingly used in place of more specific terms such as mobile money. DFS is used here to refer to a range of financial services accessible via digital remote access, including e-money or mobile money. For more terminology definitions, see Alliance for Financial Inclusion, 2013, "Mobile financial services: basic terminology," March http://www.afi-global.org/sites/default/files/publications/mtswg_gl_1_basic_terminology_finalnewnew_pdf.pdf.

3 Voorhies, R., J. Lamb, and M. Oxman, 2013, "Fighting poverty profitably – transforming the economics of payments to build sustainable, inclusive financial systems," Bill and Melinda Gates Foundation, September.

4 There are two appendices at the end of this article. The first provides a list of acronyms used throughout this article and the second provides a glossary of terms.

2. Background

2.1 The regulation of DFS - international developments

The regulation of DFS, and mobile money in particular, is currently the focus of considerable discussion and debate among development partners, policy “think tanks,” industry researchers and academics. Financial regulatory frameworks for mobile money are evolving at a fast pace in emerging markets (fast for financial regulation), and regular announcements cite countries’ latest enabling regulatory moves. These new regulatory environments respond to the entry of new players in the payments space; players previously not captured by financial regulation.⁵

Internationally accepted standards for the regulation of mobile money are also emerging; the Alliance for Financial Inclusion (AFI), and particularly its Mobile Financial Services Working Group (MFSWG), is proactive in this area, providing a platform for regulators to share, discuss and develop consistent understandings of the regulatory issues. The AFI and MFSWG develop and publish guidance papers outlining common approaches for the oversight and supervision of mobile money and mobile financial services (MFS) more broadly.⁶

However, regulatory approaches for dealing with the wider category of products becoming available through partnerships in the DFS (such as loans, insurance and savings) are still very much in the nascent stage, as is our understanding of the regulatory challenges presented by partnerships themselves in DFS. This article presents these issues as a new regulatory frontier. We provide initial guidance for regulators to respond to partnerships in DFS. As they assist in building sustainable DFS products, we consider it critical for regulators to be ready to respond. We will develop and extend on this guidance in future research papers.

5 See for example Owens, J., 2014, “Highlights on the mobile financial services landscape in Tanzania and lessons for regulators,” Alliance for Financial Inclusion, 24 February. <http://www.afi-global.org/blog/2014/02/24/highlights-mobile-financial-services-landscape-tanzania-and-lessons-regulators>; and Almazan, M. 2013, “Mobile money for the unbanked,” GSMA, 19 December. <http://www.gsma.com/mobilefordevelopment/mobile-money-regulation-in-latin-america-leveling-the-playing-field-in-brazil-peru>. For a recapitulation on what is meant by an ‘enabling’ regulatory environment, see: Gutierrez, E., and S. Singh, 2013, “What regulatory frameworks are more conducive to mobile banking? Empirical evidence from Findex data,” World Bank Policy Research, working paper no. 6652, <http://ssrn.com/abstract=2338858>.

6 See, Alliance for Financial Inclusion, 2014, “Mobile financial services: consumer protection in mobile financial services,” March, <<http://asbaweb.org/E-News/enews-37/incfin/06incfin.pdf>>; Alliance for Financial Inclusion, 2014, “Mobile financial services: supervision and oversight of financial services,” February, http://www.afi-global.org/sites/default/files/publications/mfswg_guidelinenote12_oversight_and_supervision_of_mfs_2.pdf.

2.2 Financial inclusion - international developments

The increased international focus on financial inclusion is also contributing to the fast pace of regulatory developments for DFS; as such products are seen as key to greater financial inclusion and economic development.⁷ Policymakers must now look beyond their traditional policy objectives of promoting safe and efficient financial systems to also focus on promoting financial inclusion.⁸ This dual regulatory focus has been referred to as “the two sides to the financial inclusion coin;” enabling innovation to reach the financially excluded while at the same time providing protection for those newly included to ensure they have confidence in the system and use it regularly.⁹

With financial inclusion, the regulatory focus should also include realizing the broader economic and social policy objectives and the potential for inclusive growth. In this context, the Consultative Group to Assist the Poor (CGAP) highlights comments from Pia Roman, Head of Financial Inclusion at Bangko Sentral ng Pilipinas (BSP), the Philippines’ central bank; Roman noted that the result of making MFS available for a remote island in the Philippines, Rapu Rapu, was increased economic activity on the island.¹⁰

Alfred Hannig, Executive Director of AFI, has noted that the phenomenon of financial regulators increasingly focusing on financial inclusion is mostly being seen in emerging countries and they are “reshaping the approach of central banking.”¹¹ This trend continues and global standard-setting bodies are now

7 DFS can drive greater financial inclusion because they offer more than merely a viable alternative to the hawala systems or basic remittance networks that simply transfer cash from A to B. As mobile money also involves storing values electronically it provides the end user with a potentially improved budgeting and payments mechanism. Financial products and services can also be offered including credit and insurance creating greater demand for DFS. The DFS ecosystem is still nascent, as deployments are still to crack how to create mass adoption and usage so that mobile money moves beyond a simple “cash-in”/“cash-out” to where “cash-in” stays “in.” This will mean financial inclusion will flourish, financial systems will be strengthened and economic development will benefit.

8 The focus on financial inclusion is seen in many international forums: G20 Summits, the G20’s Global Partnership for Financial Inclusion (GPFI), the Global Policy Forum (GPF) of AFI, the Better Than Cash Alliance (BTCA), the Financial Action Task Force (FATF), and the Bank for International Settlements’ Basel Committee on Banking Supervision (BCBS).

9 Lyman, T., 2013, “Building an enabling and protective policy environment,” CGAP, 24 May. <http://www.cgap.org/blog/building-enabling-and-protective-policy-environment>.

10 Ibid

11 Hannig, A., 2013, “Developing countries focused on financial inclusion are reshaping central banking,” Alliance for Financial Inclusion, 25 November. <http://www.afi-global.org/blog/2013/11/25/developing-countries-focused-financial-inclusion-are-reshaping-central-banking>.

actively engaging with regulators seeking to promote financial inclusion.¹²

2.3 “Build it and they will come” – avoid the trap

While this international cooperation and alignment of goals bode well for financial inclusion, it is important that the refinement and implementation of “best practice” regulatory frameworks do not become the sole focus of financial regulators, who, operating with the goal of financial inclusion in mind, also need to ensure end users are provided with safe, affordable and practical payment options. If payment providers assume the position of “build it and they will come” and regulators respond only by determining how to devise risk-based regulations for the new entities or new payments products and services, the result may be sound and supportive regulatory frameworks for new products and services with low uptake and limited success as they do not match what the end users need and want. This outcome is of little use in improving financial inclusion and is a questionable use of regulatory resources.¹³ By focusing on the need to understand and build consumer demand, regulators will assist in avoiding these situations.

Low uptake and inactive users are already common in the rollout of mobile money in emerging markets. The success stories of Kenya and the Philippines have been difficult to replicate. This situation may have occurred due to a focus on broadening accessibility (i.e., through developing agent networks and mass sign-ups of end users) without understanding the real desires of end users. Consumers may have no strong incentive to switch to the new products or services. To develop successful DFS ecosystems, it is now recognized that it is necessary to go beyond ensuring these products are simply available, accessible and affordable. Development partners are now encouraging greater focus on the demand side, to ensure the products meet consumer demand, are being used and will become sustainable.

2.4 Market forces not enough to deliver products for unbanked and under-banked

Experience to date suggests that financial inclusion regulators and advocates cannot expect market forces alone to deliver products that match the unbanked and under-banked’s needs and wants and ultimately improve financial inclusion. This is because their target markets are traditionally from low-income socioeconomic groups, which likely means low returns for providers of products and services if insufficient scale is achieved. While a number of driving forces will be needed to achieve the scale required for profitable products and services for the unbanked and under-banked, this article posits consumer demand as a key driving force behind determining whether the requisite scale for profitability will be achieved.¹⁴

2.5 A financial regulator’s role in understanding and building consumer demand

There is a general trend for regulators to now extend themselves beyond the traditional oversight role of encouraging the safety and stability of the financial system to also focus on actively directing efforts toward increasing financial inclusion. In particular, financial regulators are focusing on how to encourage the building of sustainable DFS ecosystems. We consider that financial regulators can improve their efforts by sharpening their focus on understanding and building consumer demand for DFS, specifically by:

- ▶ Understanding the financial desires of the unbanked and under-banked, including understanding the existing demand for formal financial mechanisms
- ▶ Facilitating the processes that can build demand for financially inclusive products and services (Regulators who first understand consumer demand can better appreciate which market developments need to be encouraged or facilitated through policy and regulatory changes).

3. Understanding consumer demand

Regulators can assess a DFS product’s potential for promoting financial inclusion by considering how well the initiative focuses on local context and customer value proposition. Emphasizing these two aspects in DFS initiatives will ensure players are being

¹² Hannig, A., 2014, “Financial inclusion a new common ground for central banks,” Alliance for Financial Inclusion 14 May <http://www.afi-global.org/blog/2014/05/14/financial-inclusion-new-common-ground-central-banks>.

¹³ Graham Wright (head of MicroSave) recently commented on this point in his reflections on the Mor Committee Report in India. Wright notes that the Report offers a “sophisticated vision of the financial architecture” and a road map for providing financial access to all. However, he questions whether due consideration was given to the demand side, noting that “the report seems to imply that low income people’s demand for formal financial services was a given.” See Wright, G., 2014, “The Mor Committee report – the demand side conundrum,” MicroSave, February. <<http://blog.microsave.net/the-mor-committee-report-the-demand-side-conundrum/>>.

¹⁴ For a discussion on other factors that come into play in developing profitable innovative products and services see Voorhies et al., *supra*.

encouraged to deliver solutions and products that are useful and relevant for the under-banked and unbanked. Considerable research has emphasized the importance of these two aspects for DFS, a summary of which follows, highlighting how regulators can assess if local context and customer value proposition have been adequately considered.

3.1 Local context

Davis and Owens contrast different countries to illustrate the importance of local context in understanding demand.¹⁵ In the Philippines, the demand is to move money between urban and rural areas and from overseas. The MNOs have, therefore, enjoyed a distributional advantage over point-of-sale (POS) networks and their mobile money products, Smartmoney and GCash, have been very successful.¹⁶ In contrast, in South Africa, consumers either have a bank account in which to receive their salary or access to a cash-out facility provided by the Government.¹⁷ There is little incentive for consumers in this market to replace their existing methods of accessing funds with a mobile phone payments channel.¹⁸ In order to determine whether a product will be successful, attention to the local context, and insight into the local customer base will be essential.¹⁹ In particular, any new service must be evaluated in the context of existing services that customers are accessing.²⁰ Only with that information can a reasonable assessment be made of what might or might not be successful. A good illustration of this point is recent research into smallholder farmers, whose demand for mobile services, including finance and information, is far below the potential it has to benefit their businesses.²¹

3.2 Customer value proposition

MicroSave has written extensively on the importance of the customer value proposition and keeping the clients' needs at

center focus when designing new products.²² Manoj Sharma, Managing Director at MicroSave Asia, has noted what might seem obvious, but seems to have been missed by many product developers: "Your good intentions are not necessarily good for the client – talk to them and find out."²³ Sharma lists certain questions to address when assessing how compelling the value proposition is for end users:

- ▶ What pain points does the new system address?
- ▶ Is it more convenient and easier to use?
- ▶ Does it provide value for money (if not less expensive)?
- ▶ Is it more secure than alternatives?²⁴

Sharma refers to "consumer pull" as being the key consideration. He notes the "natural pull" of particular products such as "money transfers/remittances and welfare receipts" but emphasizes that "[a] deeper understanding of consumer aspirations and preferences is essential for the success of other products that do not have the benefit of a natural pull."²⁵ For example, consumers may want a savings account product, but simply be prevented from actively using the account due to expenditure shocks and having very little income to keep as savings. Consequently, financial literacy and aggressive marketing may have little effect on long-term usage. In contrast, the demand for other products, such as remittances, is naturally strong and explicit and requires little in the way of marketing and consumer education.²⁶

3.3 Customer demand surveys

Customer demand surveys are also useful for drawing background information. However, care should be taken in interpreting the results of demand studies as survey results depend heavily on the precise questions asked. Surveys are also done at a single point in time when what is needed is an understanding of the longer-run perspective – what the customer may need in three months' or a year's time. Capturing customer perceptions in these surveys is

15 Owens, J., and B. Davis, 2008, "POS vs. mobile phone as a channel for mbanking MicroSave," 19 September.

16 Ibid. at 2.

17 Ibid.

18 Ibid.

19 Watkins, D., 2013, "Context and culture: designing relevant financial services," CGAP, 13 August <http://www.cgap.org/blog/context-and-culture-designing-relevant-financial-services>.

20 Ibid.

21 Deyners, L., 2014, "How do smallholder farmers access information," GCAP, 31 January. <http://www.cgap.org/blog/how-do-smallholder-farmers-access-information>.

22 Sharma, M., 2013, "Sustainable non-banking financial institutions," MicroSave (Presentation), 18 November. http://www.microsave.net/resource/sustainable_non_banking_financial_institutions#.U5royViSw00.

23 Sharma, M., 2013, "DFS for the under-banked," MicroSave (Presentation, Pacific Microfinance Week), October. http://www.microsave.net/files/pdf/MicroSave_DFS_for_the_Under_Banked.pdf.

24 Ibid.

25 Ibid.

26 Gosh, I., 2013, "Remittances vs. savings on the mobile money platform (part 2)," Institute for Money, Technology and Financial Inclusion, 23 July. <http://blog.imtfin.uci.edu/2013/07/remittances-vs-savings-on-mobile-money.html>.

also important: perceptions on existing access to financial services (formal and informal) and what customers may perceive as valuable in a new service or product.²⁷

3.4 Understanding consumer demand – not so straightforward

Ignacio Mas has looked at why moving consumers from informal financial mechanisms to formal financial mechanisms, such as DFS, is not as straightforward as some might believe or want.²⁸ Mas posits an interesting thesis on how to marry the “richness of informal financial practices” with the “structure of formal finance” to create a financial experience analogous to eating a “richly layered cake.”²⁹ Mas describes how the various needs underpinning financial inclusion can be thought of as layers of a cake that combine to offer a texture, flavor and color that can only be fully experienced when slicing through the various layers.³⁰ Mas emphasizes that it is only through combining formal and informal financial mechanisms, akin to combining the various layers of a cake, that the benefits of financial inclusion come to the fore.³¹ Mas gives the example of M-Pesa, referring to the formal mechanisms as the MNO offering the product, and the Central Bank and competition regulator overseeing the process, while the informal mechanisms are the existing domestic remittance methods embedded in Kenyan culture³² (which quickly shifted across to being remitted via mobile money upon commencement of M-Pesa). These formal and informal mechanisms combined to create the DFS ecosystem that is today spurring on financial inclusion in Kenya.³³ Mas cites Susan

Johnson as appropriately revealing this “source of the magic that has lit up Kenya with electronic money” which Johnson has termed “The Rift.”³⁴

Mas explains that by combining informal and formal mechanisms, end users will feel as though they own the financial services relationship and have control over their money.³⁵ Mas emphasizes that new products should not simply be built and rolled out with consumer education on their use with the expectation that this will create consumer demand. Instead, Mas advocates pursuing a more detailed understanding of what is important to the end users operating in an informal economy and then working out how to combine those important informal disciplines and mechanisms with formal payments, disciplines and mechanisms. This would give rise to digital savings solutions that could displace informal savings options.

4. Building consumer demand

Regulators can encourage the development of successful and sustainable DFS ecosystems by encouraging, and being a part of, efforts to build consumer demand. Examples of what these efforts might include are:

- ▶ To be an enabling regulator
- ▶ To encourage the movement of cash payments to be done electronically using mobile money, particularly government payments (such as G2P and person-to-government (P2G))
- ▶ To facilitate financial literacy efforts that focus on incorporating end users’ needs
- ▶ To develop open/interoperable/interconnected systems
- ▶ To enable partnerships between the various market players leveraging on the “sum is greater than the parts.”

We provide further detail on these examples below, with particular focus on the importance of enabling partnerships in building consumer demand. Financial regulators’ roles for the other examples above are well-canvassed in the literature on DFS and mobile money regulation; examples of this literature are provided in the footnote references below.

27 Watkins, supra.; Deyners, supra.

28 See Mas, I., 2014, “Digitizing the kaleidoscope of informal financial practices,” *Journal of Business Management and Social Science Research* 3:5.

29 Ibid. at 57.

30 Ibid

31 Ibid

32 Mobile Money Africa recently reported on M-Pesa agents observing a tripling of transactions over the Christmas and New Year period as people sent money to relatives and friends as gifts, see Mobile Money Africa, 2014, “Mobile money agents await huge commissions after Christmas Boom,” 6 January <http://mobilemoneyafrica.com/details.php?post_id=1544> .

33 Today, more than 40% of GDP flows through M-Pesa, more than two-thirds of the adult population use it and the Head of Strategy for Financial Services, Sitoyo Lopokoiyit, at Safaricom (the operator of M-Pesa), recently interpreted this usage figure to mean that 80% of the population in Kenya is now considered financially included. Without M-Pesa this figure drops to 23%. Lopokoiyit noted that now with M-Shwari, M-Pesa users are provided with further formal financial services; M-Shwari is a partnership between Safaricom and the Commercial Bank of Africa. Users can move savings into M-Shwari using their mobile phone and M-Pesa account, it is an opt-in service, the savings earn interest and M-Shwari users can also borrow funds. Users are learning about savings and credit ratings through education provided by Safaricom. Lopokoiyit noted there were now four million M-Shwari customers. Kyla Yeoman, K., 2013, Interview: How M-Pesa innovates new business models for its base of the pyramid customers, Global Envision, 13 December. <http://www.globalevision.org/2013/12/13/interview-how-m-pesa-innovates-new-business-models-its-base-pyramid-customers>.

34 Mas, supra. at 57.

35 Ibid. At 58.

4.1 An enabling regulator

The Philippines' central bank, Bangko Sentral ng Pilipinas (BSP), is renowned for being an enabling regulator when it comes to innovations in financial services.³⁶ In an interview with CGAP in November 2012, Deputy Governor Nestor Espinilla Jr. explained how the BSP created space for private sector innovation in the area of DFS by adopting a regulatory approach of allowing the private sector to test and learn.³⁷ The BSP developed regulations for mobile money which enabled the telecommunications companies to compete with banks to deliver mobile money services through a subsidiary which is required by BSP regulations to focus solely on mobile money services. Espinilla noted two main benefits from BSP's "test and learn" approach: increased competition leading to a greater range of available services and decreased remittance costs (the latter particularly important in the Philippines where external remittances comprise 10% of GDP and internal remittances are an important part of the domestic economy as families working in urban areas regularly send money to family members living in remote rural areas). BSP supported this enabling regulatory approach for the new financial services by strengthening its regulatory capacity to oversee e-money issuers. BSP established a new supervisory unit bringing together the skills of regulators from its information technology area as well as the banking supervisory area.

India's regulatory approach toward mobile money ecosystems has, until very recently, sat in stark contrast to that of the Philippines. The Reserve Bank of India (RBI) has required MNOs to use bank agents for the "cash-out" service associated with MNOs' mobile money products. The MNOs would prefer to use their own agents to provide this service. The MNOs have argued that the infrastructure is already in place, through their extensive network of agents which mobile phone customers use to "top-up" airtime on prepaid cards. The RBI has prohibited MNOs from using these agents for cashing out mobile money. The banks themselves have been reluctant to move into this space as there were limited prospects for profitability. Banks tend to seek profitability from cross-selling, whereas MNOs

focus on profits from large volumes. The RBI has, however, become much more proactive on the financial inclusion front, especially in relation to payments.³⁸ The RBI recently announced it would create a new class of regulated institutions, "payment banks" that will accept demand deposits and provide remittance services.³⁹ This was a key recommendation in the RBI's Report of the Committee on Comprehensive Financial Services for Small Business and Low Income Households (the "Mor Committee Report").⁴⁰ In announcing this change, the RBI is acknowledging the importance of payments services products that facilitate domestic remittances for greater financial inclusion.⁴¹ The payment banks will be allowed to act as agents for banks. Entities eligible to apply to undertake this new bank agent activity include existing nonbank prepaid instrument issuers (PPIs), non-banking finance companies (NBFCs), corporate business correspondents, mobile telephone companies, supermarket chains, companies, real sector cooperatives and public sector entities. It is expected that this regulatory change will see a more effective and efficient use of the MNOs' extensive agent networks. However, it is not yet clear whether this means MNOs can provide cash-out services to their mobile money customers.⁴² The RBI may maintain its cautious approach in this area.⁴³

36 For a brief description of an enabling regulatory environment for mobile money, see Gutierrez and Singh, *supra*.

37 Thomas, J., 2012, "Regulation spurs innovation in the Philippines," CGAP, 5 November. <http://www.cgap.org/blog/regulation-spurs-innovation-philippines>.

38 PTI, 2014, "Reserve Bank of India to soon come out with payment bank," The Economic Times, 12 June, <http://economictimes.indiatimes.com/news/economy/policy/reserve-bank-of-india-to-soon-come-out-with-payment-bank/articleshow/36445449.cms>.

39 RBI, 2014, "RBI releases draft guidelines for licensing of payments banks and small banks," Reserve Bank of India, 17 July. http://www.rbi.org.in/scripts/BS_PressReleaseDisplay.aspx?prid=31646; Unnikrishnan, D., 2014, "RBI lets NBFCs work as banking correspondents," Livemint, June. <http://www.livemint.com/Industry/PuWOHdv8crJQ28dIWY7TGK/RBI-allows-NBFCs-work-as-banking-correspondents.html>; and Mirani, L., 2014, "A new kind of no-frills bank could kickstart India's long awaited mobile money revolution," Quartz, July. <http://qz.com/237847/a-new-kind-of-no-frills-bank-could-kickstart-indias-long-awaited-mobile-money-revolution/>.

40 RBI, 2014, "The report of the Committee on Comprehensive Financial Services for Small Business and Low Income Households," Reserve Bank of India, 7 January http://rbi.org.in/scripts/BS_PressReleaseDisplay.aspx?prid=30353.

41 For further commentary on "payments banks" and the Mor Committee's Report, see Wright G., 2014, "The Mor Committee Report - the demand side conundrum," MicroSave, February. <http://blog.microsave.net/the-mor-committee-report-the-demand-side-conundrum/>.

42 Parbat, K., 2014, "Telecom companies expect spurt in revenues with 'payments banks'," Economic Times, 19 July. http://articles.economictimes.indiatimes.com/2014-07-19/news/51744670_1_vodafone-india-mobile-payments-safaricom?_ga=1.89423515.1014043529.1405995841.

43 As agents to a bank, MNOs can appoint their own agent and cash-in/cash-out is allowed through these agents as long as the client has a bank account. MNOs can provide a "wallet" to customers that may or may not be linked to a bank account. However, in this instance, customers can perform cash-in activities (purchase goods and services) but not do cash-out from the wallet. (Thank you to Manoj Sharma, MicroSave, for this explanation).

4.2 Shifting government payments to electronic funds transfer channels

Regulators may also assist by working with governments to channel government funds and subsidies through safer and more efficient digital payments systems.⁴⁴ Such efforts are not without challenges.⁴⁵ However, financial regulators supporting such initiatives (either through regulation of the entities channeling the payments or through policy changes to support the required payments infrastructure developments) will contribute to building consumer demand for the new payment methods.

An example of a government initiative to support the move toward more efficient and safer payments systems is India's Aadhaar program. This involves biometric identification processes to capture fingerprints and eye scans to confirm a person's identity. Early findings suggest this program can reduce fraud, which prevents government aid from reaching the intended recipients.⁴⁶ This program may contribute toward the success of moving from cash-based payments to electronic methods.

4.3 Financial literacy efforts focused on end users' needs

Improved financial literacy can help build more trust with the end users of the new payment methods. Tilman Ehrbeck, CEO of CGAP, has commented that what is really needed is not necessarily financial literacy but new thinking on how products are designed and how their usage and functionality is communicated to an audience that is linguistically illiterate and consequently have different lenses through which they view the world. Ehrbeck argues that the onus is on the designers of the products to translate the formal financial concepts "into language consistent with the everyday realities of poor people."⁴⁷

4.4 Open/interoperable/interconnected systems

The development of system infrastructure that enables interoperability and interconnectivity will assist in building consumer demand for DFS systems. As explained below through the examples of the Philippines, Malawi, Papua New Guinea and Kenya, the path toward interoperable DFS systems is a challenging one for regulators. However, regulatory involvement is likely to be necessary to provide the drive that market forces alone will not create.

Mobile money in the Philippines consists of two MNOs offering e-money which are not interoperable. The central bank, Bangko Sentral ng Pilipinas (BSP), is working with the MNOs to speed the journey to interoperability. BSP is working with Bankable Frontiers Associates and began the process by defining the ideal of interoperability. A vision was developed for "any to any" – sending e-money to bank accounts or to other e-money accounts irrespective of with whom the end users banked or held mobile money accounts. BSP is now working with the industry to develop the rules of the game and has aimed for interoperability between electronic payments by 2018.⁴⁸ BSP emphasizes the role of consultation and has conducted a conference on the topic with industry players. Feedback from industry participants at the conference indicated they wanted BSP to play a key role in the journey toward interoperability. BSP is now working on options, such as a common switch, that will operate as a utility to which payments participants can connect.⁴⁹

BSP is also considering a payments system law alongside these market developments because the legal framework will determine what it can do, including a regulation mandating the interoperability of all POS and cash-in/cash-out outlets.⁵⁰

Malawi's central bank, the Reserve Bank of Malawi (RBM), has also identified interoperability as a goal. The RBM has launched a national switch for retail payment systems to improve

44 Better Than Cash Alliance (2014) <http://betterthancash.org/>.

45 CGAP has also recently released four case studies (from Haiti, the Philippines, Kenya and Uganda) examining the challenges of establishing mobile money based G2P payment systems; see Zimmerman, J., and K. Bohling, 2014, "E-payments in low-income settings: cutting-edge or high risk?" CGAP, 12 March. <http://www.cgap.org/blog/e-payments-low-income-settings-cutting-edge-or-high-risk>.

46 Andrews, E., 2014, "Think ID theft is a problem here? Try protecting one billion people," Stanford Graduate School of Business, 1 May. http://www.gsb.stanford.edu/news/headlines/think-id-theft-is-problem-here-try-protecting-one-billion-people?utm_source=twitter&utm_medium=social-media&utm_campaign=wein-india-id.

47 Ehrbeck, T., 2013, "Avoid blaming the victim in the financial literacy debate," Huffington Post, 19 December. http://www.huffingtonpost.com/tilman-ehrbeck/the-financial-literacy-debate_b_4459311.html.

48 Philippine News Agency, 2015, "BSP eyes national payments system by 2018," June 15. <http://www.interaksyon.com/business/112425/bsp-eyes-national-payment-system-by-2018>.

49 USAID, 2013, "Building consensus towards enabling an efficient and inclusive national payments system in the Philippines: a significant step," 24 April. <http://www.simmphil.org/misc/building-consensus-towards-enabling-an-efficient-and-inclusive-national-payments-system-in-the-philippines-a-significant-first-step>.

50 USAID, 2014, "Internal assessment report for the scaling innovations in mobile money (SIMM) activity: Philippines," November. http://pdf.usaid.gov/pdf_docs/PA00KB2M.pdf.

interoperability between existing digital payment systems, and to further accelerate digital payment uptake.⁵¹ In a speech delivered by Ralph Jooma, the Minister of Economic Planning and Development, he noted that the national switch “will provide a switching platform for internet banking, remittances, and mobile money transactions.”⁵² Jooma said, “we have decided to develop this as a shared payment services arrangement with the Bankers Association of Malawi so as to facilitate interoperability and help ensure the volumes to make the investment viable.”

In Papua New Guinea, the challenges of interoperability possibly still lie ahead for the regulator, as there are six mobile money providers with no fully interoperable systems as yet. Its central bank, the Bank of Papua New Guinea (BPNG), encourages interoperability but does not mandate it. Nationwide Microbank’s (NMB) mobile money wallet, MiCash, has entered into an agreement with Digicell and Post to move toward interoperability. However, this agreement will still be outside of the main payments system. PNG recently launched a new real-time payments system, CATS, but it does not include players outside of the traditional payments systems such as mobile money providers.

In Kenya, the National Payment Service Regulations provide a framework for market-led interoperability, and permit the Central Bank to recognize a payment service provider management body whose intent is to facilitate interoperability among payment service providers.⁵³ In early 2014 in Kenya, the Communications Authority of Kenya (CAK) licensed three Mobile Virtual Network Operators (MVNOs) (Finserve Africa, Mobile Pay and Zioncell Kenya), which will all have their wallets hosted by Airtel. Aside from the serious competitive threat this brings to Safaricom’s M-Pesa (Airtel is Kenya’s second-largest MNO behind Safaricom), there is a great potential for these three MNVOs’

services to be made interoperable as they will all operate over the same MNO’s network.⁵⁴

Safaricom, Airtel and CAK have also had extended negotiations seeking an out-of-court settlement of a case in which Airtel accused Safaricom of abuse of its market-leader position. CAK declined to investigate unfair pricing of M-Pesa transfers between Safaricom users and users of other MNOs’ networks and so Airtel launched a court case. Safaricom was subsequently ordered by CAK to open up its network and CAK indicated in its ruling that further discussions with the Central Bank of Kenya on interoperability and costs of transactions will take place.⁵⁵

Central banks, in endeavoring to improve financial inclusion through interoperable networks, need to think and act strategically. Acknowledging the presence and importance of new payments players in the payments space and navigating the path toward open and interoperable systems will be challenging but is important and potentially productive of major improvements in financial inclusion.

4.5 Role of partnerships in building consumer demand

The importance of partnerships in the DFS space is of increasing interest to development partners and policy think tanks, such as CGAP and AFI. In this article, we are referring to partnerships between payments providers, banks, MFIs and MNOs. Such collaborative efforts assist to strengthen the products and services available, as outlined below, and can consequently strengthen financial systems more broadly.

Partnerships between nonbanks and banks within the DFS space are beneficial on a number of fronts. Partnerships can address some regulatory concerns; the pool of funds held by a nonbank may be reduced as end users transfer funds into prudentially regulated deposit accounts at a bank that has a partnership with a mobile money provider. Partnerships can also allow for deeper

51 Better than Cash Alliance, 2015, “The opportunities for Malawi’s transition away from cash, April. <http://betterthancash.org/wp-content/uploads/2015/04/BTCA-Highlights-Malawi-Diagnostic.pdf>.

52 Jooma, R., 2013, “Inclusive growth in Malawi and digital financial inclusion, speech, UNGA Week, 24 September. <http://betterthancash.org/speech-delivered-by-hon-ralph-jooma-mp-minister-of-economic-planning-and-development-at-partnership-for-digital-financial-inclusion-a-driver-of-inclusive-growth/>.

53 GSMA, 2015, “Enabling mobile money policies in Kenya: fostering a digital financial revolution,” GSMA Mobile Money for the Unbanked, January. http://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/02/2015_MMU_Enabling-Mobile-Money-Policies-in-Kenya.pdf.

54 The Consumers Federation of Kenya (COFEK) has launched a court case against the awarding of these licenses, seeking for them to be revoked as it says there was no stakeholder and public consultation on the matter. The court case was to be on 26 June 2014. Mwenesi, S., 2014, “COFEK wants Kenyan MVNO licenses revoked,” Humanipo, 11 June. <http://www.humanipo.com/news/45013/cofek-wants-kenyan-mvno-licences-revoked/>.

55 BizTech Afrika, 2014, “Airtel wins case to open up M-Pesa,” 28 July. <http://www.biztechafrica.com/article/airtel-wins-case-open-m-pesa/8514/#.U9nGzYCSw00>; and for background see Nduku, A., 2014, “Safaricom, Airtel seeks extension in talks over M-Pesa fees,” Humanipo, 8 May. <http://www.humanipo.com/news/43623/safaricom-airtel-seek-extension-in-talks-over-m-pesa-fees/>.

product offerings: beyond bill payments and remittance activities to providing customers with a greater range of services, including savings, credit and insurance. From a bank's perspective, partnering with nontraditional competitors also provides an opportunity to tap into expert innovative digital solutions that may otherwise be beyond their capability.⁵⁶ From a nonbank's perspective, partnerships provide an opportunity to take advantage of a bank's governance arrangements and operating models.⁵⁷ From a regulator's perspective, where there is an emphasis on financial inclusion in particular, the regulator may need to reassess which institutions are allowed to take deposits. In many markets, there are restrictions on MFIs taking deposits. Such restrictions may need to be reassessed in order to enable partnerships in DFS ecosystems to be successful.⁵⁸

We provide examples below of how partnerships deepen the product offerings in DFS and the risks and challenges that arise as a result.

4.5.1 Partnerships deepening product offerings

The potential for deeper product offerings is driving a number of partnerships being established in the DFS space and is expected to contribute to the sustainability of DFS.⁵⁹ Such expectations are seen in the increased references to MFS or DFS, as opposed to simply mobile money, which connotes a more basic product offer. Below is an overview of two successful partnerships, one involving Econet, a Zimbabwean mobile money provider (EcoCash) and the other involving Safaricom in Kenya (of M-Pesa fame).⁶⁰

4.5.1.1 Econet and EcoCash

Econet, a mobile telecommunications operator in Zimbabwe, provides a good example of how partnerships enable deeper product offerings. Econet's mobile money service is called EcoCash. Since early 2014, EcoCash's mobile money customers

have been able to access both savings and loans: EcoCashSave and EcoCashLoans (customers must first establish a savings history in order to qualify for a loan).⁶¹ Steward Bank provides the savings and loans facilities. Steward Bank was acquired by Econet Wireless in early 2013 reportedly for the purpose of supporting the adoption of EcoCash.

Econet has also moved into mobile money remittance services. EcoCash Diaspora enables Zimbabweans in the U.K. to transfer cash to Zimbabwe via EcoCash.⁶² Users do not need an EcoCash account, they can do an over-the-counter transfer in the same way as with MoneyGram or Western Union.⁶³ Earlier in 2014, Steward Bank announced a suite of diaspora banking products that included EcoCash Diaspora. It appeared to operate in a similar way to EcoCash Diaspora but relied on Steward Bank customers having Econet roaming and so may be more suitable for people traveling in and out of Zimbabwe.⁶⁴ Steward Bank customers open an EcoCash account if they have an Econet mobile line activated in Zimbabwe with roaming capabilities.⁶⁵

Most recently, Econet has partnered with WorldRemit and now WorldRemit's payout networks incorporate EcoCash and Steward Bank – people can receive money to their EcoCash Mobile Wallets or to their Steward Bank account.⁶⁶

4.5.1.2 Safaricom and M-Pesa

M-Shwari, launched in November 2012, is a partnership between Safaricom (the operator of M-Pesa) and the Commercial Bank of Africa (CBA).⁶⁷ Users can move savings into M-Shwari using their mobile phone and M-Pesa account. It is an opt-in service, the

56 Starke, A., 2014, "The payments revolution," AB+F Online, 1 June. <http://www.australianbankingfinance.com/banking/the-payments-revolution/>.

57 Nambiar, M., and S. Srimal, 2014, "From vision to reality: RBI ruling brings India one step closer to true financial inclusion," July. <http://www.nextbillion.net/blogpost.aspx?blogid=3965>.

58 CGAP, Product development. <http://www.cgap.org/topics/product-development>.

59 Mirani, L., 2014, "Why mobile money has failed to take off in India," Quartz, 19 June. qz.com/222964/why-mobile-money-has-failed-to-take-off-in-india/.

60 Mirani, L., 2014, "How to manage all your financial affairs from a \$20 mobile phone," Quartz, 18 June. qz.com/218988/how-to-manage-all-your-financial-affairs-from-a-20-mobile-phone/.

61 Mupaso, T., 2014, "EcoCashLoans now available to EcoCashSave customers with zero interest," Techzim, 2 April. <http://www.techzim.co.zw/2014/04/ecocashloans-now-available-ecocashsave-customers-zero-interest/>.

62 Steward bank launches product suite for Zimbabweans living in the Diaspora Steward Bank (Press Release, February 2014) www.stewardbank.co.zw.

63 Mupaso, T., 2014, "EcoCash to launch EcoCash Diaspora in the U.K. in the coming days," Techzim, 19 March. <http://www.techzim.co.zw/2014/03/ecocash-to-launch-ecocash-diaspora-in-the-uk-in-the-coming-days/>.

64 Mupaso, T., 2014, "Steward Bank's EcoCash enabled diaspora banking not so clear," Techzim, 21 February. <http://www.techzim.co.zw/2014/02/steward-banks-ecocash-enabled-diaspora-banking/>.

65 Mupaso, T., 2014, "EcoCash to launch EcoCash Diaspora in the U.K. in the coming days," supra.

66 Techzim, 2014, "Econet's partnership with WorldRemit a smart way to stay in money remittance?" 24 April. <http://www.techzim.co.zw/2014/04/econets-partnership-worldremit-smart-way-stay-money-remittance/>.

67 Wakoba, S., 2014, "M-Shwari launches a fixed deposit account dubbed lock," TechMoran, 16 June. <http://techmoran.com/m-shwari-launches-a-fixed-deposit-account-dubbed-lock/>.

savings earn interest and M-Shwari users can also borrow funds.⁶⁸ The loans are for small amounts between KES100 and KES50,000 (approximately U.S.\$1.5 to U.S.\$550).⁶⁹

In late 2013, there were about 4 million M-Shwari customers according to Safaricom.⁷⁰ The service has been recognized in Computerworld Honors Program in Washington DC with the 21st Century Achievement Award in emerging technology.⁷¹

In mid-2014, CBA and Safaricom launch a fixed deposit savings account – “Lock Savings Account” – claimed to be the first of its kind in the mobile money space.⁷² At the launch of the product, CBA was reported to have said that the product was developed in response to customer demand for a facility that would encourage them to save in the medium term for a specific goal.⁷³

4.5.2 Risks from partnerships in DFS and regulatory responses

Regulators will need to assess and approve partnerships that regulated entities wish to enter. Partnerships between nonbanks and banks give rise to potential risks that regulators need to consider before giving their approval. In this article, we highlight two areas for regulators to include in their approach toward identification, assessment and mitigation of risks arising from partnerships in DFS:

- ▶ Collaboration risks
- ▶ Consumer risks that arise as a result of a greater range of product offers available via a mobile phone

4.5.2.1 Collaboration risks

Collaboration risks are the risks arising from the chosen legal nature of the partnership. Partnerships between MNOs and banks or MFIs can be structured in a number of ways. The two entities can enter into a legal partnership, but are unlikely to want to do so, and we would recommend against it, because, at law, partners are liable for each other's obligations.

The more likely structure to be adopted is some form of joint venture, which can be incorporated so that a new corporate legal entity is created in which the MNO and bank or MFI would each hold shares; or unincorporated which means the two entities simply do business together but no new legal entity is created. There can be tax or other advantages to either form of joint venture.

An incorporated joint venture will only have whatever assets the shareholders inject into it, which may cause a concern for regulators, as it probably will not be a substantial organization in financial terms. For this reason, regulators may prefer an unincorporated joint venture or may ask that the shareholders give guarantees of the liability of an incorporated joint venture.

Davidson has analyzed how banks and operators can structure their agreements most effectively.⁷⁴ Davidson compares straightforward outsourcing contracts versus partnerships that require agreements on sharing of revenue or profits and responsibilities. Davidson found that banks and operators identified a number of best practices in structuring agreements with each other: “clarity about responsibilities,” “an explicit governance structure” and “a win-win proposition, now and in the future.”⁷⁵ We recommend regulators consider whether the parties involved have considered such best practices in their agreements.

4.5.2.2 Consumer risks

Consumer risks that arise as a result of a greater range of product offers available via a mobile phone or other digital device need to be identified, assessed and mitigated by market players and the regulator. This risk management process is necessary before consumer protection problems arise for the end users that could negatively affect trust in the new DFS. Without consumer trust, the uptake and usage of these new DFS will be compromised. This issue is a subset of the broader topic of consumer risks associated with DFS or “responsible digital finance”⁷⁶ and while beyond the scope of this article is noted here to illustrate that it is considered an important emerging issue for market players

68 Yeoman, *supra*.

69 Wakoba, *supra*.

70 Yeoman, *supra*.

71 Wakoba, *supra*.

72 *Ibid*.

73 *Ibid*.

74 Davidson, N., 2012, “Mapping and effectively structuring operator-bank relationships to offer mobile money for the unbanked,” GSMA. <http://www.gsma.com/mobileforddevelopment/wp-content/uploads/2012/03/mappingandeffectivestructuringfinal2643.pdf>.

75 *Ibid*. at 14.

76 Zimmerman, J., 2014, “The emergence of responsible digital finance,” Centre for Financial Inclusion, 21 July. <http://cfi-blog.org/2014/07/21/the-emergence-of-responsible-digital-finance/>.

and in international policy development. There is currently a general awareness among financial inclusion advocates that far too little is known about this broader topic and considerable work is underway to improve all players' comprehension of how to balance the promotion of DFS with mitigating consumer risks.⁷⁷

The specific consumer risks to be mitigated in relation to DFS have been identified by CGAP and UNCDF's Better Than Cash Alliance to include:

- ▶ **"Fraud** types that have potential negative effects on customers, such as SIM swaps and card skimming
- ▶ Breaches of **data privacy and protection**, as inadequate data handling can trigger other risks, such as identity theft, misuse by government, sale of one's data without knowledge or consent, etc.
- ▶ **Agent misconduct** that causes financial loss, poor service quality or mistrust in the agent network
- ▶ Ineffective or **inadequate consumer recourse** and its effect on consumer trust as well as financial services uptake and usage
- ▶ Customer risk implications of the predicted rapid transition to **smartphones in BOP [base of the pyramid] markets**⁷⁸

Interestingly, the above list does not specifically consider the consumer risks that arise as a result of partnerships in DFS providing the end users with access to a broader range of financial services. To be fair, international discussions are still at the very early stage of identifying and assessing emerging consumer risks in DFS.⁷⁹ This article represents an important contribution to these preliminary international discussions, given its focus on consumer risks arising as a result of partnerships in DFS. In due course, we expect and urge that consideration is given to separately identifying the need to mitigate consumer risks associated with partnerships in DFS. Examples of how consumer risks arise from partnerships in DFS include:

- ▶ Consumers access **credit via digital interfaces**. Mobile money customers may initially be using basic mobile money products to receive and transfer funds but then as a result of

their mobile money provider partnering with a bank or MFI, they are provided with access to a micro-loan. The provider needs to be wary of excessive or nontransparent interest rate charges and/or poor credit risk assessments leading to client indebtedness and potential loan defaults. The challenges involved in managing loan portfolios comprising largely of unsecured microfinance credit have been well documented.⁸⁰ However, regulators responsible for the DFS partnership will need to consider the implications associated with customers accessing loans via a digital interface. Is such credit more readily accessible or automated, are the customers adequately assessed, are the loan portfolios well-managed and, most importantly, are financial inclusion goals truly being served or are the end users at risk of becoming over-indebted?

- ▶ Consumers misunderstand the **legal distinction between stored values in mobile money accounts versus the funds held in the deposit accounts**. When a mobile money provider enters into a partnership with an approved deposit-taking institution, such as a bank, the mobile money customer may be offered access to traditional bank deposit accounts. Such deposit accounts will be attractive as they can earn interest. However, there are likely to be different mechanisms in place for protecting the funds in the deposit accounts versus protecting the stored values.⁸¹ Consumers may not understand the distinction and implications of these different mechanisms. If at the "end of the day," the stored values are compromised and are at risk but end users consider there to be no distinction between their stored values and the funds in their deposit accounts, what will be the implications for the reputation risk of the providers and the regulators responsible for the providers? Will regulators be faced with "bail-out" scenarios in order to

80 The Smart Campaign and its Smart Microfinance and the Client Protection Principles provide a framework for addressing the challenges involved in microfinance Client Protection Principles The Smart Campaign (2014) <http://www.smartcampaign.org/about/smart-microfinance-and-the-client-protection-principles>.

81 Where there is stored value (also known as "e-money") the regulators will focus on how to safeguard the customers' funds and how to isolate the funds. The funds will not generally be recognized as a deposit of the end user, however the end user may think of the funds as a deposit and therefore appropriate safeguards need to be implemented to ensure consumer confidence can be maintained in these systems. For further background on the distinction and implications of protecting stored value (or "e-money") reference should be made to the "knowledge product" by Jonathan Greenacre and Ross Buckley and supported by the Pacific Financial Inclusion Programme, Trust Law Protections for E-Money Customers: Lessons and a Model Trust Deed Arising from Mobile Money Deployments in the Pacific Islands (October 2013) <http://www.cifr.edu.au/assets/document/E226%20Buckley%20E-Money%20Knowledge%20Product%202014%2009.pdf>.

77 Ibid.

78 Ibid.

79 Ibid.

address considerable reputation risk that could create a crisis of confidence in DFS more broadly?

- ▶ **Partnerships bring new, and previously unregulated, players into the DFS space.** Regulators will need to determine whether consumer protection frameworks that focus on disclosure requirements and consumer recourse mechanisms apply to the new players providing DFS. CGAP's Financial Access 2010, the state of financial inclusion through the crisis (September 2010) found that for the economies captured in the survey even where regulations for consumer protection did exist, they did not apply to unregulated financial service providers.⁸²
- ▶ Consumer protection frameworks may not be enforceable and relevant if **regulatory mandates or inter-regulatory cooperation arrangements do not keep pace with partnerships.** For example, with the scenario of an MNO offering a mobile money product wanting to enter into a partnership with an MFI in order to provide its end users with access to loans. The microfinance industry in which that particular MFI operates may have been largely unregulated or regulated in a different way from traditional financial institutions involved in taking deposits and extending loans. Regulators may find themselves in a situation where they have a regulatory mandate over one of the participants in a partnership but not over the other (the MFI). Regulators may need to consider implementing memorandums of understanding to clarify areas for regulator cooperation where partnerships involve players with different regulators.

From the above points on consumer risks arising as a result of partnerships in DFS, it will not be surprising if some regulators find themselves in uncharted territory. Regulators are being proactive in deepening their skills and knowledge in these areas with the focus on improving financial inclusion. Of note is the recent China-Peru knowledge exchange for the regulation and supervision of nonbank, nondeposit-taking institutions. Peru's regulator (Superintendencia de Banca, Seguros y AFP (SBS)) is addressing the challenges of microfinance lending from a number of angles, including requiring the regulated entity to comply with stricter provisioning and write-off policies and strengthening

consumer protection frameworks that involve both regulatory requirements for supervised entities and increased information and financial disclosure.⁸³

Financial inclusion advocates are also being proactive in deepening industry understanding of the benefits of partnerships between MNOs, banks and MFIs. For example, GSMA's mobile money unit (MMU) recognizes that mobile money providers and MFIs are working together to improve the quality and range of financial services available.⁸⁴ GSMA's MMU website brings together articles, blog posts and other resources of use for industry players considering partnerships. GSMA's MMU is also building a deployment tracker on mobile credit and savings services similar to its highly regarded mobile money deployment tracker.⁸⁵

4.5.2.3 Challenges for partnerships in DFS

While partnerships do bring promise in terms of contributing toward the sustainability of MFS and DFS, they also present a number of challenges as stakeholders work out the required commitments and expected returns from the partnerships. These challenges are not explored in this article, but some examples are noted here to emphasize that partnerships are not straightforward "win-wins" for MFS and DFS ecosystems.

GSMA has emphasized that government-to-people payments (G2P) may look attractive for providers and those who make payments. However, this business is challenging and "requires fully committed partnerships."⁸⁶ CGAP has released four case studies (Haiti, the Philippines, Kenya and Uganda) that examine the challenges in the establishment of mobile money based G2P payment systems.⁸⁷ Before the success of M-Shwari, Safaricom had a similar product, MKesho, through a partnership with

82 Consultative Group to Assist the Poor and World Bank Group Financial Access 2010, The State of Financial Inclusion Through the Crisis (2010) <http://www.cgap.org/publications/financial-access-2010>.

83 China-Peru Knowledge Exchange: non-bank non-deposit taking FI regulation and supervision alliance for financial inclusion (1 April 2014) <http://www.afi-global.org/news/2014/4/01/china-peru-knowledge-exchange-non-bank-non-deposit-taking-fi-regulation-and>.

84 MMU products – credit GSMA, <http://www.gsma.com/mobilefordevelopment/programmes/mobile-money-for-the-unbanked/products/mmu-products-credit>.

85 Ibid.

86 Almazan, M., 2013, "G2P payments and mobile money: opportunity or red herring?" GSMA, 30 September. <http://www.gsma.com/mobilefordevelopment/g2p-payments-mobile-money-opportunity-or-red-herring>.

87 Zimmerman and Bohling, supra.

Equity Bank, which was unsuccessful due to complications over revenue sharing.⁸⁸ Most recently, one of the first articles analyzing the RBI's regulatory change allowing NBFCs to act as agents providing cash-out services posed the question of whether mutually beneficial agreements on the division of revenues could be reached and whether this challenge would compromise RBI's efforts to improve financial inclusion.⁸⁹

4.5.2.4 Concluding remarks on partnerships and consumer demand

Partnerships between payments providers, banks, MFIs and MNOs assist the success of DFS. Partnerships can address regulatory concerns and allow for deeper product offerings beyond payments and remittance activities to providing customers with a greater range of services, including savings, credit and insurance products. Regulators need to assess partnerships on a number of grounds, which may include the proposed legal nature of the partnership that gives rise to collaboration risks. Partnerships will also raise consumer protection issues as a result of consumers potentially having access to a much broader range of financial services via a mobile phone than simply mobile money.

Regulators should stay in close contact with industry players regarding developments in partnerships to ensure regulatory oversight supports the benefits from partnerships in the DFS space yet responds quickly and appropriately to any additional risks arising as a consequence of the players' involvement in partnerships.

Our analysis of the risks arising from partnerships is at an elementary stage. We will conduct further analysis and research in this area with the objective of improving existing knowledge and awareness of the regulatory challenges arising from partnerships in DFS.

5. Conclusion

Regulators should develop an understanding of consumer demand, so as to better appreciate which market developments

need to be encouraged or facilitated through policy and regulatory changes. We have outlined factors for regulators to consider in developing an understanding of consumer demand, including the importance of local context and the customer value proposition. We have outlined examples of how regulators can build consumer demand, with a particular focus on their role in facilitating successful partnerships in the DFS space.

In summary, by working to understand and build consumer demand, regulators can facilitate the building of sustainable DFS ecosystems and move closer to the goal of providing financial access for all. We urge regulators to consider this approach to consumer demand alongside their traditional responsibilities of ensuring safe and sound financial systems. We recognize this approach is advocating a broader role for financial regulators. We believe, however, it is critical for regulators to assume this role because it is now clear that market forces alone will not always, or even regularly, deliver sustainable DFS in markets that can benefit from improved financial inclusion.

We believe financial inclusion will be significantly strengthened when regulators focus on the importance of consumer demand in DFS and the regulatory challenges that come with building consumer demand. This regulatory focus will strengthen and support the existing efforts of market players, development partners and financial inclusion advocates in emerging markets to use DFS to broaden accessibility to financial services. While this represents a new regulatory frontier for financial regulators, it is a frontier well worth navigating in order to ensure the unbanked and under-banked benefit as much as possible from the abundance of innovative DFS available today.

⁸⁸ Heinrich, E., 2014, "The apparent M-Pesa monopoly may be set to crumble," *Fortune Magazine*, 27 June. <http://fortune.com/2014/06/27/m-pesa-kenya-mobile-payments-competition/>.

⁸⁹ Anand, A., R. Barua and M. Sharma, 2014, "NBFC-MFIs as business correspondents - who benefits?" *MicroSave*, July. <http://blog.microsave.net/nbfc-mfis-as-business-correspondents-who-benefits-part-i/>.

AFI	Alliance for financial inclusion
BPNG	Bank of Papua New Guinea
BSP	Bangko Sentral ng Pilipinas
CAK	Communications Authority of Kenya
CBA	Commercial Bank of Africa
CGAP	Consultative Group to Assist the Poor
DFS	Digital financial services
G2P	Government to person
MFI	Microfinance institution
MFS	Mobile financial services
MFSWG	Mobile Financial Services Working Group
MMU	Mobile money unit
MNO	Mobile network operator
MVNO	Mobile virtual network operator
NBFC	Non-bank finance company
NMB	Nationwide Merchant Bank
P2G	Person to government
POS	Point of sale
RBI	Reserve Bank of India
RBM	Reserve Bank of Malawi
SBS	Superintendencia de Banca, Seguros y AFP

Appendix 1: List of acronyms*

E-money	Monetary value electronically recorded with the following attributes: (i) issued upon receipt of funds in an amount no lesser in value than the value of the e-money issued; (ii) stored on an electronic device (e.g. a chip, prepaid card, mobile phone, or computer system); (iii) accepted as a means of payment by parties other than the issuer; and (iv) convertible into cash
Cash-in	Exchanging cash for e-money
Cash-out	Exchanging e-money for cash
Collaboration risk	Risks arising from the legal structure of a joint venture, for example, while the finances of each partner in a joint venture might be robust, the joint venture vehicle itself may be poorly capitalized and carry a real risk of insolvency
Consumer risk	Risks consumers are directly exposed to by their use of a service, for example, fraud, breaches of privacy, or the accumulation of debts that the consumer is unable to service
Customer value proposition	The benefits a product or service holds for a customer, the reasons why a customer might buy that product or service
Digital financial services	Financial services provided via digital remote access, including e-money or mobile money, which is in contrast to traditional financial services accessed through physical means, such as visiting a bank branch
Enabling regulator	An agency that creates a regulatory environment conducive to the safe growth of mobile money

Appendix 2: Glossary

* Definitions from Alliance for Financial Inclusion, Guideline Note Mobile Financial Services: Basic Terminology (2013) <http://www.afi-global.org/sites/default/files/publications/mfswg_gl_1_basic_terminology_finalnewnew_pdf.pdf>.

The hidden cost of accommodating crowdfunder privacy preferences: a randomized field experiment¹



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Abstract

Online crowdfunding has received a great deal of attention as a promising avenue to fostering entrepreneurship and innovation. Because online settings bring increased visibility and traceability of transactions, many crowdfunding platforms provide mechanisms that enable a campaign contributor to conceal his or her identity or contribution amount from peers. We study the impact of these information (privacy) control mechanisms on crowdfunder behavior. Employing a randomized experiment at one of the world's largest online crowdfunding platforms, we find evidence of both positive (e.g., comfort) and negative (e.g., privacy priming) causal effects. We find that reducing access to information controls induces a net increase in fundraising, yet this outcome results from two competing influences – treatment increases willingness to engage with the platform (a 4.9% increase in the probability of contribution) and simultaneously decreases the average contribution (a U.S.\$5.81 decline). This decline derives from a publicity effect, wherein contributors respond to a lack of privacy by tempering extreme contributions. We unravel the causal mechanisms that drive the results and discuss the implications of our findings for the design of online platforms.

1. Introduction

Over the last eight years, a growing proportion of the venture finance gap has been filled by novel funding mechanisms. Online crowdfunding, defined as “a collective effort by people who network and pool their money together, usually via the internet, in order to invest in and support efforts initiated by other people or organizations” (Ordanini et al. 2010, p. 444), has received a great deal of attention from entrepreneurs and policymakers as a promising avenue to fostering entrepreneurship and innovation.

One of the primary hurdles typically faced by new entrepreneurs is the identification and sourcing of capital (Wetzel 1987). Crowdfunding simplifies this process by providing entrepreneurs with broader reach and visibility (Agrawal et al. 2014, Kim and Hann 2013). However, a notable implication of shifting the fundraising process online is the increased visibility and traceability of transactions. Most crowdfunding platforms maintain a public record of all transactions, including information about contributors’ identities, the amount of their contributions, and the campaigns they chose to support. Perhaps cognizant of the possibility that some crowdfunders may shy away from scrutiny (while others may seek it), many crowdfunding platforms now provide users with transaction-level information controls that enable concealment (revelation) of identity or contribution amounts, at the contributor’s discretion.

Ostensibly, providing crowdfunders with the ability to determine the visibility of their contributions to peers should increase their level of satisfaction, and thus their willingness to transact, resulting in increased fundraising. A large number of studies in recent years support this logic. Scholars have noted the growing prevalence of privacy concerns among consumers (Goldfarb and Tucker 2012) and have demonstrated the positive effects of privacy assurances, policies and seals on user information sharing and product purchase (Hui et al. 2007, Tsai et al. 2011). At the same time, a number of studies have demonstrated the value of social recognition and reputational gains as drivers of user contributions to online communities (Wasko and Faraj 2005, Zhang and Zhu 2011).

However, providing users with information control mechanisms can also be costly. Recent work suggests that users may ignore these features if they perceive that they are inflexible, difficult to understand, or a challenge to use (Das and Kramer 2013, Sleeper

et al. 2013), potentially opting not to transact at all. It has also been shown that prompting individuals with questions about scrutiny or their privacy can elicit privacy concerns via priming effects (John et al. 2011, Joinson et al. 2008, Tucker 2014). This, in turn, can have a negative influence on users’ willingness to engage with a purveyor, platform or other users.

We, therefore, set out to understand the impact that transaction-level information controls have on crowdfunders’ willingness to contribute, as well as their subsequent behavior, conditional on conversion. More specifically:

- ▶ We seek to identify and quantify the causal relationship between a crowdfunding platform’s provision of information control features and potential contributors’ willingness to transact.
- ▶ Further, we look to understand any associated shifts in behavior, conditional on transaction.

Evaluating the impact of information control provision on user behavior is inherently challenging because of various biases associated with observational and survey-based attempts to evaluate privacy-sensitive individuals who frequently are, by definition, unwilling to be scrutinized or profiled. Moreover, concerns about privacy may not be accurately reflected in interview or survey-based settings because of the gap between consumers’ claimed privacy concerns and their actual behavior in response to those concerns (Strandburg 2005). Experimental subjects expect a researcher to collect their information, and they are unlikely to have concerns about receiving unwanted solicitations from third party organizations or individuals down the line, because standard data collection policies in experimental protocols prohibit the sharing of data without consent (Wattal et al. 2012).

Meanwhile, observational studies are confronted with their own comparable issues. Researchers must contend with a lack of available data as subjects strive to conceal their actions. Further, issues of endogeneity stemming from self-sorting and self-selection (Heckman 1979) are also likely to arise from any changes in user privacy conditions. To clarify, consider the example of the privacy-sensitive consumer. Such consumers may opt to exit a marketplace entirely following, for example, the removal of a privacy assurance. Unless this selection effect were to somehow be accounted for explicitly, either in the data or through estimation techniques, it

would be impossible to draw valid, generalizable conclusions about the effect that such a change had on user behavior. Although various econometric techniques are available to address these issues, each is heavily laden with assumptions. Further, data-based adjustments are often challenging, if not impossible, to implement because subjects who do not participate will often go unobserved.

Fortunately, web-based experimentation with impression or session-level data can alleviate many of these concerns. We partnered directly with the purveyor of a leading global online crowdfunding platform to design and execute a randomized control trial, unbeknown to the subjects under study (i.e., website visitors). Subjects in our sample were thus observed while making real-life decisions, with real economic consequences. Our results are, therefore, not subject to the reporting biases inherent in survey research of privacy issues, nor are they subject to issues of self-selection, because we observe subjects even when they choose not to transact.

We randomly manipulate the presentation timing of an information control question, displaying it either before or after the completion of payment. This intervention allows us to understand what impact information control features have on users' willingness to engage with the website, in terms of whether they contribute to crowdfunding campaigns (willingness to transact) and, given contribution, their contribution amounts.

We found, counter to intuition, that delaying the presentation of information controls drove a 4.9% increase in users' probability of completing a transaction. At the same time, conditional on transacting, the dollar amount of the average campaign contribution declined (by U.S.\$5.81) with treatment. Fortunately for the purveyor of this platform, the increase in the rate of participation was sufficient to offset the decline in average contributions, resulting in an immediate net benefit from the intervention. Accordingly, the purveyor has since adopted the post payment setup on a permanent basis.

Our subsequent analyses indicate that the treatment reduced the variance of contribution amounts, with an asymmetrically stronger effect on large contributions. That is, our treatment reduced the prevalence of both large and small contributions, although the decline in large contributions was more pronounced. We submit that this occurred because contributors in the post

payment condition, having reduced access to privacy controls, perceived greater publicity for their actions. Accordingly, they regressed toward the mean to avoid drawing unwanted attention (e.g., unsolicited requests from other crowdfunding campaigns). This result provides empirical evidence of the impact of publicity on individuals' behavior, which has seen theoretical consideration in the prior literature on monetary donations to public goods (Daughety and Reinganum 2010) and which has also been demonstrated in regard to other types of online contributions, such as user-generated content in the form of restaurant reviews (Wang 2010). This implies that a careful balance must be maintained between users' privacy concerns and the behavior that can ensue from accommodating those concerns.

This work contributes to the growing literature on crowdfunding (Agrawal et al. 2014, Burtch et al. 2013a). Studies have looked at various drivers of campaign fundraising outcomes, including pitch framing and information disclosure (Ahlers et al. 2012, Herzenstein et al. 2011b), fundraisers' social networks (Lin et al. 2013, Mollick 2014), and geography and culture (Burtch et al. 2014a, Lin and Viswanathan 2013, Agrawal et al. 2015). However, perhaps the most common subject of study has been peer influence among contributors (Burtch 2011, Burtch et al. 2013b, Herzenstein et al. 2011a, Kim and Viswanathan 2014, Zhang and Liu 2012). Bearing in mind that peer influence depends on the visibility of peers' actions, our work considers the underlying context and mechanisms that enable those effects. In that vein, this work is most closely related to Burtch et al. (2014b), who examine how and when users choose to make use of information controls in crowdfunding. We build on that work by examining the causal effect on crowdfunders' behavior from merely providing (or not providing) information controls.

Our work also builds on the literatures dealing with privacy and reputation, in that we consider the dual, potentially countervailing impacts of privacy feature provision on users' (i) conversion and (ii) subsequent behavior, conditional on conversion. To our knowledge, these parallel effects have not been separately examined in prior work. Last, our work contributes to the literature on anonymity in charitable contribution. A number of studies in recent years have noted the role of perception management and social image in prosocial behavior (Andreoni and Bernheim 2009, Daughety and Reinganum 2010). Our results indicate that these types of concerns similarly play into

crowdfunder behavior, which in turn speaks to the presence of altruistic motives in online crowdfunding markets.

2. Methods: randomized experiment
2.1 Study context

Our experiment was conducted at one of the largest global reward-based crowdfunding platforms, which enables anyone to raise money for a project or venture. The marketplace attracts upward of 200,000 visitors per day and facilitates millions of dollars in contributions each month. Since 2008, the platform has attracted over one million users from more than 200 countries.

The platform allows fundraising for any purpose. When campaign owners first submit their project, they are required to specify how the money will be used, rewards that contributors can claim, the target amount to be raised, the number of days the fundraiser will run for, and the funding format (keeping what is raised versus a provision point mechanism/threshold fundraiser).

Campaigns are presented to website visitors in order of popularity. Popularity is measured algorithmically by the platform operator, based on a variety of factors, including organizer effort, fundraising progress, media coverage, etc. The home page highlights new campaigns and those that are ending soon. A visitor can also filter ongoing campaigns by location, proximity (“near me”), or category.²

Individuals who decide to contribute must first specify how many dollars they would like to supply. Next, contributors provide their email addresses and, if a reward is being claimed, their shipping addresses. At this point, in our control condition, the contributor is presented with a question about how the contribution record should appear to website visitors. Contributors can conceal either their identity or the amount of their contribution (but not both).³ Importantly, a contributor’s identity and amount will always be visible to the campaign organizer and platform operator; this information control prompt only masks details from a contributor’s peers.

Your contribution will currently appear to everyone as “John Doe – U.S.\$20.” Would you like to change the appearance?

- ▶ Name and amount: “John Doe – U.S.\$20”
- ▶ Name only: “John Doe – Undisclosed”
- ▶ Amount only: “Anonymous – U.S.\$20”

Figure 1: Privacy control prompt

2.2 Experimental design

Figure 1 presents a design mock-up of the information control question that is posed to users during the course of contribution. Each user is asked to specify which pieces of information about the contribution he or she would like to display publicly.⁴ Our experimental treatment imposes a delay in the presentation of this question, from before payment to after payment. This treatment mimics removal of the mechanism from the platform, in a watered-down form. This treatment allows us to assess the economic impact of providing information controls, in terms of both users’ willingness to transact and contribution amounts, conditional on transaction. Ultimately, we aim to assess whether these mechanisms deliver a net benefit or are detrimental to campaign fundraisers and the platform operator.

As noted above, in the prepayment (control) condition, the information control question is presented to the user just prior to payment. In the post-payment (treatment) condition, the mechanism is not presented until after payment has been completed. Figure 2 provides a visual comparison of the experimental flow experienced by subjects in our treatment and control conditions.

The timing of the information control prompt (i.e., before versus after payment) may have two foreseeable, countervailing impacts on user behavior. On one hand, placing the mechanism after payment may reduce any potential privacy or scrutiny priming

2 The campaign organizer (rather than the marketplace purveyor) determines the campaign category. As such, there are no strict rules around the assignment of categories; thus these groupings are fuzzy and may overlap.
3 Information-hiding mechanisms of this sort are relatively common in online crowdfunding. Some other prominent platforms that employ these features include GoFundMe.com, GiveForward.com, and Crowdrise.com.

4 Although it is possible for a user to create an account using a pseudonym, the high frequency with which these information control mechanisms are used (in approximately 50% of contribution instances) indicates that a majority of users reveal their true identity in their user profile.

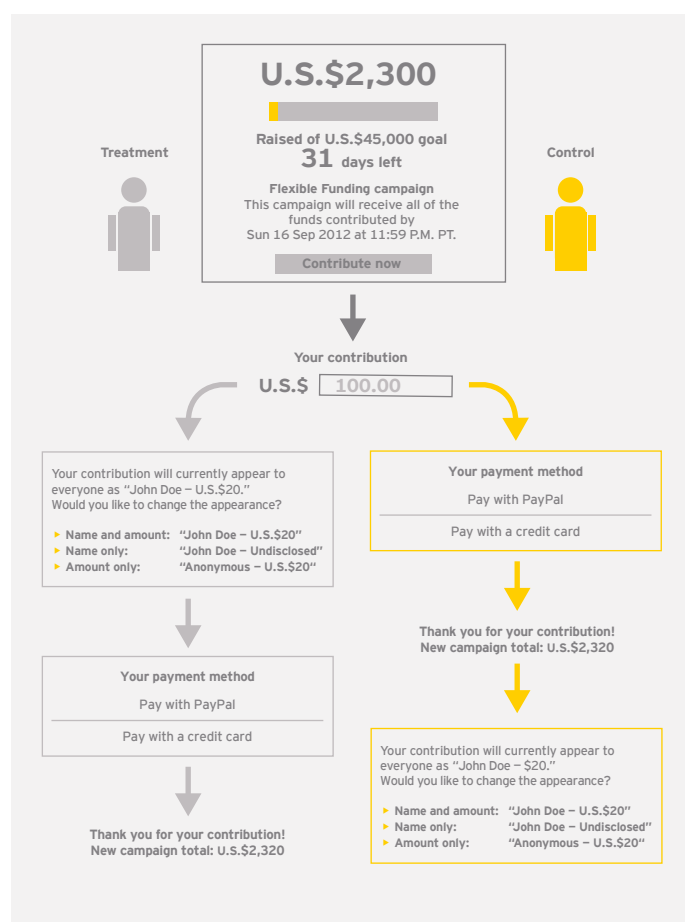


Figure 2: Contribution flow and information control prompt positioning

effects, because users are not prompted to consider these issues before making their payments. In turn, this effect could be expected to increase conversion rates. On the other hand, delaying presentation might reduce willingness to transact if users already have privacy or scrutiny in mind (e.g., privacy-sensitive individuals). Because of these competing effects, it is not immediately clear what impact our treatment will have on fundraising.

This treatment allows us to gain insights into the economic impacts of providing information control mechanisms. Because we only delay the presentation of the mechanism and do not

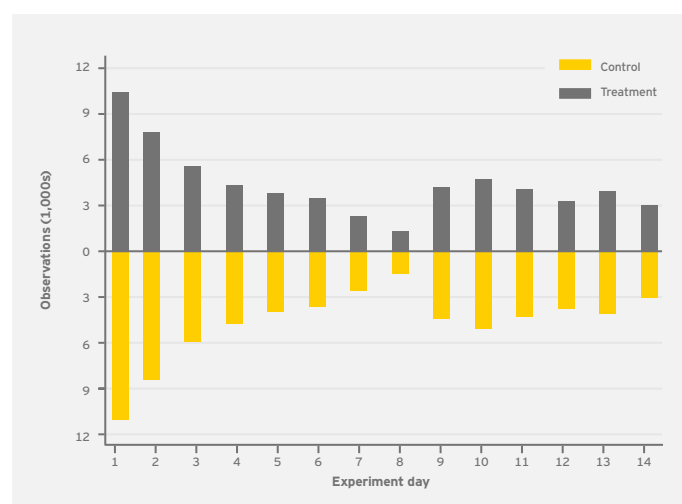


Figure 3: Treatment of control proportions over time

remove it entirely, any identified effects are presumed to be conservative estimates of how provision impacts behavior. Moreover, because we cannot ensure that every campaign visit is associated with a first-time contributor,⁵ some subjects in our treatment condition may anticipate the eventual provision of information-hiding mechanisms. Such anticipatory behavior can only mute the effects of our treatment, again resulting in conservative estimates.

2.3 Econometric specification

Our estimation approach relies primarily on ordinary least squares (OLS) with campaign fixed effects. All of our estimations additionally incorporate time-fixed effects (in terms of the absolute day on which the observation took place as well as the day of week) and a variety of other control variables⁶ pertaining to both the contributor and the campaign.

⁵ We offer one robustness check in which we examine our treatment's effect on conditional contribution among only new users (i.e., those registering in the 24 hours prior). We can be reasonably sure that recent joiners are first-time contributors and thus are unlikely to hold any prior expectations about the availability of information control features. Our results remain consistent in this estimation.

⁶ We do not incorporate user-fixed effects because we are unable to identify users who do not contribute any funds. This is not a major concern, however, because our treatment is randomized, and thus it is extremely unlikely to be correlated with omitted variables. Our estimations also demonstrate that incorporating the various controls at our disposal does little to influence the magnitude or significance of our treatment effect estimates.

Control				Treatment			Total N
Variable	Mean	SD	N	Mean	SD	N	
Conversion	0.259	0.438	66,369	0.323	0.467	62,332	128,701
Conditional contribution	89.337	260.948	17,222	85.939	263.440	20,106	37,328
Organizer	0.017	0.128	17,222	0.019	0.136	20,106	37,328
Binary info hiding	0.470	0.500	17,222	0.208	0.406	20,106	37,328

Table 1: Descriptive statistics: control vs. treatment

Note. Binary info hiding is an indicator of whether the contributor chose to hide any information in his or her transaction (either his or her name or the amount).

Variable	Mean	SD	Min	Max	N
Treatment	0.48	0.50	0.00	1.00	128,701
Conversion	0.29	0.45	0.00	1.00	128,701
Unconditional contribution	25.38	146.73	0.00	10,000.00	128,701
Campaign balance	148,134.60	253,854.80	0.00	1,142,523.00	128,701
Campaign days	25.77	22.74	1.00	252.00	128,701
User mobile	0.22	0.42	0.00	1.00	128,701
Organizer	0.02	0.13	0.00	1.00	37,328
User tenure	43.15	127.49	0.00	1,835.00	37,328
Day of week					
Monday	0.12	0.32	0.00	1.00	128,701
Tuesday	0.08	0.28	0.00	1.00	128,701
Wednesday	0.19	0.39	0.00	1.00	128,701
Thursday	0.19	0.39	0.00	1.00	128,701
Friday	0.17	0.37	0.00	1.00	128,701
Saturday	0.14	0.34	0.00	1.00	128,701

Table 2: Descriptive statistics: sample wide

Note. Sample is based only on converted users.

We estimate our models in a stepwise fashion, beginning with a simple model that includes only our treatment indicator, Treatment (T), as well as campaign and time-fixed effects. We then incrementally incorporate the other controls – namely, the funds raised by the campaign to date (Campaign Balance); the number of days of elapsed fundraising (Campaign Days); and a binary indicator of whether the visitor arrived on a mobile device (User Mobile) as well as indicators for his or her browser type (User Browser), language (User Language), and country, based on Internet protocol address (User Country). Equation (1) captures our econometric specification:

$$\text{Conversion}_{ijt} = \beta \times T_{ijt} + \gamma \times X_{jt} + \lambda \times Z_{it} + \varphi_j + \omega_t + \varepsilon_{ijt}$$

We index users with i , campaigns with j , and time in days with t . The coefficient of interest is β , capturing the effect of our treatment on conversion rates; X is a vector of dynamic campaign controls for fundraising and duration; Z is a vector of user/visit controls, including browser, language, country and device; φ is a vector of campaign fixed effects; ω is a vector of day and day of week fixed effects; and last, ε is our error term.

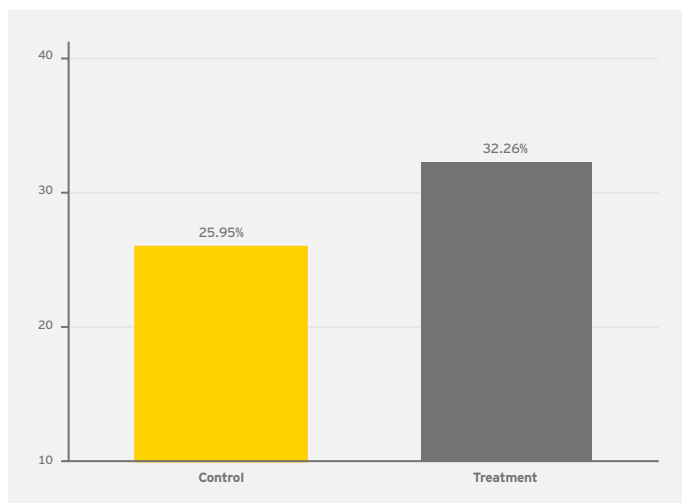


Figure 4: Conversion rate between control and treatment groups

We employ a similar specification to estimate our treatment's effect on conditional and unconditional contribution. A notable difference in our conditional contribution estimations, however, is that we are able to identify all subjects in the sample. Accordingly, we can incorporate additional contributor controls associated with the user account, such as his or her tenure on the platform (User Tenure) and an indicator of whether he or she has an explicit organizer relationship with the campaign (Organizer). Equation (2) captures our specification for the conditional conversion model. Our estimations considering contribution per visitor (unconditional contribution) are identical, except that they exclude the account-based contributor controls:

$$\text{Contribution}_{ijt} = \beta \times T_{ijt} + \gamma \times X_{ijt} + \lambda \times Z_{ijt} + \varphi_j + \omega_t + \varepsilon_{ijt}$$

In addition to providing our main regression results, we offer a set of ancillary analyses intended to explore and validate the mechanism underlying our treatment effect. Further, we provide a series of robustness checks, e.g., alternative estimators, sample splits and manipulation checks.

2.4. Data and descriptive statistics

Our experiment was conducted over a 14-day period. We observed 128,701 visitors that entered the campaign contribution flow and thus joined our subject pool. Of these,

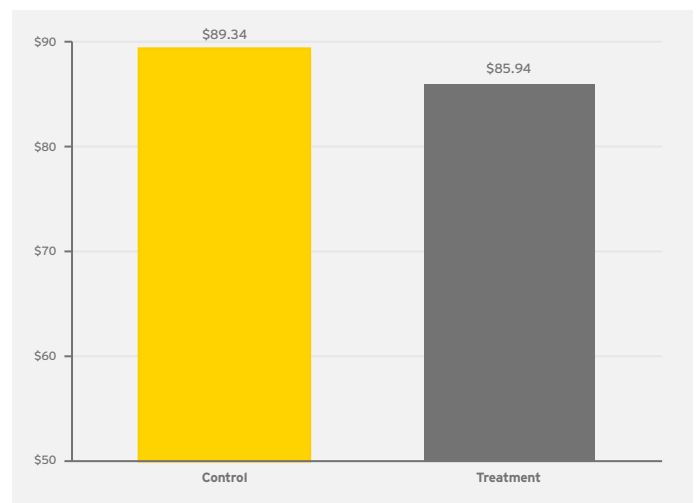


Figure 5: Average conditional contribution between control and treatment groups

62,332 were assigned to the treatment condition (48.4%) and 37,328 chose to contribute funds (29%). The distribution of subjects entering each condition, over the course of our experiment, is presented in Figure 3. Table 1 provides a breakdown of notable descriptive statistics across each stage of the contribution flow, across conditions. Table 2 provides sample-wide descriptive statistics for all of our variables.

Figures 4, 5, and 6 depict differences in the probability of conversion, expected conditional contribution, and expected unconditional contribution, respectively, between our control and treatment groups. In each case, we see rather stark shifts in user behavior, with conversion rates increasing and conditional average contributions decreasing.

We also collected additional data about the prevalence with which campaign visitors view prior records of contribution. We obtained data from the platform operator about user navigation patterns. Specifically, we obtained data for roughly 145,000 campaign visitors about the last campaign tab they viewed before navigating elsewhere. We observed that nearly 30% of visitors examined the list of past contributions immediately before navigating elsewhere (either to contribute or exit). Considering that we only observe the last tab viewed, the proportion of visitors navigating to the funders tab is in fact likely to be much

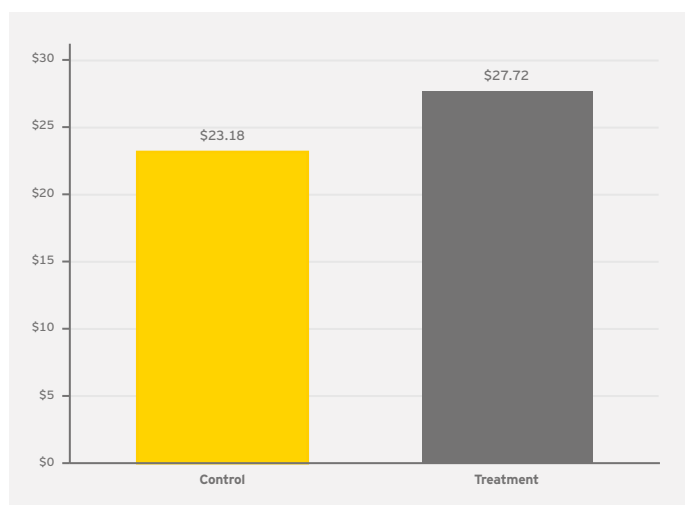


Figure 6: Average unconditional contribution between control and treatment groups

higher than this. This provides clear empirical evidence of the potential role of scrutiny and publicity.

3. Results

We began by studying the treatment effect on the probability of visitor contribution. As noted previously, the perception of control over one's information, and thus one's privacy, can have multiple countervailing effects. On one hand, users' perception of control can result in increased rates of participation if privacy-sensitive users are made more comfortable (Hui et al. 2007, Tsai et al. 2011). On the other hand, prompting users with privacy- or scrutiny-related questions can prime users with privacy concerns, thereby reducing participation (John et al. 2011, Tucker 2014). This latter notion is also supported by recent work that has found that individuals actually place less emphasis on privacy when they are not initially endowed with it (Acquisti et al. 2013).

We also assessed the treatment's impact on users' dollar contributions. A number of studies note that individuals go to great lengths to conceal information when they are concerned about how others will view it (Ariely and Levav 2000, Huberman et al. 2005). Here, individuals may prefer to conceal their contributions if they may be viewed as "cheap." Alternatively, large donors might fear drawing attention or unwanted solicitations for future donations from other campaigns. For these

reasons, we anticipated that the prominence of the information control prompt would be positively associated with extreme contributions (very small or very large), because cognizance of the option to conceal information was expected to make users more willing to engage in such activity.

We first report results for the impact of our treatment on the probability of campaign contribution (see Table 3). We saw that the treatment reduces privacy sensitivity, resulting in an approximate 4.9% increase in the probability of conversion (column (4)). Examining the change in dollar contributions, conditional on conversion (see Table 4), we found that the average contribution declined by approximately U.S.\$5.81 (column (5)). This result reinforces our earlier observation that offering information controls may have a somewhat complex effect, in that it can have a variety of countervailing impacts. Taken together, the above two results indicate that the provision of information hiding mechanisms, and perhaps privacy controls in general, can have counterintuitive, detrimental impacts on user behavior from the purveyor's standpoint, raising users' concerns and lowering their willingness to transact on the platform.⁷

When we consider the above effects in tandem (i.e., the combination of increased participation and reduced contribution), we find that the increase in conversion rates dominated. These results are reported in Table 5. Thus, our treatment ultimately resulted in a net benefit for the platform purveyor in terms of overall fundraising outcomes. We saw an estimated increase of roughly U.S.\$3.55 in the average contribution per visitor, following treatment.

4. Supporting analyses

We next conducted a set of secondary analyses to understand the underlying mechanisms of the observed effects. We examined whether average contributions were indeed falling because of a decline in the variance of contributions (i.e., fewer extreme contributions), as suspected. Further, we looked for heterogeneity in the treatment effect around sensitive campaign topics. We undertook four additional analyses in this regard.

⁷ At the same time, it should also be noted that the provision of these features could reduce consumer surplus. If opting out of a particular transaction is actually an optimal choice, removing privacy controls and thus privacy priming from the contribution process may actually drive the crowdfunder toward suboptimal behavior. As such, the treatment may impose some unobserved costs on crowdfunders.

Explanatory variable	(1)	(2)	(3)	(4)
Treatment	0.057*** (0.007)	0.057*** (0.007)	0.055*** (0.007)	0.049*** (0.007)
Campaign balance	–	1.17e–07** (3.77e–08)	1.25e–07** (3.27e–08)	2.09e–07*** (1.78e–08)
Campaign days	–	–0.015*** (0.002)	–0.013*** (0.002)	–0.013*** (0.001)
User mobile	–	–	–0.152*** (0.009)	–0.156*** (0.009)
User browser	Not included	Not included	Not included	Included
User language	Not included	Not included	Not included	Included
User country	Not included	Not included	Not included	Included
Day of week effects	Included	Included	Included	Included
Time effects	Included	Included	Included	Included
Campaign effects	Included	Included	Included	Included
Observations	128,701	128,701	128,701	128,701
F-statistic	27.80 (20,5077)	33.33 (22,5077)	57.78 (23,5077)	1.2e+08 (214,5077)
R ²	0.14	0.14	0.15	0.18

Table 3: Regression results: conversion rate (linear probability model with fixed effects; dependent variable is conversion)

Notes. Robust standard errors are reported in parentheses for coefficients, clustered by campaign. Sample includes all users who entered the contribution flow.

p<0.01; *p<0.001.

Explanatory variable	(1)	(2)	(3)	(4)	(5)
Treatment	–5.472* (2.727)	–5.472* (2.727)	–5.472* (2.726)	–5.525* (2.720)	–5.810* (2.679)
Campaign balance	–	4.22e–06 (0.000)	4.22e–06 (0.000)	5.21e–06 (0.000)	7.79e–07 (0.000)
Campaign days	–	0.703 (1.115)	0.703 (1.108)	0.617 (1.108)	–2.954+ (1.781)
User mobile	–	–	–0.064 (4.148)	0.458 (4.152)	–3.095 (5.772)
User tenure	–	–	–	–0.024** (0.009)	–0.020* (0.008)
Organizer	–	–	–	81.792** (25.129)	82.868** (25.184)
User browser	Not included	Not included	Not included	Not included	Included
User language	Not included	Not included	Not included	Not included	Included
User country	Not included	Not included	Not included	Not included	Included
Day of week effects	Included	Included	Included	Included	Included
Time effects	Included	Included	Included	Included	Included
Campaign effects	Included	Included	Included	Included	Included
Observations	37,328	37,328	37,328	37,328	37,328
F-statistic	1.79 (20,3581)	2.20 (21,3581)	2.06 (23,3581)	2.73 (25,3581)	1.2e+09 (216,3581)
R ²	0.17	0.17	0.17	0.17	0.18

Table 4: Regression results: conditional contribution (OLS with fixed effects; dependent variable is contribution)

Notes. Robust standard errors are reported in parentheses for coefficients, clustered by campaign. Sample includes only converted users (i.e., those who contributed at least some amount of money). Estimation includes additional user profile specific controls, user tenure and user mobile, because all users are identified.

+p<0.10; *p<0.05; **p<0.01.

Explanatory variable	(1)	(2)	(3)	(4)
Treatment	4.375*** (1.015)	4.396*** (1.022)	4.232*** (1.003)	3.552*** (0.953)
Campaign balance	–	3.01e–05*** (7.34e–06)	3.10e–05*** (7.10e–06)	3.83e–05*** (6.23e–06)
Campaign days	–	–1.498** (0.481)	–1.344** (0.467)	–1.300** (0.443)
User mobile	–	–	–15.131*** (2.482)	–16.386*** (2.604)
User browser	Not included	Not included	Not included	Included
User language	Not included	Not included	Not included	Included
User country	Not included	Not included	Not included	Included
Day of week effects	Included	Included	Included	Included
Time effects	Included	Included	Included	Included
Campaign effects	Included	Included	Included	Included
Observations	128,701	128,701	128,701	128,701
F-statistic	3.38 (20,5077)	5.41 (22,5077)	6.75 (23,5077)	6.5e+08 (214,5077)
R ²	0.06	0.06	0.06	0.06

Table 5: Regression results: unconditional contribution (ols with fixed effects; dependent variable is contribution)

Notes. Robust standard errors are reported in parentheses for coefficients, clustered by campaign. Sample includes all users who entered the contribution flow.

p<0.01; *p<0.001.

First, we sought to quantify any shifts in the deviation of contributions relative to the overall campaign average. This reference point is appropriate because the definition of an extreme contribution should depend on the characteristics of the campaign being supported and the social norms surrounding it. We determined the absolute deviation from the average for each contribution record. We then regressed that absolute deviation⁸ on our binary indicator of treatment. The results are presented in Table 6. Taking the exponential of our coefficient estimate, we found that the treatment produced an approximate 21% decrease in deviations from the campaign average.

Second, we examined the total variance in contribution amounts between our treatment and control conditions, identifying a statistically significant decrease ($F=1.059$, $p<0.001$). Additional tests based on Levene's robust test statistic, as well as that proposed by Brown and Forsythe, were similarly significant ($p<0.001$). This result provides further support for our interpretation of the treatment effect on contribution amounts as deriving largely from subjects' increased perception of publicity.

Third, we examined the degree to which information hiding was associated with larger or smaller contributions (the tails of the distribution) and whether the association was balanced between the two. We constructed two binary indicators of contribution size, small or large, based on whether the contribution amount fell into the bottom or top 1%, 5% or 10% of the overall distribution, respectively. We then ran three regressions, modeling a binary indicator of information hiding as a function of each pair of indicators, in addition to our various controls. We obtained the results reported in Table 7. We saw that contributions at either tail are significantly more likely to be associated with information hiding, and we saw an asymmetric effect: larger contributions were almost twice as likely to be associated with information hiding. Moreover, the difference between the two coefficients was statistically significant ($F(1,3581)=6.92$, $p<0.01$).

Fourth, and last, to explore whether our treatment effect varied with the sensitivity of the campaign topic, we constructed an indicator of topic sensitivity and interacted it with our treatment indicator. We first examined the list of campaign categories, of which there were 24. Among these, we identified four categories that are potentially quite sensitive, where individuals' feelings and

⁸ We employ the log of absolute deviation to obtain percentage effects. We also include outlier contributions in this estimation, given that such observations contribute in large part to extreme donations in our sample.

Explanatory variable	OLS fixed effects
Treatment	-0.192*** (0.044)
Controls ^a	Included
Observations	33,746
F-statistic	7.5e+09 (216,2517)
R ²	0.05

Table 6: Regression results: publicity effect (dependent variable is log (absolute deviation))

Notes. Robust standard errors are reported in parentheses for coefficients, clustered by campaign. Sample includes all observations that resulted in contribution, with the exception of those that arrived to a campaign first (i.e., first contribution in the sequence). Accordingly, the sample only includes campaigns that received more than one contribution.

^a The same set of controls used in Table 4, column (5), are incorporated in the estimation.

*** p<0.001.

opinions are somewhat ideological in nature: politics, religion, education, and the environment.⁹ Based on this, our new indicator variable, sensitive, reflected whether a campaign fell into one of these four categories. The results of this estimation are reported in Table 8 (note that the main effect of campaign type is not identified in this estimation, because the value is static and thus collinear with the fixed effects). We observed that, as anticipated, our treatment effect was much stronger for sensitive campaign topics. Taken together, these results collectively provide support for the notion that publicity plays a central role in our treatment effect.

5. Additional analyses and alternative explanations

We also considered alternative explanations for our results. These analyses, as well as the robustness checks that follow, are provided in the supplementary appendix. One seemingly likely alternative explanation for the observed positive effect of our treatment on conversion rates pertains to simplification of the user interface (UI). Specifically, we might be concerned that the increase in conversion rates was actually due to removal of a radio button from the prepayment contribution process, which could have simply streamlined the UI. However, this is unlikely to explain the observed effects for a number of reasons.

First, we explored the duration of time it took contributors to complete the payment between our treatment and control groups. We found no evidence that the treatment group completed its payments more quickly ($t = -1.26$, $p = 0.21$).¹⁰ This is important, because we would expect to see significantly shorter visit durations in our treatment group if reduced complexity and effort were to explain our results.

Second, we examined moderating effects associated with visitors' mobile device usage. The UI complexity explanation would suggest that our treatment effect should be amplified for mobile users, who should be more sensitive to UI changes because of the limitations of smartphone screen size, among other features. However, we find no evidence of a positive moderating effect. This result, reported in Table S1 of the supplementary appendix, runs directly counter to a UI complexity explanation.¹¹

Third, and last, it is important to keep in mind that UI complexity is completely incapable of explaining the significant decline we observe in average contribution amounts with treatment. Taken in tandem, the above analyses and this last notable fact make it unlikely that UI complexity can explain our findings.

We next sought to delve deeper into the publicity effect. We considered that campaign organizers might contribute to their own campaigns, which we refer to as self-contribution. Noting this, we find it conceivable that the contribution effect we observed was largely attributable to campaign organizers' ceasing self-contribution in the face of publicity. To assess this, we constructed a binary indicator of self-contribution and regressed it on our treatment indicator, as well as our set of control variables. If our results were driven by campaign organizers' ceasing self-contribution, then we would expect our treatment indicator to have a significant, negative effect on the probability of any contribution being made by a campaign organizer. As reported in Table S2 of the supplementary appendix, we observed no evidence

⁹ A complete list of campaign categories is provided in Table S7 of the supplementary appendix (available as supplemental material at <http://dx.doi.org/10.1287/mnsc.2014.2069>). Examples of less sensitive topics include video and web, games, and food.

¹⁰ This t-test was performed on logged visit duration to meet the assumptions of normality. This analysis also excluded outlier observations in terms of visit durations – namely, visits in excess of 1,500 seconds or 25 minutes. We exclude these observations because they likely represent visits where a browser window was left open and inactive.

¹¹ Note that we do observe a decline in visit durations, but they are not severe enough to produce statistical significance. We provide clustered histograms of logged visit durations comparing the treatment and control groups, as well as comparing mobile and desktop users, in Figures S1 and S2 of the supplementary appendix.

Explanatory variable	10%	5%	1%
Large	0.070*** (0.010)	0.128*** (0.012)	0.153*** (0.026)
Small	0.033*** (0.009)	0.043** (0.014)	0.075** (0.027)
Controls ^a	Included	Included	Included
Observations	37,328	37,328	37,328
F-statistic	2,022.83 (216,3581)	3.2e+09 (216,3581)	1.4e+09 (216,3581)
R ²	0.21	0.21	0.21

Table 7: Regression results: contribution size and information hiding (linear probability model with fixed effects; dependent variable is binary info hiding)

Notes. Robust standard errors are reported in parentheses for coefficients, clustered by campaign. The sample includes all converted visitors (i.e., those who contributed at least some amount of money).

^a The treatment indicator, campaign-level fixed effects, day fixed effects, day of week fixed effects, browser language effects, browser type effects, etc., are incorporated in the estimation.

p<0.01; *p<0.001.

of this. It, therefore, seems unlikely that our results are due to a decline in the rate of organizers supporting their own campaigns.

6. Robustness checks

We explored the robustness of our results in a number of ways. First, we considered the impact of outlier observations. We repeated our primary estimations excluding observations that fell within the top 5% of the distribution in terms of contribution amounts. We also repeated our estimations excluding observations associated with campaigns in the top 5% of the distribution of funding targets. Our results remained generally unchanged in both cases.

Next, we considered the use of alternative estimators. We explored both the conditional logit and probit estimators for our conversion model, and we considered fixed effects Poisson and negative binomial estimators for our contribution models. The results of the additional estimations for the treatment's effect on conversion are once again provided in Table S3 of the supplementary appendix. Similarly, the results we obtained using Poisson and negative binomial estimators for our conditional and unconditional contribution models are reported in Tables S4 and S5 of the supplementary appendix, respectively. In each case, we report marginal effects. In all three cases, we see results that are consistent with those reported in our primary results.

We then reran our estimation using a subsample of our data, focusing only on converted visits among users who registered on

the platform within the prior 24 hours.¹² The logic here was that new users should be unlikely to hold any expectations about the availability of information controls on the platform, and they should therefore be less likely to notice any changes in the website design. Repeating our conditional contribution estimation on this subsample of observations, we obtained the results reported in Table S6 of the supplementary appendix, which exhibit a roughly equivalent treatment effect. We can therefore be confident that our results are not driven by subjects' awareness of alternative conditions.

As a final validation of our results, we considered possible sources of heterogeneity in the treatment effect on conversion. First, we examined possible differences across campaign types that draw different average contribution amounts. We began by calculating average contribution amounts for each campaign type. We then constructed an indicator variable capturing whether a campaign was a "high-spend" category or not, based on whether the campaign was in the top half of this list. We then re-estimated our linear probability model, incorporating an interaction between the high-spend indicator and our treatment indicator. Doing so, we found no significant effects. We then repeated this process based on median campaign contribution size and again observed no significant differences.¹³

¹² Because we can identify everyone, we are able to comprehensively determine the date on which they joined the platform.

¹³ We also examined whether the treatment effect was attenuated when subjects arrived following an anonymous contributor (e.g., if such subjects anticipated eventual access to information controls, even when that access was delayed). However, we found no evidence of this.

Explanatory variable	Coefficient
Treatment	0.044*** (0.007)
Treatment x sensitive	0.090*** (0.033)
Controls ^a	Included
Observations	128,701
F-statistic	1.2e+08 (212,5077)
R ²	0.17

Table 8: Regression results: topic sensitivity (linear probability model with fixed effects; dependent variable is conversion)

Notes. Robust standard errors are reported in parentheses for coefficients, clustered by campaign. The sample includes all visitors who entered the contribution flow.

^aThe same set of controls used in Table 3, column (4), are incorporated in the estimation.

*** p<0.001.

7. Manipulation checks

Following the above, we undertook a manipulation check for our intervention, assessing shifts in the pattern of information-hiding mechanism usage between the pre- and post-payment conditions. Logically, delaying access to the information-hiding mechanism should drive a reduction in its use if our intervention is having the anticipated effect. As such, we looked for a general downward shift in the mechanism's usage in our treatment condition. As anticipated, the rate of information hiding was found to be much lower, indicating that our treatment did indeed have the desired effect. In particular, in the control condition approximately 47% of contributions involved information hiding compared with the treatment condition, where approximately 21% of contributions involved information hiding. These results are depicted graphically in Figure 7.

We next examined whether information hiding (and our treatment's effect on information hiding) depended on campaign characteristics. To examine this, we constructed campaign category dummies and interacted them with our treatment indicator. We then regressed a binary measure of information hiding on these various dummy interactions (note that we employed fixed effect estimators; thus the main effects of campaign type were not identified in this estimation).

We found that our treatment had a large, highly negative effect on hiding behavior, as we would expect from the model-free results above ($\beta = -0.279$, $p < 0.001$). However, we found no

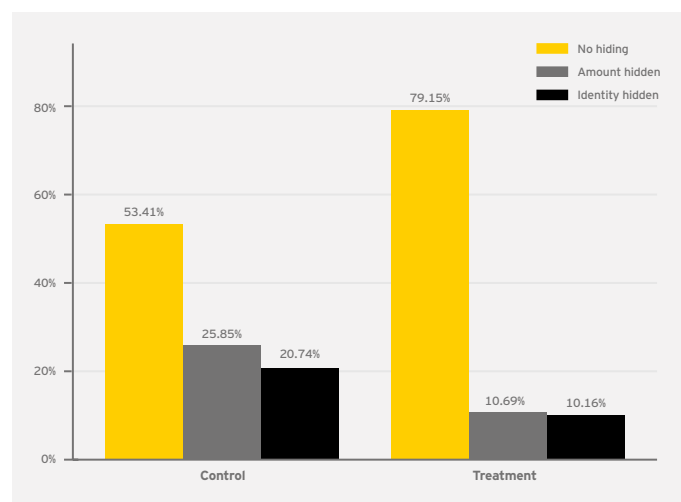


Figure 7: Probability of information hiding by type (N = 37,328)

evidence that the effect was moderated by campaign category, with one exception: the video and web category, where the treatment effect was significantly attenuated ($\beta = 0.106$, $p < 0.01$). Our suspicion is that this is because the baseline level of information hiding is already quite low for contributions toward projects in this category; thus the potential impact of the treatment is much lower to begin with. In particular, the rate of information hiding in the video and web category in the control condition is 0.33, yet the rate is 0.48 among all other categories. In fact, the next lowest rate is 0.41, in the theatre category. Next, we considered potential interactions between our treatment and the size of the project target. However, we again came to a similar conclusion: the main effect of treatment was comparable to that reported in our category type analysis ($\beta = -0.266$, $p < 0.001$), and the interaction effect, although statistically significant, was extremely small ($\beta = 6.46e-10$, $p < 0.01$). Moreover, when we re-estimated this model-replacing project goal with its log, the interaction was completely insignificant. Given these results, it appears that our treatment effect is quite generalizable and does not depend heavily on the type of campaign being supported.

8. Managerial implications

Our findings indicate that the results of past fieldwork might not tell the entire story when it comes to the impacts of privacy assurances and information controls on consumer behavior.

Although numerous studies in the literature have employed laboratory and field experiments to evaluate these issues, generally reporting that these mechanisms increase customer information sharing and transaction likelihood, it is possible (even likely) that past results cannot account for changes in the volume or composition of the converted population that are likely to arise following modifications to a website interface.

Our results can inform crowdfunding stakeholders in a number of ways. First, the provision of information controls should be considered with care. Although it is likely that our results would generalize to other reward- and donation-based crowdfunding platforms, or perhaps even equity-based crowdfunding, this will depend heavily on a number of factors. The degree to which the platform enables transparency, reputation and recognition is likely to be important, for example. Therefore, the design of the platform in this regard should be context dependent. One key factor to consider is the nature of the campaigns typically funded on a given platform. Potentially controversial campaigns are likely to induce greater cognizance and use of information control features. Firms operating platforms with sensitive content will, therefore, need to take greater care in the design and implementation of information controls.

Additionally, given that there is an inherent tension between enabling recognition for contributors and avoiding issues of privacy and publicity, platform operators and campaign organizers should consider supplemental approaches to mitigating privacy priming in the presence of information controls. For example, organizers might present privacy seals and other forms of reassurance alongside information control prompts. Campaign organizers might also offer recognition to contributors for large contributions by providing participatory rewards and recognizing contributors for their effort – e.g., awarding large contributors naming rights to products or thanking them for their participation on the company website – rather than tying recognition to the transaction. Contributors could then maintain obscurity by concealing contribution activity while still benefiting from recognition.

Campaign organizers might also offer the crowd an opportunity to participate and contribute via other effort-based avenues. Although some contributors might shy away from public monetary contributions, they might be willing to publicly partake in the

campaign on an effort basis instead, by volunteering expertise or ideas. Notably, some platforms provide these options (e.g., Spot.us provides an option to “Donate Talent” to a campaign).

With regard to crowdfunding contributors, our work reinforces the prior finding in other contexts that individuals are often uncertain of privacy risks, and that these perceptions are largely driven by available cues (John et al. 2011). We have shown that the mere presence of information-related prompts can severely impact conversion rates and platform contributions.

It is also important to discuss potential limitations of our work. A key issue that arises here concerns user names and pseudonyms. It could be argued that crowdfunders can simply employ a pseudonym if they are really concerned about being observed. However, empirically, we have seen that more than one-third of contributions in our sample involve information hiding. This indicates that many crowdfunders do in fact place value on their user profile.

Moreover, this issue is more complex than it might appear at first glance. If users wish to accrue recognition for their actions, it is in their interest to incorporate aspects of their true identity into their user profile. Even for those users who do not do so, online personas tend to persist across transactions and interactions and thus can carry their own reputation (Dellarocas 2003). This kind of identity disclosure in online personas has been shown to have significant economic outcomes in electronic markets (Ghose and Ipeiritis 2011, Ghose et al. 2012). It is worth noting that reputation and recognition are both factors that have proven to be quite important in offline venture capital, because high-profile and well-regarded investors are better able to drive follow-on investment (Hochberg et al. 2007, Sørensen 2007, Sorenson and Stuart 2001). Indeed, recent work in crowdfunding has found that expert contributors play a similarly key role in driving follow-on contribution in some markets (Kim and Viswanathan 2014). Moreover, other recent work has noted the role of campaign organizers’ social embeddedness in the crowdfunding as a driver of fundraiser success (Younkin and Kashkooli 2013), as well as the critical role of indirect reciprocity (Zvilichovsky et al. 2013).

9. Conclusion

Online spaces are characterized by increased visibility and traceability, and crowdfunding platforms, in particular, publicly

record transactions that include the identity or dollar amounts of campaign contributions. Financial transactions tend to be sensitive in nature; thus publicity and scrutiny may impede transactions. Bearing in mind these issues of visibility, many crowdfunding platforms offer transaction-level information controls so that contributors can decide what will be made publicly visible about their transactions.

Unfortunately, prompting users with information and scrutiny-related questions can have detrimental effects. On one hand, prompts of this sort can prime users with privacy concerns. On the other hand, withholding these features could make privacy-conscious users less comfortable. With the above tension in mind, we have examined the effect of transaction level information controls on the behavior of online crowdfunders. Employing a randomized field experiment, we considered the double-edged sword presented by the provision of these features during the course of the crowdfunder contribution process. We considered both positive effects (increased comfort and security) and negative effects (privacy priming). We find that delaying the presentation of these mechanisms increases conversion rates yet simultaneously lowers average dollar contributions.

Although we provide evidence suggesting that privacy priming and publicity effects drive these outcomes, future work can explore the role of mechanism design, wording and presentation format. It is possible that one or both of these effects would be moderated by specific attributes of the mechanism, such as the wording of the text, the granularity of information-hiding options (e.g., providing an additional option of presenting a discretized “range” of the contribution, such as “U.S.\$10–U.S.\$20”), or the positioning of the mechanism in the user interface (Egelman et al. 2009).

It is also important to consider the contextual nature of these results and the degree to which they would generalize to other, non-crowdfunding contexts. It is possible that our results would not extend to a purchase context, where issues of social capital, reputation, etc., might be less pronounced. Further, in regard to the net positive outcome in contributions that we have observed, although users are given complete freedom here to specify the size of their contributions, thereby allowing for a shift in the distribution of contributions that can offset the decline in participation, we would observe that, when introducing a privacy

control question in other contexts, engagement or contribution may not be up to the user.

To clarify, if transaction amounts are fixed (e.g., a transaction on Amazon.com that involves a product with a fixed price, a voting-type setup where voters may vote once and only once), then any decline in participation could not be offset by a parallel increase in contribution amounts. In that scenario, the impact of our intervention on participation and unconditional contribution would be strictly negative as a matter of course. This point highlights the fact that the impact of privacy control provision on user participation and contribution is contextual in a number of different respects, which need to be evaluated in tandem.

Our work shows the potential of large-scale in vivo randomized experiments to robustly estimate treatment effects around online user behavior, circumventing numerous threats to validity. The methods themselves are widely applicable to research in online contexts, which has ever-increasing relevance and practicality for numerous fields of study. Indeed, given the plethora of influences and information sources available to users in online settings, the complex, messy nature of these contexts means that endogeneity of effects grows increasingly likely. Randomized experiments thus appear to be the best course of action in achieving causal inference, going forward.

Supplemental material

Supplemental material to this paper is available at <http://dx.doi.org/10.1287/mnsc.2014.2069>.

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References

- Acquisti, A., J. L., and G. Loewenstein, 2013**, "What is privacy worth?" *Journal of Legal Studies* 42:2, 249-274
- Agrawal, A., C. Catalini, and A. Goldfarb, 2014**, "Some simple economics of crowdfunding," in Lerner J. and S. Stern (eds.) *Innovation policy and the economy*, Vol. 14, University of Chicago Press, Chicago, 63-97
- Agrawal, A., C. Catalini, and A. Goldfarb, 2015**, "Crowdfunding: geography, social networks and the timing of investment decisions," *Journal of Economics Management Strategy*, Forthcoming
- Ahlers, G. K. C., D. Cumming, C. Gunther, and D. Schweizer, 2012**, "Signaling in equity crowdfunding," working paper, A.T. Kearney, Berlin
- Andreoni, J., and B. D. Bernheim, 2009**, "Social image and the 50-50 norm: a theoretical and experimental analysis of audience effects," *Econometrica* 77:5, 1607-1636
- Ariely, D., and J. Levav, 2000**, "Sequential choice in group settings: taking the road less traveled and less enjoyed," *Journal of Consumer Research* 27:3, 279-290
- Burtch, G., 2011**, "Herding behavior as a network externality," ICIS 2011 Proceedings, Association of Information Systems, Champaign, IL, Paper 28
- Burtch, G., C. A. Di Benedetto, and S. M. Mudambi, 2013a**, "Leveraging information systems for enhanced product innovation," in Martínez López F.J. (ed.), *Handbook of strategic e-business management*, 211-216, Springer, Berlin
- Burtch, G., A. Ghose, and S. Wattal, 2013b**, "An empirical examination of the antecedents and consequences of contribution patterns in crowd-funded markets," *Information Systems Research* 24:3, 499-519
- Burtch, G., A. Ghose, and S. Wattal, 2014a**, "Cultural differences and geography as determinants of pro-social lending," *MIS Quarterly*, 38:3, 773-794
- Burtch, G., A. Ghose, and S. Wattal, 2014b**, "Secret admirers: examining the antecedents and consequences of crowdfunder information hiding," working paper, New York University, New York
- Das, S., and A. Kramer, 2013**, "Self-censorship on Facebook," *Proceedings of the 7th International AAAI Conference Weblogs and Social Media (CWSM)*, Association for the Advancement of Artificial Intelligence, Palo Alto, CA, 120-127.
- Daughety, A.F., and J. F. Reinganum, 2010**, "Public goods, social pressure, and the choice between privacy and publicity," *American Economic Association Journal: Microeconomic* 2:2, 191-221
- Dellarocas, C., 2003**, "The digitization of word-of-mouth: Promise and challenges of online feedback," *Management Science* 49:10, 1407-1424
- Egelman, S., J. Y. Tsai, L. F. Cranor, and A. Acquisti, 2009**, "Timing is everything?" *Proceedings of the 27th International Conference on Human Factors Computing Systems 4CHI 2009S*, ACM Press, New York, 319-328
- Ghose, A., and P. G. Ipeirotis, 2011**, "Estimating the helpfulness and economic impact of product reviews: mining text and reviewer characteristics," *IEEE Transactions on Knowledge and Data Engineering IEEE Trans* 23:10, 1498-1512
- Ghose, A., P. G. Ipeirotis, and B. Li, 2012**, "Designing ranking systems for hotels on travel search engines by mining user-generated and crowdsourced content," *Marketing Science* 31:3, 493-520
- Goldfarb, A., and C. E. Tucker, 2012**, "Shifts in privacy concerns," *American Economic Review* 102:3, 349-353
- Heckman, J. J., 1979**, "Sample selection bias as a specification error," *Econometrica* 47:1, 153-161
- Herzenstein, M., U. Dholakia, and R. L. Andrews, 2011a** "Strategic herding behavior in peer-to-peer loan auctions," *Journal of Interactive Marketing* 25:1, 27-36
- Herzenstein, M., S. Sonenshein, and U. M. Dholakia 2011b**, "Tell me a good story and I may lend you money: the role of narratives in peer-to-peer lending decisions," *Journal of Marketing Research* 48(Special issue), S138-S149
- Hochberg, Y., A. Ljungqvist, and Y. Lu, 2007**, "Whom you know matters: Venture capital networks and investment performance," *Journal of Finance* 62:1, 251-301
- Huberman, B. A., E. Adar, and L. Fine, 2005**, "Valuating privacy," *IEEE Security Privacy* 3:5, 22-25
- Hui, K., H. H. Teo, and S. T. Lee, 2007**, "The value of privacy assurance: An exploratory field experiment," *MIS Quarterly* 31:1, 19-33
- John, L., A. Acquisti, and G. Loewenstein, 2011**, "Strangers on a plane: context-dependent willingness to divulge sensitive information," *Journal of Consumer Research* 37:5, 858-873
- Joinson, A. N., C. Paine, T. Buchanan, and U. Reips, 2008**, "Measuring selfdisclosure online: blurring and non-response to sensitive items in Web-based surveys," *Computing Human Behavior* 24:5, 2158-2171
- Kim, K., and I. Hann, 2013**, "Does crowdfunding democratize access to capital? A geographical analysis," Presentation, INFORMS Conference on Information Systems and Technology (CIST 2013), October 5, INFORMS, Catonsville, MD.
- Kim, K., and S. Viswanathan, 2014**, "The experts in the crowd: the role of reputable investors in a crowdfunding market," Working paper, City University of Hong Kong, Hong Kong
- Lin, M., and S. Viswanathan, 2013**, "Home bias in online investments: an empirical study of an online crowd funding market," Working paper, University of Arizona, Tucson
- Lin, M., N. R. Prabhala, and S. Viswanathan, 2013**, "Judging borrowers by the company they keep: friendship networks and information asymmetry in online peer-to-peer lending," *Management Science* 59:1, 17-35
- Mollick, E., 2014**, "The dynamics of crowdfunding: an exploratory study," *Journal of Business Venturing* 29:1, 1-16
- Ordanini, A., L. Miceli, M. Pizzetti, and A. Parasuraman, 2010**, "Crowdfunding: transforming customers into investors through innovative service platforms," *Journal of Service Management* 22:4, 443-470
- Sleeper, M., R. Balebako, S. Das, A. L. McConahy, J. Wiese, and L. F. Cranor, 2013**, "The post that wasn't: exploring self-censorship on Facebook," *Proceedings of the 2013 Conference on Computer Supported Cooperative Work Society, Computing, 4CSCW5*, ACM Press, New York, 793-802
- Sørensen, M., 2007**, "How smart is smart money? A two-sided matching model of venture capital," *Journal of Finance* 62:6, 2725-2762
- Sorenson O, Stuart T., 2001**, Syndication networks and the spatial distribution of venture capital investments. *Amer. J. Sociol.*, 106(6), 1546-1588
- Strandburg, K. J., 2005**, "Social norms, self control, and privacy in the online world," in Strandburg, K. J., and D. S. Raicu (eds.) *Privacy and technologies of identity: a cross-disciplinary conversation*, 31-54, Springer, New York
- Tsai, J. Y., S. Egelman, L. Cranor, A. Acquisti, 2011**, "The effect of online privacy information on purchasing behavior: an experimental study," *Information Systems Research* 22:2, 254-268
- Tucker, C. E., 2014**, "Social networks, personalized advertising, and privacy controls," *Journal of Marketing Research* 51:5, 546-562
- Wang, Z., 2010**, "Anonymity, social image, and the competition for volunteers: a case study of the online market for reviews," *The B.E. journal of economic analysis & policy* 10:1, Article 44
- Wasiko, M. M., and S. Faraj, 2005**, "Why should I share? Examining social capital and knowledge contribution in electronic networks of practice," *MIS Quarterly* 29:1, 35-57
- Wattal, S., R. Telang, T. Mukhopadhyay, P. Boatwright, 2012**, "What's in a 'name'? Impact of use of customer information in e-mail advertisements," *Information Systems Research* 23:3, Part 1, 679-697
- Wetzel, W. E., 1987**, "The informal venture capital market: aspects of scale and efficiency," *Journal of Business Venturing* 2:4, 299-313
- Younkin, P., and K. Kashkooli, 2013**, "A crowd or a community?" working paper, McGill University, Montreal
- Zhang, J., and P. Liu, 2012**, "Rational herding in microloan markets," *Management Science* 58:5, 892-912
- Zhang, M., and F. Zhu, 2011**, "Group size and incentive to contribute: a natural experiment at Chinese Wikipedia," *American Economic Review* 101:4, 1601-1615
- Zvilichovsky, D., Y. Inbar, and O. Barzilay, 2013**, "Playing both sides of the market: success and reciprocity on crowdfunding platforms," working paper, Tel Aviv University, Tel Aviv, Israel

Advice goes virtual: how new digital investment services are changing the wealth management landscape



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Abstract

The emergence of a new group of digital wealth management firms offering automated investment advice services has quickly become one of the most frequently debated topics in the industry. Comparisons are being made to the travel industry of the 1990s, when the travel agent model lost ground to online services such as Expedia, and some media outlets and analysts are predicting that the emerging start-ups will revolutionize how wealth management advice is provided. Yet others have discounted and labeled this “robo-advisor” movement as unproven and believe its solutions are no match for human personalized investment advice. In this context, we wanted to explore these new firms to understand the innovations they are offering and their aspirations for the future and answer some of the questions many in the industry are asking. Are these firms going to challenge the traditional wealth management model and change the industry landscape? Is there a large enough market for their services beyond the young, tech-savvy client segment they have attracted so far? And, if the underlying changes (e.g., client experience, new potential client segments) are permanent, what should traditional firms do?

This report presents our insights and perspectives based on numerous interviews and discussions with senior executives across the industry, including traditional wealth managers and digital entrants, as well as secondary market research. Our key findings are as follows: digital entrants use a combination of simplified client experience, lower fees and increased transparency to offer automated advice direct to consumers; the new models have the potential to make advice for the mass market feasible at last; the changes digital firms have introduced are here to stay, so traditional players need to determine if and how they want to approach them. In summary, our view is that the emergence of digital entrants into the wealth management space will indeed change the industry in several ways. This will ultimately benefit new and existing investors alike by providing better and more affordable products and services through an improved client experience.

Digital meets advice: emerging advisory models

In today's world, it is hard to find an industry that has not been revolutionized, or at least dramatically changed, by the advent of digital technologies. After the financial crisis and the resulting loss of clients' trust in established financial services institutions, digital technology firms began to emerge with fresh ideas on investing and providing advice. While traditional wealth management firms were focused on meeting new regulatory requirements and the complexities of crisis-driven consolidation, the start-ups saw an opportunity to leverage their high-tech talent to build out simpler and cheaper methods of delivering financial advice in an innovative way. Now, with the help and support of venture capitalists, these firms are starting to redefine the wealth management landscape, enabling alternative business models and expanding the boundaries of the wealth management client base.

Driven by innovative software engineers and finance academics, these companies are digital registered investment advisors (RIAs) seeking to provide simplified financial solutions through sophisticated online platforms, eliminating or reducing the need for face-to-face interaction. The steady rise of the digital entrants has led to the emergence of two alternatives to the traditional advisor-based wealth management model, as displayed in Figure 1:

1. **Fully automated digital wealth managers:** This model uses a direct-to-consumer business approach to offer fully automated investment services, without assistance from a financial advisor, to obtain a diversified investment portfolio. Firms like Wealthfront and Betterment – at the forefront in this category – have differentiated themselves by offering easy-to-use tools that simplify the client experience. New clients complete a simple profile and risk tolerance questionnaire online and receive a recommended portfolio, composed mostly of low-cost exchange-traded funds (ETFs), that has been optimized to meet their needs. These firms seem to have gained traction with millennials and the lower segments of the market, as evidenced by the average account size of between U.S.\$20,000 and U.S.\$100,000.¹ These fully automated investment accounts offer direct deposit, periodic rebalancing, dividend reinvestment and tax-loss harvesting, among other features.

2. **Advisor-assisted digital wealth managers:** This model combines the digital client portal and investment automation with a virtual financial advisor typically conducting simple financial planning and periodic reviews over the phone. Firms like Personal Capital, Future Advisor and LearnVest are key players in this category. To further differentiate themselves, they offer value-added services like asset aggregation capabilities that enable the provision of more holistic advice than fully automated wealth managers, based on a comprehensive view of client assets and liabilities, as well as expense tracking and advice on budgeting and financial goal planning.

The common characteristic of these models is the offer of more affordable basic components of wealth management directly to consumers in a seamless, scalable and cost-efficient manner. This is done by leveraging several key elements, outlined in Figure 2:

- ▶ **Broad use of technology across the whole client life cycle to deliver a simplified client experience.** Many of the automated components that firms leverage have been available in the market for some time (e.g., online investment proposals, model management and automatic rebalancing). Hence, it is the ability to integrate them in a seamless manner and deliver them through a simple and intuitive user interface that creates a scalable and cost-effective self-service model. The persistent focus on user-centric design and continuous innovation that is part of a technology company's DNA further enhances the client experience.
- ▶ **Digital delivery of firms' education and client-relevant content.** Most established wealth management firms still print, fax and mail complex and difficult-to-understand hard copy reports and statements. Digital entrants, instead, have enlisted the help of skilled writers and bloggers to reach their customer base through meaningful and personal media content. Emphasizing knowledge-sharing and education on personal finance (rather than stock research and market news), these firms provide useful content online and through mobile devices in a manner they believe better aligns with how clients communicate and collaborate today.
- ▶ **Focus on lower pricing and greater transparency.** While most of the established firms are still charging above 1% on assets under management (AUM), digital entrants are leveraging low-cost managed ETF and single-stock investment portfolios

¹ Based on publicly available information and EY research.

Digital wealth managers		versus	Traditional wealth management firms
	Fully automated	Advisor-assisted	
Business model	► Software-based delivery of customized and automated investment advice	► Phone-based financial advisor (FA) accessible through digital channels to deliver personal advice	► Face-to-face advice mainly through branch network offering comprehensive wealth management
Typical investor	► Millennial, tech-savvy, price-sensitive; wants to match market returns and pay low fees	► Mass market and mass affluent* clients who value human guidance and technology	► Affluent, high-net-worth*** and ultra-high-net-worth**** clients who value guidance from a trusted FA
Value proposition	► Convenient and easy-to-use, low-cost online platform offered directly to consumers	► Digital platform combined with advisor relationship; affordable pricing for fully diversified portfolio	► Dedicated FA with full range of investment choices and comprehensive wealth planning
Fee structure	► 0.25%-0.50% fee on assets managed; minimums may apply	► 0.30%-0.90% fee on assets managed; monthly fees per planning program; minimums may apply	► 0.75%-1.5%+ fee on assets managed; minimums may apply, varies by investment type
Investment process overview	► Risk profile, target asset allocation, managed investment account, automated rebalancing, easy access	► Virtual FA meeting, financial planning, risk profile, target asset allocation, managed investment account, automated rebalancing, easy access, periodic reviews	► In-person meeting with dedicated advisor, financial planning, investment proposal, target asset allocation, brokerage and managed accounts, automated rebalancing, in-person access and reviews
Investment vehicles	► Exchange-traded funds (ETFs), direct indexing**	► ETFs, stocks	► Stocks, bonds, ETFs, mutual funds, options, alternative investments, commodities, structured products

Figure 1: The new market landscape

Source: Based on publicly available information and EY research

*U.S. households with U.S.\$250,000 to U.S.\$1 million in financial assets

**Wealthfront offers direct indexing to accounts >U.S.\$500,000 in assets through individual stock selection

***U.S. households with U.S.\$1 million to U.S.\$10 million in financial assets

****U.S. households with greater than U.S.\$10 million in financial assets

that provide asset diversification with much lower pricing (i.e., less than 30 basis points). Digital entrants are not only charging lower fees, they are also providing more transparency, for example, by exposing how much customers are paying other financial providers through online fee analyzers and alerts when new fees are being charged. This is in stark contrast to the opaque and complex fee schedules offered by many traditional firms, which make it difficult for customers to understand exactly how much they are paying for their investment management and advice.

Leveraging these innovations, digital entrants have experienced sustained double-digit growth rates in AUM. This growth is also the result of strategies to accelerate client acquisition, like viral marketing and partnerships with employers to offer investment advice services to their employees (e.g., Wealthfront's

partnering with Facebook, Google and Twitter). The start-up nature of the firms certainly means they will continue introducing innovative products and services, such as income management for retirees and tax optimization through direct indexing, to stay competitive (see Figure 3 for an overview of the major products and services across the key players in the digital market).

Also key to these firms' rapid growth has been their ability to take the proven approach of referrals that traditional players use, but with a digital twist: leveraging the multiplier effect of social networks like Facebook, Twitter and LinkedIn to create awareness and begin building trust through recommendations from peers. Digital entrants have also benefited from the fact that many millennials do not have a trusted advisor relationship and feel comfortable using technology to manage their

	Traditional model	Digital innovations	Why are they innovative?
1 Broad use of technology across the whole client life cycle to deliver a simplified client experience	Technology is primarily focused on employee productivity, regulatory requirements and integration of disparate and legacy IT systems	Well-designed platforms focused on simplicity, speed and intuitive workflows through digital and mobile offerings	Technology is client centric and improves the experience of financial advice for the investor
2 Digital delivery of financial education and client-relevant content	Traditional marketing and advertising through brochures, firm website and direct mail	Compelling editorial content and financial education distributed openly online with focus on human connection; constant feedback on client's financial health	Focusing on the human connection and financial education in plain language through digital means improves investor awareness and brings greater confidence, trust and engagement
3 Focus on lower pricing and greater transparency	Fees on AUM typically above 100 basis points; difficult to understand and not transparent enough for investors	Average fees between 25 and 50 basis points; free tools to analyze fees across accounts while offering cost-saving alternatives	Leveraging low-cost ETFs and stock indexing enables portfolio diversification at lower prices with transparent fee structure

Figure 2: What are the innovations?

finances, as we have seen with the success of mint.com and other online financial tools. While this approach seems to have worked with the younger, tech-savvy generation, earning the trust of older generations will likely be challenging given the firms' limited track record and recognition. The current use of mainstream advertising by some digital entrants to target a broader demographic illustrates the type of adjustments needed to venture into the wider market. We will see whether these adjustments prove successful.

We believe that the current landscape will continue to change over the next few years as firms continue to evolve their models to differentiate themselves, maintain revenue growth and achieve economic sustainability. This evolution will go beyond the development of the underlying products and services. There is already evidence of this, with some digital entrants starting to white-label their platforms and service offerings to RIAs, as in Betterment's and LearnVest's partnering with an established industry player, while other firms are focusing on millennials and capturing white space in that market. We see the digital wealth management market continuing to evolve over time with different business models, which may include some level of consolidation and partnership or acquisitions by traditional wealth management firms.

Leveraging digital to bring advice to the masses

As we analyze the growth of digital wealth management advice, it is clear that initial demand for these services has been fueled

by a younger set of investors that has largely been underserved by traditional players. A recent survey revealed that only 18% of financial advisors are targeting clients in Generation Y² (millennials),³ and with the average financial advisor being older than 50, the traditional advisor-based model is challenged to understand their needs and attract the younger generation.⁴ Yet at more than 80 million, the millennial generation is now the largest generational client base in the U.S. market.⁵ Its characteristics align naturally with digital offerings: it is composed of individuals who are computer natives – do-it-yourselfers who want to be connected all the time. Wealthfront, the largest automated investment firm by AUM, has openly stated that millennials are its target client base. The firm believes this demographic is looking for a different type of investment advice from what is available today, and this is driving its growth. Silicon Valley investors seem to agree and have already poured hundreds of millions of dollars into funding digital start-ups, betting they can profit from a steep growth curve of millennial assets, which are estimated to rise from

2 U.S. individuals between the ages of 18 and 35.

3 According to The Principal Financial Well-Being IndexSM: Advisors, a nationwide study of 614 financial advisors conducted online by Harris Poll for the Principal Financial Group in the second quarter of 2014, 18% of financial advisors surveyed are targeting clients in Generation Y, <https://www.principal.com/about/news/2014/crp-wbi-81114.htm?print>, 11 August 2014.

4 Cerulli research calculates the average age of a financial advisor as of 17 January 2014 is 50.9, <http://www.fa-mag.com/news/43--of-all-advisors-are-approaching-retirement--says-cerulli-16661.html>, 17 January 2014.

5 According to the United States Census, millennials now represent the largest generation in the United States, comprising roughly one-third of the total population in 2013, http://www.whitehouse.gov/sites/default/files/docs/millennials_report.pdf, 9 October 2014.

Automated investment firm	Assets under mgmt.	Products and services									
		Financial planning	Account aggregation	Asset allocation	Exchange-traded funds	Individual stocks	Single-stock diversification	Automated rebalancing	Automated deposits/transfers	Dividend reinvestment	Tax-loss harvesting
Wealthfront	US\$2b			✓	✓	✓	✓	✓	✓	✓	✓
Betterment	US\$1.6b			✓	✓			✓	✓	✓	✓
Personal Capital	US\$1b	✓	✓	✓	✓	✓		✓	✓	✓	✓
Future Advisor	US\$450m		✓	✓	✓	✓		✓	✓	✓	✓
LearnVest	NA	✓	✓	✓							

Figure 3: Major product and service offerings in the digital advice market

Source: AUM data sourced from ADV registration for each respective firm: Wealthfront (8 Dec 2014), Betterment (18 Nov 2014), Personal Capital (12 Jan 2015), Future Advisor (26 Sep 2014); products and services are based on publicly available information as of current publication date; additional products and services may be supported thereafter.

about U.S.\$2 trillion in aggregate net worth today to approximately U.S.\$7 trillion in five to seven years.⁶

While the tech-savvy millennial generation is the initial target for automated investment advice, we believe there is a much broader, and in some cases untapped, market for these firms, given their ability to deliver a cost-effective solution direct-to-consumer. In fact, the focus of advisor-assisted firms like FutureAdvisor and Personal Capital on a broader segment of the population (including Generation X⁷ Generation Y and baby boomers)⁸ illustrates how digital investment services have already started to expand their generational reach beyond the initial niche.⁹ Most importantly, by expanding their reach, digital entrants are aiming to break the generational paradigm, which will allow them to truly unlock the potential of the mass market and mass affluent segments.

A look at financial needs across the various wealth segments of the U.S. population shows that there is a considerable market for a set of common foundational wealth services like financial planning, asset allocation and investment management, as highlighted in Figure 4. Yet some studies have shown that only 20% of mass

affluent Americans have a financial advisor because traditional firms have largely focused on high-net-worth (HNW) and ultra-high-net-worth (UHNW) individuals, who align better with the economics of their advisor-based business model.¹⁰ Our research shows that mass affluent households (U.S.\$250,000 - U.S.\$1 million in financial assets) hold about U.S. \$7 trillion of wealth throughout a fragmented market, as displayed in Figure 5. Furthermore, if we combine mass affluent, mass market and millennial assets, we estimate the current opportunity for digital advice to be above U.S.\$10 trillion in investable assets. By developing low-cost and potentially highly scalable solutions to meet core wealth management needs, fully automated and advisor-assisted digital firms seem to be well positioned to penetrate the mass market and mass affluent segments.

Drawing a parallel with the evolution of social networking and e-commerce, the new wealth management firms believe the demand for user-friendly and interconnected digital services permeates our society across all demographics. They are betting that the growth in the digital wealth advice space will come from a wider range of clients, as already seen in the success of many technology companies. Admittedly, investment advice is different from social networking; however, they think they can make a case for the adoption of financial service technology along a similar growth curve.

⁶ There are over 80 million millennials in the U.S. with an aggregate net worth of more than U.S.\$2 trillion; by 2018, that is expected to grow to U.S.\$7 trillion, <https://blog.wealthfront.com/one-billion-assets-under-management/>, 4 June 2014.

⁷ U.S. individuals between the ages of 36 and 47

⁸ U.S. individuals between the ages of 48 and 67

⁹ The average age of a Personal Capital client is 45, <https://blog.personalcapital.com/personal-capital-news/personal-capital-surpasses-500-million-assets-management/>, 7 May 2014.

¹⁰ 20% of mass affluent Americans have a financial advisor, <http://www.cnbc.com/id/101690532#>, 23 October 2014.

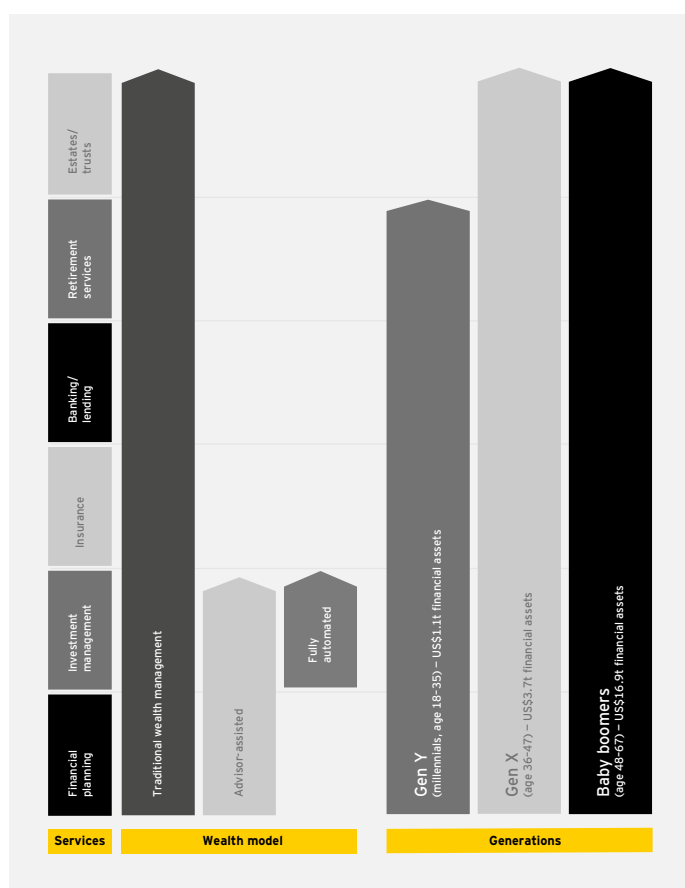


Figure 4: Wealth management needs across generations

Source: Estimates based on the Federal Reserve 2013 *Survey of Consumer Finances*

What's next?

The current estimated market share of digital wealth firms is just 0.01% of the U.S.\$33 trillion industry.¹¹ This is clearly limited, and there are still unanswered questions about how robust the emerging models would be in a market downturn and whether they can grow fast enough to reach profitability. However, our view is that the changes to the client experience ushered in by

digital entrants, and their ability to access new markets, cannot be underestimated.

We believe that the most likely future scenario is for a broader, larger wealth management market serving clients across multiple segments (from mass market to UHNW) through fully automated solutions, traditional high-touch advisors, and hybrid versions of the two that combine virtual advisor interaction with automation and self-service technology-based tools.

Given such a scenario and considering the vast market opportunity, we see many traditional players revisiting their strategies. The mass affluent segment alone offers close to U.S.\$10 trillion of market potential, and traditional wealth managers have typically struggled to serve this segment profitably. Furthermore, the greatest wealth transfer in history is currently underway and will continue over the next decades as baby boomers pass along wealth to their heirs, creating more pressure on the traditional model. This next generation of clients, set to inherit upward of U.S.\$30 trillion, has a different set of preferences and expectations that will affect how firms adapt and leverage digital strategies to serve them. The fact that a few established players have recently announced their own direct-to-consumer automated advice offerings¹² and/or continue to invest in phone-based services would appear to support this thinking. These “fast followers” could enjoy a first-mover’s advantage over the firms that seem to be observing cautiously from a distance how the digital advice space evolves.

Traditional firms willing to venture into automated and hybrid models will face four main challenges, as highlighted in Figure 6.

Addressing these challenges is no trivial task. Considering the level of change management involved, as well as the resources and investment required, many firms will find it difficult to balance their efforts to change and, at the same time, manage the needs of their existing customer base. Yet for those firms willing to take the risk, the prospect of finally being able to tap into the potential of the mass and/or mass affluent market certainly offers a worthwhile reward. We see a tremendous opportunity ahead for both traditional firms and new digital

¹¹ Cerulli: At the end of 2013, U.S. households controlled U.S.\$33.5 trillion in investable assets – up from U.S.\$29.9 trillion in 2012, according to research from Cerulli Associates, <http://www.wealthadviser.co/2014/11/13/212847/us-households-control-usd335-trillion-investable-assets>, 13 November 2014.

¹² InvestmentNews, <http://www.investmentnews.com/article/20141208/FREE/141209910/vanguard-quintuples-assets-in-robo-adviser-leapfrogging-competitors>, 8 December 2014.

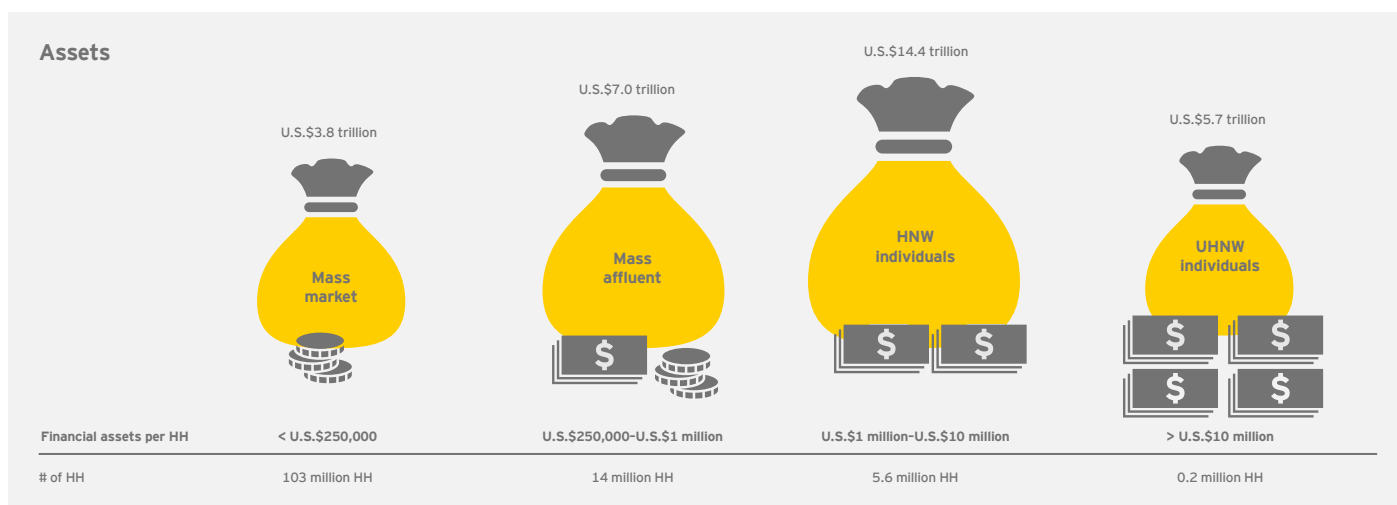


Figure 5: Financial assets per household and market segment

Source: Estimates based on the Federal Reserve 2013 *Survey of Consumer Finances*

entrants to improve the way advice is delivered and align the cost of advice delivery with affordability, perceived value and new client expectations.

Appendix: automated advice around the globe

While the U.S. seems to be the most evolved market in terms of automated advice offerings and business models, there is plenty of evidence that interest is strong and growing in other markets across the globe:

- ▶ In the U.K., a handful of digital advice platforms have been launched, looking to fill the gap in affordable advice created by the introduction of new regulatory rules in 2013. These rules, which prohibit banks and financial advisors from pocketing commission for investment recommendations, were introduced to avoid any potential bias or conflict of interest. The result, however, was a majority of banks pulling out of offering financial advice altogether: advisor numbers dropped from 40,000 at the end of 2011 to 31,000 by the start of 2013, according to the U.K. Financial Services Authority. Consequently, millions of investors ended up without access to any affordable advice and are looking for alternatives. New technology entrants are thus targeting the needs of those clients with automated advice solutions that are fully compliant with the new regulations:
- ▶ Nutmeg, launched in 2013 by a group of former investment managers, builds a portfolio of funds from ETFs. It has now more than 35,000 users and is continuing to grow at a rapid rate.
- ▶ Wealth Horizon, launched in August 2014, offers a hybrid model combining an automated advice platform and front end with human advisors behind the scenes to help investors through the process of setting up portfolios.
- ▶ In Asia-Pacific, the fastest-growing region worldwide in terms of private wealth, firms like Dragon Wealth are enabling investors to access advice and targeted research via automated solutions. Based in Singapore, Dragon Wealth leverages social media and cloud-based technology to enable investors and advisors to compare their portfolios with those of their peer group and access a wide range of targeted news and information services.
- ▶ Australia's burgeoning, but also highly regulated, private wealth industry, already the fourth largest in the world due to government-mandated retirement savings, is also looking to automated advice tools to improve access to quality advice and reduce the cost of delivery. Employer-sponsored pension funds provide investors with simple advice tools to develop guided strategies, while Stockspot offers automated ETF-based managed accounts online. There are also examples of hybrid models like MOVO offering digital advice tools supported by

	1 Conflict with FA-led value network	2 Limited resources and capital allocation	3 Pace of innovation	4 Pressure to bring prices down
Description	A direct online digital advice offering may disenfranchise FAs if customers circumvent the financial advisor relationship and shift assets to the automated firm offering.	The high resource costs and spending associated with the new service offering may come at the expense of the core business, i.e., reduced investments to the existing FA-driven platforms.	Many traditional firms have a large amount of technical debt and legacy systems that are slow and expensive to modernize.	Automation of portfolio management and financial guidance has significantly driven down the price of advice. Firms must develop a new pricing strategy that does not conflict with their current FA business model.
Key questions	<ul style="list-style-type: none"> ▶ What is the right service model (automated, advisor-assisted, hybrid) across our various client segments? ▶ How can digital technology and automation be leveraged by the firm to improve advice delivery from FAs? ▶ What is the right change management and field communication plan (awareness, understanding, buy-in)? 	<ul style="list-style-type: none"> ▶ Does this opportunity fit with our long-term financial goals? ▶ How does this investment align with our firm strategy, and how should we prioritize it against other initiatives? ▶ What is the cost of outsourcing or partnering with a digital technology provider? ▶ What organization or team should own this new product offering? 	<ul style="list-style-type: none"> ▶ Do we have the right competencies and internal processes to deliver? ▶ Do we have the right people and culture to build the solution in-house (build vs. buy vs. partner)? ▶ How quickly can we go to market? ▶ How will this solution be integrated with our legacy platform? 	<ul style="list-style-type: none"> ▶ How do we illustrate and market our value proposition? ▶ How does digital automation change our current cost structure? ▶ How do we gain efficiencies through greater automation? ▶ How will unbundling of services impact our bottom line?

Figure 6: Traditional firm challenges

personalized interactions with financial advisors as necessary. As in the U.S., interest in automated advice is underpinned by a greater focus on meeting the needs of the next generation of affluent investors; more than half of Australian private wealth is expected to be transferred to a younger and tech-savvy generation over the next 10 years.

All in all, considering the rapid growth, the size of the opportunity and the limited supply of advisors, especially in emerging markets, our expectation is that automated advice will continue evolving rapidly across the globe and has the potential to play a fundamental role in the future development of the wealth management industry worldwide.



The impact of digital technology on consumer purchase behavior



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Abstract

The retail industry is going through a transformation, according to a study by Synchrony Financial. The transformation is largely driven by the influence of digital technology on the shopping experience. According to the third annual Digital Consumer Study, almost 50% of consumers say they have performed shopping-related tasks on their mobile phones in the past three months. Consumers state they are using digital technology to research, browse and purchase, sometimes all on one website.

As a result, retailers have implemented new strategies to attract and retain this omni-channel shopper. Some strategies include responsive website design, free shipping offers, mobile alerts and content marketing. The imperative to implement these digital tools has gone from spotty and isolated, to mainstream and necessary. In this article, we summarize the results of the Digital Study and outline strategies retailers use to proactively engage this new shopper.

1. Introduction

Consumers' shopping habits have changed over the past decade. The use of digital technology to research, browse and purchase has gone from segment-specific or sporadic to mainstream. This has resulted in an undeniable and nonreversible shift in the retail landscape. Synchrony Financial's third annual Digital Consumer Study¹ gathered insights on how customers use mobile technology and their expectations of brands in this new environment. Based on the insights of this study, proactive brands use strategies that successfully attract this omni-channel shopper and encourage them to become more loyal, developing true brand advocates.

Key insights from the study reveal how today's shopper uses technology. As a result, retail brands are using new strategies to answer their needs and respond to their expectations. As proactive brands provide innovations to enhance the shopping experience, customer expectations change – they expect more from all retailers. As a result, the dynamics of the retail experience is evolving, and investing in digital technology is becoming an important strategic imperative for many retail brands today.

2. Shopping and related activities are one of the top uses of digital technology

Over the course of three years, the use of mobile devices for shopping activities has grown significantly. A total of 53% of consumers state they have visited a retailer website on their mobile phone within the past three months alone. As Figure 1 shows, almost half (45%) have performed shopping-related tasks on their mobile phone in the past three months, compared to two years ago, when only about a third of the respondents stated this was the case.

Brands are well advised to follow this trend closely and implement new tools and strategies to respond to the needs of the mobile shopper. This new omni-channel behavior is no longer limited to certain segments and technology gurus; it is becoming widespread and mainstream across the generations. Some tools and strategies include:

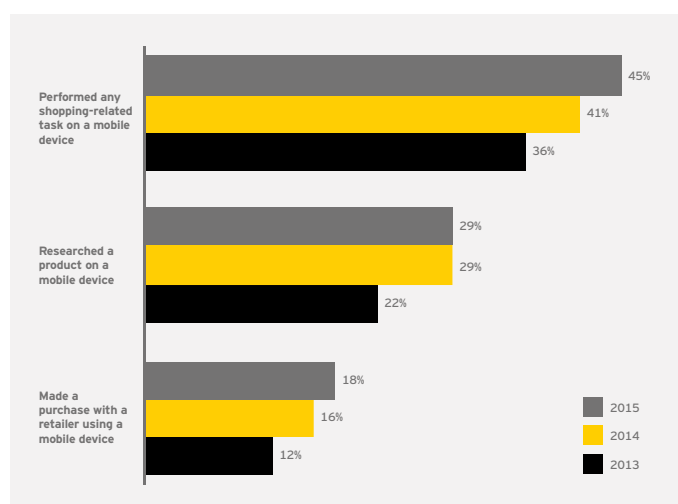


Figure 1: Shopping-related tasks on mobile continue to climb

- **Responsive design:** a website design that enables the experience to be optimized, no matter which device is being used. The website's look and brand feel are similar across devices (e.g., smartphone, tablet, laptop), but the shopping experience is customized for each device.
- **Enhanced wish lists:** give customers a place to retain and store their favorite items in a virtual shopping closet. This can also create opportunities to cross-sell merchandise.
- **Drag and drop features:** give mobile shoppers the ability to "drag" products onto a clipboard and save them as they shop. With one click, they are able to see their personal clipboard at any time to review and compare items and add matching add-ons.
- **Custom alerts:** enable customers to receive alerts on products when they become available or go on sale. This enables shoppers to become engaged and provides a personalized "surprise and delight" benefit.

The more seamless and customized the technology, the easier it is for shoppers to prefer one brand over another. In this highly competitive retail arena, a little digital delight goes a long way.

3. Special offers and coupons can be extremely effective, but interest in them is declining; free shipping becomes a purchase driver

Our survey shows that consumers do not have the same focus

¹ The study, conducted in March-April 2015, surveyed 5,516 Synchrony Bank cardholders and 1,209 random national shoppers. Respondents were 18+, participate in household financial decisions and shopped with a major U.S. retailer in the 6 months prior to the date of the survey. The data has been weighted to U.S. census proportions. All references to consumer and shopper in this paper refer to survey respondents.

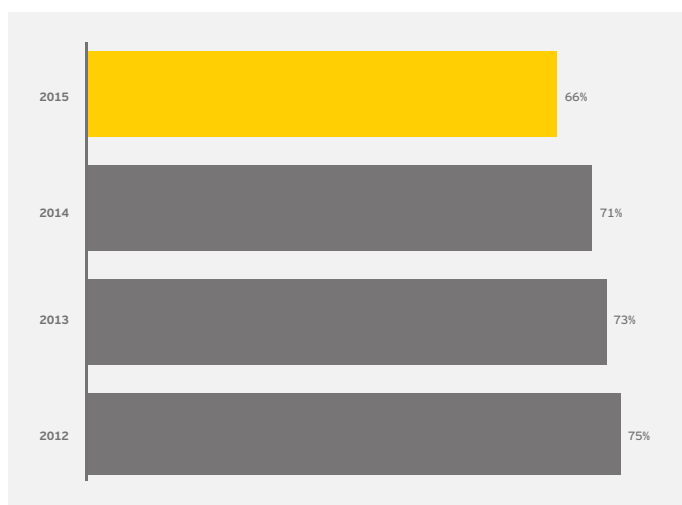


Figure 2: Percentage of survey respondents who say they regularly take advantage of discounts and coupons

on chasing offers and discounts as in years past, but they are still spending cautiously and often look for a reason to buy. With 66% of survey respondents saying they take advantage of discounts, special offers and coupons still drive behavior (Figure 2).

Some tools and strategies brands use to give customers the value they desire, while providing an omni-channel experience include:

- ▶ **Immediate, personalized offers:** These link the loyalty program with customer's online behavior. If the customer has earned a loyalty coupon, it immediately becomes accessible; no matter which channel is being used.
- ▶ **Simplification:** Since consumers are less interested in pursuing discount coupons, they may be simply doing online research to get the best price (84% of customers state they have researched a product online in the past three months). As use of coupons and discounts is declining and online research is increasing, it is important for brands to respond to this shift by offering simple, dynamic solutions.
- ▶ **Free shipping drives behavior:** 75% of the survey respondents say they are more likely to choose a retailer with free shipping. In recent years, free shipping has developed into a significant driver of purchase behavior. Online brands that regularly provide free shipping are often well-known and generate a faithful and loyal following.

4. Customers use mobile technology while in the store

There is good news for brands with a mobile marketing strategy – mobile offers do drive behavior for a segment of the population. Of survey respondents:

- ▶ 51% say they would be willing to send a text message in order to receive a discount.
- ▶ 34% say they would shop at a retailer more if they received offers on their mobile device.
- ▶ 30% say they regularly use their mobile phones to check prices before making a purchase.

In order to leverage the opportunities or address the challenges digital technology presents, strategies to consider include:

- ▶ **Segmentation:** Identify the population who prefer to receive offers via mobile and appropriately communicate using this channel.
- ▶ **Customer experience:** Make the in-store shopping experience truly "omni" by crossing over to the digital experience. Strategies to consider:
 - ▶ Give store associates the ability to access customer wish lists or online shopping baskets
 - ▶ If digital technology exists in the store (e.g., tablets, kiosks), provide training to store associates and ensure they are comfortable with the tools
 - ▶ Ability to "tag" an item online and access it within the store, or ability to "tag" the item in-store and purchase it online
 - ▶ Rewards for cross-channel behavior, such as extra loyalty points or added perks
 - ▶ Auto-replenishment and shipping of often-used items (e.g., coffee, cosmetics)
- ▶ **Social media strategy:** Encourage reviews and social media postings. Posting a review ensures that customers go back to the retail website and can provide an opportunity for the retailer to re-engage.

5. Social media drives sales, particularly for the millennial consumer

A total of 85% of consumers state they have access to social media sites and almost half of them state they use social media to follow brands. Significantly, 30% of all age groups say they have purchased a product after seeing it on social media. There are wide differences by generation, however. The millennials are

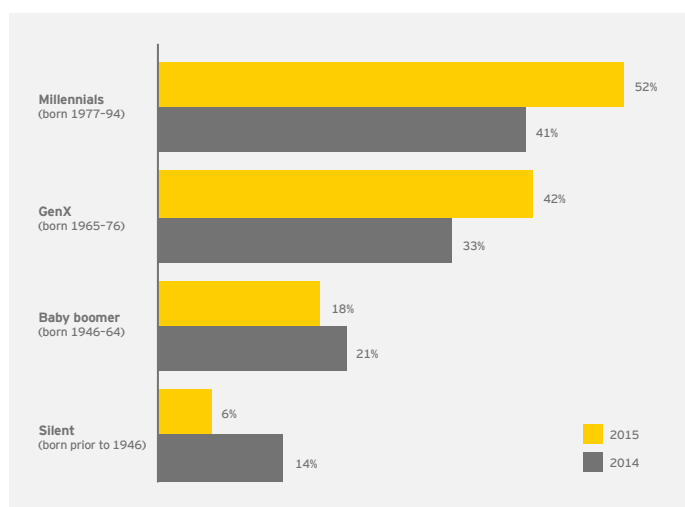


Figure 3: Percentage who state they have purchased a product seen on social media.

highly influenced by social media, with more than 50% indicating they have been influenced by social media for purchases. This trend is growing significantly for the millennial and GenX populations (Figure 3).

Brands have used social media strategies successfully to leverage this channel, including:

- ▶ **Content strategy:** Successful brands implement social media strategies that closely tie to their brand identity and provide content that is helpful, not just a sales pitch. A social media message that includes the emotional connection to the brand is often successful, whether it is driving safely or having a baby. Many brands promote their brand identity through videos and live streams. Content strategy is now a growing field and an important way to get and keep an emotional connection with current and potential customers.
- ▶ **Influencers and bloggers:** Many brands are proactive in finding the bloggers and influencers in their retail space. If the retailer has an innovative product or unique brand identity, an active reputable blogger or influencer can be instrumental in promoting their content.

6. Retail credit cardholders are more “digital” than other shoppers

A digital strategy is especially important for brands that have many customers with their retail branded store credit card. These customers are more likely to have digital devices (85% vs. 69% of the general population). Brands with successful retail branded store card programs ensure the cardholder experience is fully mobile-enabled with the latest retail tools and apps to drive engagement. Some of these tools include:

- ▶ customized user interface
- ▶ mobile credit application functionality
- ▶ loyalty and rewards – tracking and redemption
- ▶ account alerts
- ▶ account lookup

A brand that incorporates their retail card interface with their retail brand ensures a seamless experience for its customers.

7. Conclusion

Digital technology has changed the retail landscape over the past several years, and there is every indication that it will continue to do so. The evidence of this can be seen in consumer surveys, which display the extent to which digital tools have become integrated into the shopping experience. From full price transparency to mobile alerts and social sharing, retail has become much more dependent on technology and social media influences.

A retailer that is responsive and forward-looking can delight customers in this new environment by placing emphasis on a seamless digital experience. Some tools available to retailers include responsive website design, custom alerts and a compelling content strategy. The seamless integration of these tools into the shopping experience can attract new shoppers to a brand, and result in greater loyalty from existing customers.

Part 1: Innovative corporate services digitally enabled



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Part 2: Innovative corporate services digitally enabled for internationalization



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Abstract

This paper, structured in two parts, delves into the future road map of digitally enabled banking services in support of Italian companies that are moving into new markets. In the first part, EY Italy explains the reasons why this research project was undertaken in collaboration with Politecnico di Milano, and describes the best-in-class digital business services offered by the main Italian and European global banking groups. The research focuses on the internationalization process and the best practices of business products and services offered by the main global marketplace platforms, as leading business and technology innovators. In the second part, Politecnico di Milano presents the main research findings about the needs of Italian companies that undertake internationalization processes; the potential use of digital enablers to innovate the business services portfolio and generate new revenue sources for the banks; and the best practices on the “digitally enabled” processes, products and services for companies.

**Part 1: Innovative corporate services digitally enabled
(contributed by EY Italy)**

Since the 2007 financial crisis, banks' business models have been put under extreme strain. The steady increase in nonperforming loans (NPLs) combined with a low interest level environment has prompted banks to look for non-interest related revenue streams, like fees and commissions for value added services to offset decreasing lending revenues.

The revolution in consumers' selection and purchasing behaviors, brought about by their ubiquitous access to information and their greater focus on value-for-money, has forced organizations across all industries along an evolutionary path aimed at digitalizing their sales processes and omni-channel customer engagement. Banks focused their digital transformation efforts on the innovation of their relational models, sales processes and offering for retail customers, leveraging their strong relationship with these customers and the large availability of customer data, even going as far as proposing non-banking products. For instance, it is now quite common for banks to sell life and property and casualty insurance, or real estate advisory and, in some cases, high-tech, wellness and lifestyle products.

The drive to find new revenue pools from extended or non-banking services for retail customers has not been mirrored by the same innovation effort on the business clients side: the offering for this segment is still largely traditional, aside from some timid digital evolution on a few processes. The introduction of new products and services – digitally enabled – for business customers is therefore a potentially large and still unexplored source of profitability.

In this context, EY analyzed a wide sample of organizations' value chains and identified the distribution processes and the search for new markets and customers as two fundamental needs across all industries. To further expand the body of knowledge on these issues, EY engaged the Politecnico di Milano (one of Italy's leading universities, with a privileged view on market and technology innovation due to its observatories and research groups) to conduct a benchmark study on:

- The state of the art and best practices on digital business services offered by the main Italian and global banking groups,

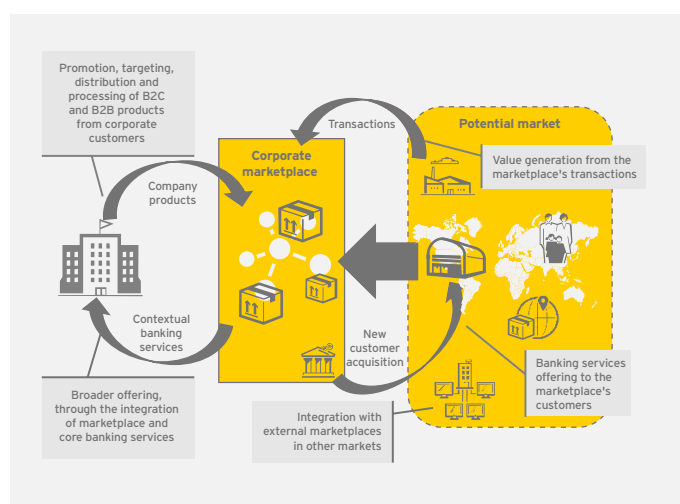


Figure 1: The right positioning along corporate customers distribution processes opens new possibilities for banks to offer new services both to their customers and to their customers' customers.

with a particular focus on the internationalization process

- The best practices on business products and service offered by the main global marketplace platforms, as leading business and technology innovators

The key finding of the research showed that – in their business customers' eyes – banks are a potential partner for growth: not only providers of financial and transactional services, but trusted advisors on business development and information providers, valuation and operations experts for the internationalization of their business. The opportunity for banks, here, is to leverage digital enablers to develop a brand new business offering, taking a leading role in the internationalization and market positioning processes of their more internationally prone business customers (Figure 1). This role will make it possible for banks to:

- Reach new markets and customers for their core products and services
- Create a virtual space where middleman and customers can find these products and services, and enable digital market making, selling and transactional processes
- Foster the link between banking services and the commercial services offered through the marketplace and enable new banking services

-
- Help with the acquisition of new prospect customers participating in the marketplace

The coming years will see a turning point for banks, with new business models and a new positioning along the economic development process: an increasing demand for decision-making and advisory related services is to be expected. This kind of service, born for corporate and mid-corporate clients, could, if standardized and industrialized, also be offered to small- and medium-sized businesses, and this will be possible only by leveraging digital tools.

Part 2: Innovative corporate services digitally enabled for internationalization (contributed by Politecnico di Milano)

The current economic environment is characterized by a difficult upturn after the recent financial crisis in Italy and in Europe, a sustained growth pace in emerging markets and an acceleration of the U.S. economy, which emerged from the crisis earlier than other countries thanks to its unconventional monetary activities. Thus, it seems increasingly clear that exports could represent the lifeline for many Italian and European business companies, seeking new markets for the sale of their products and services in both emerging countries and in those advanced countries already out of the crisis, such as the U.S.

As Figure 2 shows, in 2013 the contribution of exports to the Italian GDP was positive (30%), but unexploited development opportunities were still high in terms of internationalization. Compared with Japan and the U.S., Italy has a high degree of international openness; furthermore, development opportunities are considerably lower than Germany. After contracting in 2009, the level of international opening of Italy points to the growth rates being always positive.

In 2014, the economic activities that experienced a significant increase in terms of exports are those related to the pharmaceuticals, the mechanical and the fashion industries. The regions that contribute mostly to national exports were Marche, Emilia Romagna, Piedmont, Veneto and Lombardy, with the dynamic oriented mainly toward E.U. markets (Figure 3).

On the basis of these findings, this research aims to identify the future road map of digitally enabled banking services in supporting Italian companies that are moving into new markets.

Thus far, the services that banks provide their corporate clients have focused on a few areas – transactional services (collection and payment tools, cash management, billing services, etc.); financing, leasing and factoring; internationalization services (trade finance, international cash pooling, market scouting, etc.); investment banking services (bonds placement, advisory, mergers and acquisitions, structured finance, etc.); and capital markets services (trading services, financial risk management, etc.). The digital component of these services represents only a marginal element, limited to e-banking tools and to some collection, payment and document management (e.g., invoices) services.

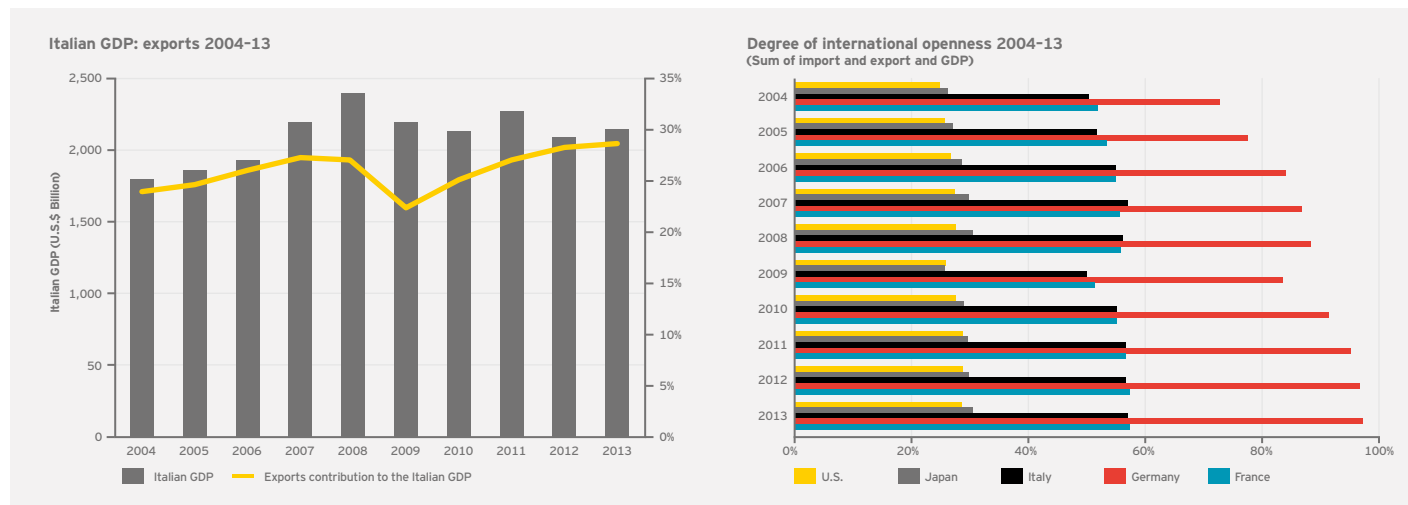


Figure 2: Italian market data: impact of exports on GDP and the degree of international openness
Sources: Politecnico di Milano analysis of world bank data and ISTAT (2014)

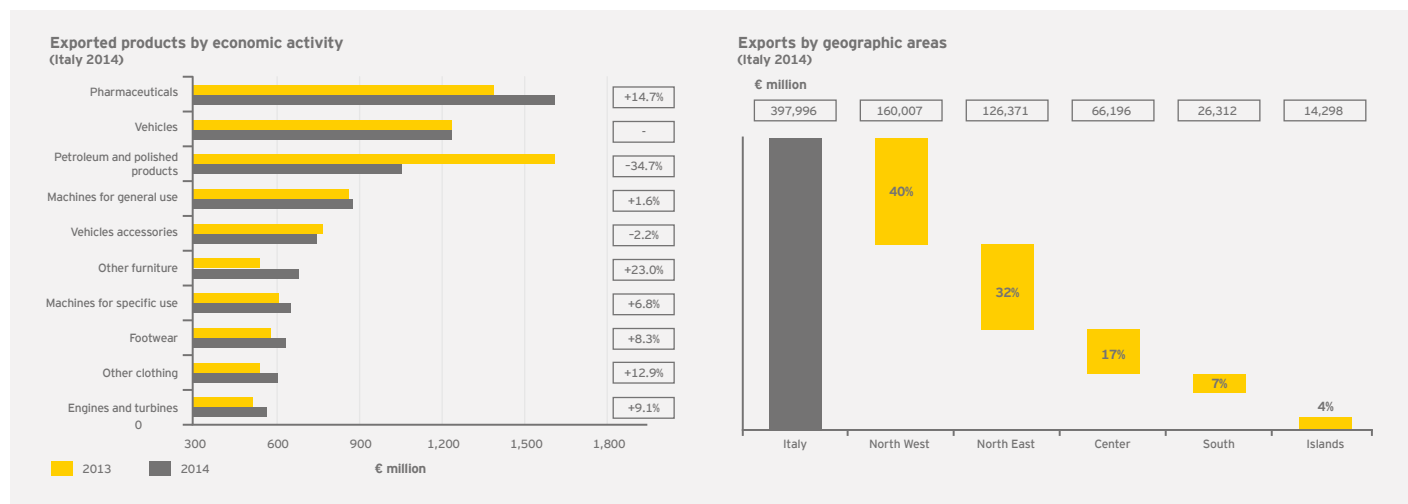


Figure 3: Italian market data: exported product categories and geographic area
Source: ISTAT

The development of new internationalization services would allow banks to support the growth of their clients, to facilitate the opening of new markets for the banks' core products and services, to enable digital processes of supply and demand matching, of sales management and of transactions processing, and to enable the extension of banks' business proposals to new

and innovative services.

The first phase of the research project focused on analyzing the needs of Italian companies that undertake internationalization processes; the second phase focused on the potential use of digital enablers to innovate the business services portfolio and

Decreasing degrees of difficulty 	Company size			Company degree of international openness		
	<50 employees	50-249 employees	>250 employees	Weakest exporter	Strong exporter (>30% of turnover)	With branches of joint ventures in the foreign market
	Company size	Cultural ties	Market access cost	Search partners for BTB meetings	Search partners for BTB meetings	Market analysis and country information
	Lack of knowledge about foreign markets	Local partners unreliability	Cultural ties	Market analysis and country information	Market analysis and country information	Advice on customs issues
	Market access cost	Company size	Credit access difficulties	Advice on customs issues	Participation in fairs and missions abroad	Participation in fairs and missions abroad

Figure 4: Companies' main difficulties in approaching foreign markets

Source: Confindustria, Rapporto internazionalizzazione Imprese Lombarde (2013)

generate new revenue sources for the banks. The third and last phase of the research proposed to identify the “digitally enabled” processes, products and services best practices for companies.

This article is organized as follows: section 1 reports on the needs of the Italian companies that decide to expand internationally. Section 2 presents the sample of banks analyzed during the study. Section 3 focuses on the services offered by these banks to support the internationalization of their corporate customers. Section 4 highlights the path toward internationalization and how it is supported by the services offered by the banks, and finally section 5 concludes.

1. Needs of Italian companies undertaking international expansion

The first phase of the research found that the Italian companies that export their products face certain problems, such as the assessment of the reliability of the counterparty, the commercial and service logistics management and the specific knowledge of each market. One of the most critical points is the need to rely on (local or not) importers, thus giving the choices of market positioning and business policy of their products to a third party.

In particular, the SMEs found that most of the difficulties associated with the internationalization process are dependent on the lack of an internationalization culture and the difficulty of supporting initial investments. Instead, with reference to the degree of business internationalization, it emerges that the main problems are finding partners for B2B meetings and the analysis

of market and economic information about the country.¹

Companies turn to various stakeholders for the distribution of specific services to support internationalization, but none of the different institutions providing services for internationalization represent a privileged partner able to support companies in a holistic manner in the foreign markets entry process. In fact, companies turn to each of the parties, taking advantage of their specific expertise.

Companies perceive banks as a key partner for their internationalization projects. This support is provided by banks through distribution of risk mitigation and investment financing tools, as well as pursuit of financial solutions and the examination of benefits that the company can access.

2. Methodology

In this section, the analysis takes into consideration the major European banks, including, though not limited to, those operating in Italy. The results presented refer to the most relevant 15 listed Italian and European banks that have some experience in supporting companies to internationalize. The market capitalization of these banks ranges from €1.5 billion to €85 billion,² and they are characterized by having a different number of branches in up to 75 different countries.

3. Bank corporate services to foster internationalization

To support the international expansion of European companies,

¹ Source: Confindustria Rapporto internazionalizzazione Imprese Lombarde 2013.

² The data about the market capitalization is as of February 2015.

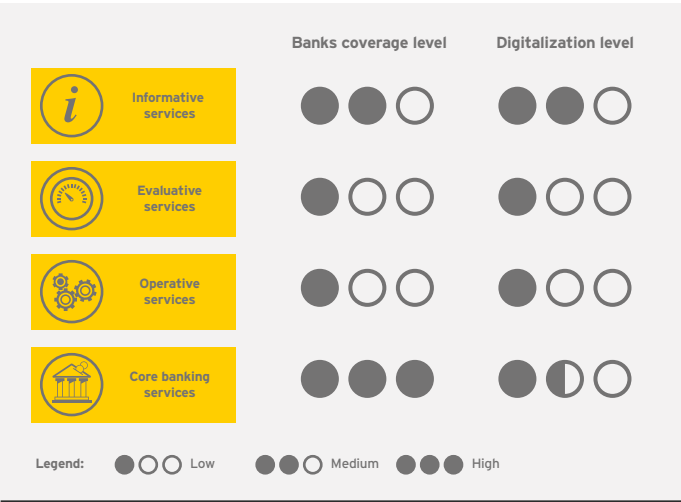


Figure 5: Level of banks' coverage and digitalization

leading banks have developed certain services. We have segregated these services into informative, evaluative, operative, and core banking.

3.1 Informative services

Informative services supply information related to the characteristics of the foreign market in order to support companies both in the initial stages of deciding on whether to expand overseas, providing an objective and detailed view on such countries, and during their permanence, providing news and insights about recent development in that environment. Among the different services offered, it is quite common that banks provide information on single countries, including an overview of politics and tax system, and on single markets that are generally available on the bank's website or on a dedicated portal. In certain cases, companies could have access to a limited number of offices or agents dedicated to internationalization in order to have more information about the services offered; nevertheless, there is generally no possibility of obtaining digital support.

3.2 Evaluative services

Evaluative services include company balance sheet and/or business plan valuation and risk assessment. However, the level of detail and analysis is very limited and it is quite common that companies require the assistance of consultancy firms to

perform the valuation properly. Furthermore, the banks that have implemented basic valuation tools require the physical delivery of the documents, such as the balance sheet and/or the business plan, or at least a physical meeting with a company executive manager.

3.3 Operative services

Operative services are those related to the ability to provide solutions to ease partnership, reciprocal exchanges, identification of local banks and funding, personnel hiring and networking. Banks provide very limited and non-digital services in this area.

Core banking services

It is not surprising to see that banks are more active in those areas that they have always been. In that regard, they provide standard and well-established services for the management of cash inflows and outflows, exchange rate risk, credit management and corporate financing. Even if there is a high standardization of solutions, as well as of processes and procedures, the level of digitalization is still limited. The majority of SMEs are still physically delivering invoices and similar documents, and the home banking systems are still not developed enough to change the habits of their corporate clients.

Figure 5 identifies the actual level of coverage of major European banks and the degree of digitalization with which the service is provided for each of the four main services.

It is obvious that banks will predominantly focus on core banking services. Sadly, however, they are concentrating on those services where profit margins are falling and are highly likely to come under attack from new non-banking players.

In such a scenario, the reaction of the traditional banks is still submissive and apathetic. Banks could integrate their traditional services with those that companies need to internationalize. This will turn out to be a win-win situation with substantial advantages for both sides. Banks that can leverage their long-term relationship with clients will benefit from new sources of revenues that have higher margins, since they are viewed as essential and value-adding. Clients can benefit from the additional services offered on a large scale, which will end up being much more affordable when compared to customized analyses provided by an appointed consultancy firm.

The informative services available are very basic and do not really add value: the same information appears in different websites, some of which are free of charge. Once again, banks could easily improve their offering by leveraging the incredible amount of information they possess from the physical presence of their own offices in different countries.

The offer of evaluative services is still limited and, despite the high margins generated, it is traditionally delegated to consultancy firms.

While operating services might be considered irrelevant, they could be the ones upon which the bank could lay on the foundations of an integrated and proactive offer of services designed to support and ease the internationalization process. Core banking services could be changed from a merely standardized support into variegated services.

Furthermore, the almost inexistence of digitalized services, usable and queryable directly in the company offices, curtails new business opportunities and new forms of access to their services. In an environment where the diffusion of information and communication technology (ICT) has been astonishing in the latest decade, this seems like an important weakness that should be rectified immediately.

In fact, in the past 10 years, the world internet penetration rate has increased from 14.9% to 42.4%. Only coming to existence since 2007, the number of mobile broadband subscriptions is growing globally by about 30% year-on-year, increasing by approximately 150 million in Q1 2015 alone. Smartphones make up the majority of mobile broadband devices today and subscriptions are expected to more than double by 2020. This is due to greater affordability in developing markets in Asia-Pacific, the Middle East and Africa. The number of subscriptions exceeds the population in many countries. This is largely due to inactive subscriptions and multiple device ownership – for example, for business and private use, or to optimize pricing by using different operators for different calls. In developed markets, users add secondary devices such as tablets. Mobile broadband subscriptions are expected to reach 7.7 billion globally by 2020. They account for an overwhelming share of all broadband subscriptions. Mobile broadband will complement

fixed broadband in some segments, and will be the dominant source of access in others.³

With the further development of ICT infrastructure and other services, there is still much space for mobile users to adopt more sophisticated applications through mobile technology. These innovations are not only meant to put a shiny gadget into the hand of a customer, but also to bring them revolutionary change of experience in as many aspects of their lives as possible. This vast space of change creates a new platform for marketers to get in touch with their customers, and it is in turn enriched by innovative practices of creative marketers.

Digital marketplaces could be a possible solution to bridge the very limited availability of digital systems and platforms through which the services required by corporate clients in the different phases of the internationalization process could be provided. The innovative features of the digital marketplace could be easily adapted to this situation. In particular, digital marketplaces are not focused on the coverage of single specific needs and they favor B2C and B2B trades in an international context. Digital marketplaces provide access to communities and forums, supporting the exchange of information and opinions on the products/services offered and incorporate loyalty programs for the clientele.

Along with the progress in ICT, more channels enabled by such technology have become available to companies. The new channels' capacity could be exploited to complement the limitations of traditional channels in providing customers with a multidimensional experience. These new channels are largely based on internet and mobile technology.

4. The internationalization process and the bank coverage

In order to become international, five different steps in the decision-making process have been identified. To begin with, companies perform an internal analysis in order to evaluate the potential of the company, in terms of availability of resources to go abroad, both in the short and long term. On that basis, companies also analyze and evaluate their strengths and weaknesses in relation to competitors, customers and suppliers.

³ Source: Ericsson Mobility Report, June 2015.

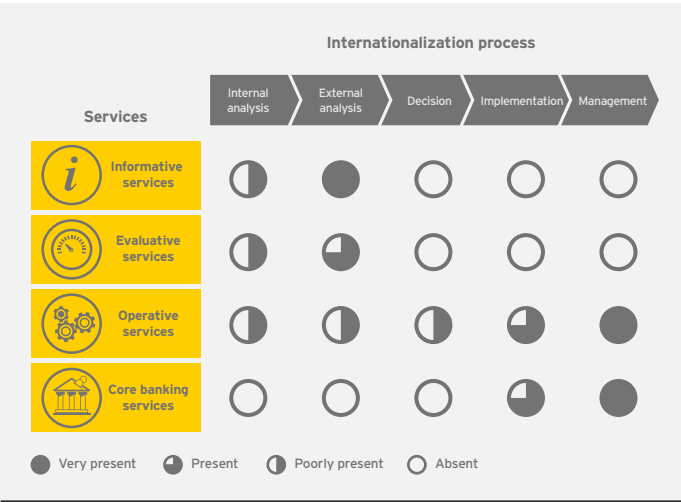


Figure 6: Coverage of banks' services of the different steps of the internationalization process

Secondly, an analysis of the possible new external environment is required in order to highlight the opportunities and threats (e.g., legal issues, technological issues, market trends) as well as the peculiarities and the attractiveness of the local market and of that particular country.

The decision-making phase results in the development and subsequent evaluation of several strategic alternatives, of which the associated risks have to be correctly identified.

When a decision is made to go international, a detailed business plan is developed, possible partners are identified, logistical and linguistic assistance is organized, legal issues are well analyzed and financing and subsidies are considered.

Finally, once established in the foreign country, the company still requires a continuous commercial and financial assistance.

The coverage of the different steps of the internationalization process by the services actually offered by banks is very limited (see Figure 6). Complete banking solutions have not been developed yet. Still there is no system able to integrate the demand and the supply, and to provide support for the whole process with innovative and digital services for those companies that are interested in expanding abroad.

5. Conclusion

Having presented the services offered by major European and Italian banks to the internationalization process of their clients, it is possible to provide an overview of the current state of play.

Informative and evaluative services should be developed at an advanced level, considering the major difficulties faced by companies, such as the lack of an internationalization culture, the difficulty of supporting initial investments and the assessment of the local counterpart's reliability. Operative services, characterized as high value added, are mainly offered by consultancy firms. The banking system should provide such services, focusing on some of the different steps of the internationalization process such as the internal analysis and the implementation.

The banking system is supporting those companies that have become international a long time ago in a very basic and traditional way, with very limited recourse of the digital enablers. The majority of the current digital platforms are focused on a limited range of services that do not cover the whole internationalization process. Very few innovative banks have developed services to integrate the bank's platforms with their client's ERP systems to ease the usability of the services provided, even though they are limited to warehouse and invoice management. This scarce integration among the systems is mainly due to difficulties in IT architectures and in programming languages. Nowadays, there is still no evidence of a complete solution that integrates the demand and the offer and which supports companies with innovative services at the same time.

Driving digital: welcome to the ExConomy¹



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¹ This article is a reprint of the original article: Viaene, S. and L. Danneels, 2015, "Driving digital: welcome to the ExConomy," Business technology strategies executive update, Cutter Consortium.

Abstract

A first step in better applying the new digital technologies currently at our disposal is understanding what creating digital value really means. To give digital a more precise focus, we have coined the “ExConomy” framework, which breaks down what digital entails into four realities: customer experience is value, experimentation is necessary, collaboration reshapes strategy and business models, and digital ecosystem platforms rule. This paper gives a presentation of these four realities and provides a tool for self-assessment of an organization’s digital readiness.

1. Introduction

There is a lot of confusion among practitioners about what “digital” really means. Does it refer to a set of technologies (i.e., social, mobile, big data/analytics, the cloud, the internet of things), or is there more to it? To give digital a more precise focus, we have coined the term “ExConomy.” It defines what digital entails from a business-value point of view and pinpoints why it deserves consideration from executive committees.

Here is the gist of things: companies embracing digital recognize the disruptive power of modern information technologies. As such, digital compels them to cultivate a profoundly new mindset and invest in winning capabilities for competing and doing business. They understand that the digital economy is ruled by four realities, which we summarize as the **ExConomy** (see Figure 1):

1. Customer **Ex**perience is value.
2. **Ex**perimentation is necessary.
3. **Co**llaboration reshapes strategy and business models.
4. Digital **eCo**system platforms rule.

This article examines the four realities in detail and offers a real-world example for each. We conclude with a set of survey questions organizations can use to assess their current state of digital.

2. Customer experience is value

Products and services are not enough to win over or keep customers. The digital space is notorious for how fast it commoditizes products and services. Ultimately, value is attributed to the total experience of engaging with customers in ways that fit with their modern connected and mobile lives. Furthermore, today's companies must make their customer's transition from the digital into the physical world of experiences, and vice versa, seamless.

Digital leaders understand that it is crucial to take an outside-in perspective – putting themselves in the customer's shoes – when designing value propositions. They embrace digital technologies as a way to enhance relationships with customers, offering truly relevant and appealing customer benefits. They also recognize that, to be successful, every part of the organization must contribute to this vision. This stands in stark contrast to the

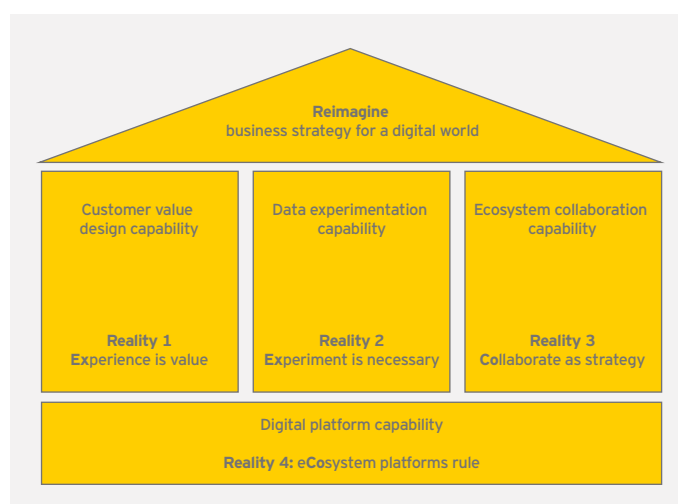


Figure 1: The ExConomy framework

traditional functional approaches for creating the customer experience and the business routines that push products onto the market instead of pulling customers in.

Example: Procter & Gamble (P&G)

P&G has invested in a global CRM system that focuses on managing data and processes to enable all of its brands to engage with customers in meaningful digital ways and to provide a holistic customer journey experience. With this initiative, the company envisions facilitating a fundamental shift from mass to one-to-one, value-adding customer engagement. A significant strategic battle that P&G hopes to win is the “zero moment of truth” – the online point in time when the customer decides what to buy. To make this new customer engagement program work, P&G is seeking radical digital change in four complementary core areas: (1) from push to real-time supply network, (2) from what has happened in the past to real-time business intelligence, (3) from hierarchy to a flat, connected organization and (4) from low-risk to speed-to-market innovation.

3. Experimentation is necessary

Customer attention is hyperephemeral in the digital space. New experiences are introduced constantly and switching between competing value propositions is best regarded as the rule rather than the exception. Now you see your customer; now you don't.

In the digital world, customers want control over their own customer journeys.

Digital leaders treat customers as moving targets and avoid working with untested assumptions. They understand that being relevant once is not enough; they must remain relevant. The way to do this is to keep up with the customer's digital self. Digital leaders deploy information technologies broadly to continuously monitor markets, sense customer needs and track behavior, systematically experiment with value propositions and respond by swiftly scaling propositions that work. This implies a strong and wide-ranging cultural focus on using data and business analytics as competitive weapons. For such digitally attuned companies, adoption of big data technologies comes naturally, as they allow businesses to move from being product oriented to offering a continuation of valuable experiences, and from mere transacting to building long-term relationships.

Example: Capital One

Capital One, one of the largest bank holdings in the U.S., has a reputation for performing leading-edge data analytics. Two decades ago, as a new entrant to the banking industry, Capital One succeeded in transforming the credit card business by radically betting on technology, data, and "test and learn." By treating each credit card offer as a data experiment, the bank successfully executed its information-based strategy to get the right offer to the right customer, at the right time, and at the right price. Today, the company continues to enhance and expand its information-based strategy beyond the credit card business. Capital One runs tens of thousands of data experiments every year to serve its customers better. Its significant strategic investment in cutting-edge big data platforms aims to consolidate its position as an analytics competitor.

4. Collaboration reshapes strategy and business models

When moving into unfamiliar territory, established organizations can rarely reinvent themselves from within. In addition, no single organization owns all the data, skills and capabilities needed to compete for the customer in a digital world. The ability to partner strategically – going beyond transactional deals or outsourcing – is rapidly becoming a core capability to competing digitally.

Digital leaders are fundamentally open to collaboration. They bet their future not just on what their own companies are capable of,

but on what others – including partner companies, customers and start-ups – can do. They reconceive their business strategies and business models through the function of business ecosystems of digitally connected partners that are able to successfully co-create and share value. Moreover, they do not just select partners to get access to scarce, complementary skills or capabilities; rather, they do so to accelerate their learning cycle through co-creation initiatives enabled by digital connectivity, collaboration and knowledge management opportunities. Such companies realize, however, that if internal collaboration is problematic, then co-creating with external partners is going to be extremely difficult.

Example: MasterCard

MasterCard has been working hard for recognition as a premier innovator in global payments. Its long-term vision: being the digital foundation of a cashless society in which every device is a commerce device. MasterCard Labs, a global network of digital innovation accelerator teams, is playing a pivotal role in facilitating this ambition by taking an outside-in view to accelerate time to market and by committing to win-win partnerships as its default innovation operating model. The MasterCard Labs for Financial Inclusion in Kenya, co-founded by the Gates Foundation, serve as a case in point: its purpose is to develop solutions for poor people living without access to mainstream financial services. MasterCard has committed to leveraging its proven innovation and product development methods as well as its existing infrastructure and solutions. Ultimately, however, success hinges on sincere co-creation efforts between profit-making companies, nonprofits, governments and individuals.

5. Digital ecosystem platforms rule

Digital innovation capability depends on the effectiveness of combining your unique digital assets with those of others. Today's most valuable digital partnerships are built around "digital ecosystem platforms" (i.e., carefully managed architectures of reusable and integratable digital assets).

Digital leaders open up their existing digital asset base as services to a wide array of ecosystem partners. Accessibility and convenience are key to leveraging the often sizable investments in creating digital platforms. Leaders also "virtualize" – or information-enable – physical assets to make the physical world digitally accessible. This allows them to use these assets at

maximum capacity on demand and to develop sharing economy business models. They understand that digital ecosystem platforms are the key to long-term economies of scale as well as scope. To enjoy the positive network effects enabled by successful ecosystem platforms, such companies develop prowess in governance as well as architecture. Governance regulates access to, and interactions on, the platform to stimulate productivity and resilience.

Example: General Electric

General Electric's (GE's) competitive strategy for the internet of things revolves around Predix, a unique software platform that allows machinery and equipment to be information-enabled as smart devices in order to connect seamlessly to each other via the platform. The ultimate goal is to make any device Predix-ready, regardless of vendor, and offer an API layer to customers and developers who want to develop new big data and analytics solutions for various industries, including mining, manufacturing, energy and healthcare. GE positions Predix as the foundational platform for the Industrial Internet ecosystem. Predix's unique selling proposition is to guarantee an architecture and governance built around open, elastic, secure and resilient access to sensor data, processing and communications. GE has partnered with Cisco and Intel to make this happen. The company has also forged global alliances with SoftBank Corporation (formerly known as SoftBank Telecom), Verizon and Vodafone to provide a range of wireless connectivity solutions.

6. Are you ready?

How can your organization understand where it stands today and how it should proceed into the ExConomy?

One way to assess your readiness is by completing the survey² presented in the Appendix. Via three questions for each of the four ExConomy realities presented in this article, you can evaluate your organization's current situation relatively quickly.

Ideally, you should support the assessment with analysis of recent successes and failures, which helps ground discussions and make them real. Try to cover your own experiences, if any,

but also expose interesting cases from beyond your normal benchmarking horizon. Since modern information technologies have a tendency to lower industry barriers, it is good practice to examine what is happening in adjacent industries as well. The output of this exercise makes an excellent discussion starter, allowing management to articulate the organization's disposition and commitment to competing in a digital world. It is a great way to start reimagining your business strategy for the digital world.

Today, not only investors and analysts, but customers, suppliers and employees, too, are challenging executive committees with regard to investments in modern information technologies. The realities of the ExConomy serve as their reference. In our experience, the need for transformation is likely high.

² If you would like to participate in an online version of the survey, please visit https://vlerick.eu.qualtrics.com/SE/?SID=SV_bebOMFt9oJ8HOLz. The authors will reveal the results in a future Cutter publication.

Appendix: Assessing digital

In the survey below, each ExConomy reality is followed by three questions. Using the following scale, to what extent does each question apply to your organization?

- 0 - Nonexistent
- 1 - Emerging
- 2 - Institutionalized
- 3 - Leader

The results will reveal your organization's current strengths and weaknesses – and its overall readiness – with regard to the ExConomy.

Customer experience is value	
Everything we do contributes to a great digital customer experience.	<input type="text"/>
We create valuable experiences that fit perfectly with our customer's modern connected and mobile life.	<input type="text"/>
Our customer experience seamlessly blends the digital and the physical worlds.	<input type="text"/>
Experimentation is necessary	
We continuously follow our customer's digital self and run many small data experiments to stay relevant.	<input type="text"/>
We excel at collecting, analyzing and acting on data to cater to end-to-end customer journeys.	<input type="text"/>
Everyone in our organization is capable of – and committed to – data-driven decision making.	<input type="text"/>
Collaboration reshapes strategy & business models	
We use digital means to foster strong employee empowerment and internal collaboration.	<input type="text"/>
We boost co-creation with partners and customers by using digital collaboration opportunities.	<input type="text"/>
By systematically sharing value and learning, we create win-win relations in an open partner network.	<input type="text"/>
Digital ecosystem platforms rule	
We promote convenient reuse of digital assets with internal and external parties, who do the same for us.	<input type="text"/>
We virtualize all physical assets and leverage the data as part of our digital platform.	<input type="text"/>
We monitor platform usage in real time to improve the productivity and resilience of the platform.	<input type="text"/>

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