Technology & Banking

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I. Introduction

The banking industry has been around for millennia. Some institutions in existence now were originally chartered in the middle ages[1] and the word "bank" itself has biblical origins. Banks keep our deposits, provide us credit, facilitate payments and are an integral part of our social, economic and political systems.

Yet, banks are now facing disruption in all areas, mainly driven by innovation in information technology (IT). Peer-to-peer lenders provide efficient alternative markets for lending and saving. There is a frenzy of new competition in the payments industry, driven as IT corporations, both large and small, act to transform the industry. Neobanks offer highly accessible yet purely online services that compete directly with retail banks. In the developing world, nearly 3 billion people look to mobile telecom operators, rather than chartered banks, to manage their money. Beyond all of this, new distributed currencies like Bitcoin compete with governmentally-issued fiat money.

Traditional banks have developed their operations over decades or centuries and find it difficult to respond to these new, highly agile competitors. Chartered banks also have a regulatory burden that the new competitors are skirting; political processes have not yet stepped in to level the playing field.

In this paper, we focus on the disruption facing retail banks in particular. Many other banks, including commercial, investment and central banks, also face disruption. However, the challenges to retail banks are particularly vivid and have a broad impact. Generally, when we use the term "bank," we refer to traditional chartered retail banking institutions such as Wells Fargo and Bank of America. New competitors may eventually find it in their interest to form chartered banks, despite the regulatory burden; this is still a disruption between the new IT-oriented players and the traditional businesses.

There are tremendous opportunities in this disruption. It has already begun and the outcome will impact our lives, economies and political systems. We discuss it in several parts, including lending, payments, neobanks, money management, mobile banking and Bitcoin. We begin with lending.

II. Lending

Lending is a core bank service with a history going back several thousands of years. Banks receive deposits from investors and lend some portion of those deposits to borrowers, charging interest to the borrowers and returning interest to the investors. Credit has become easily accessible, cheap and ubiquitous. In fact, US household debt as a share of income increased to nearly 130% during the housing crisis, although it has decreased somewhat since then.

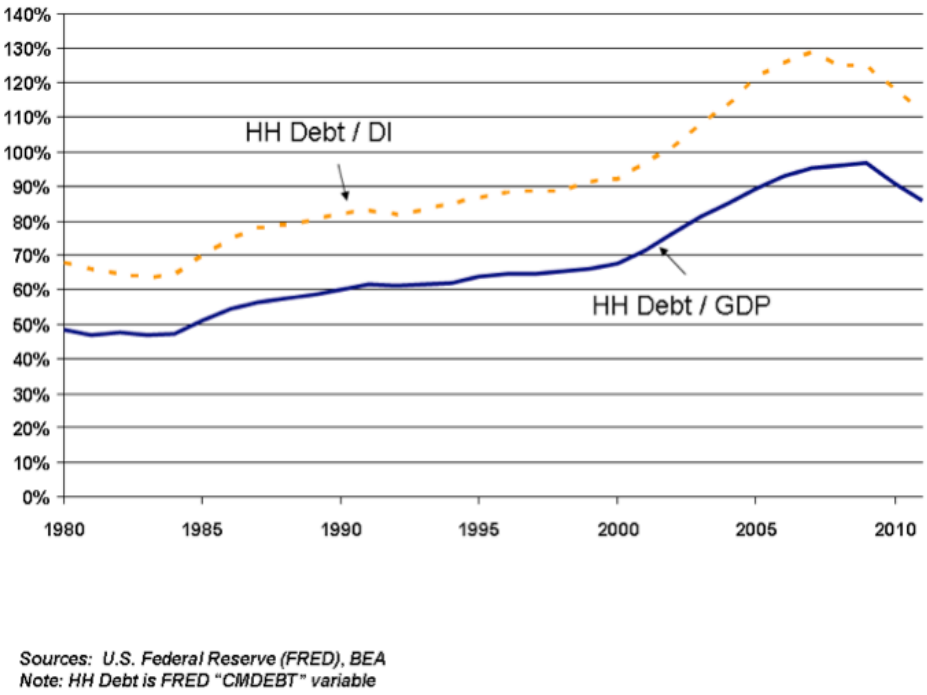

Figure 1: US Household Debt vs. Disposable Income (DI) and GDP

This is big business. In absolute numbers, total household debt in the United States is now about $12 trillion[2]. This includes about $9 trillion in mortgages and other housing-related loans. The remainder includes revolving credit accounts, auto loans, student loans and other sources. Current (Q4 2014) interest rates for borrowers range from 4% for mortgages to 16-22% for credit cards. Rates for investors are much lower at 1% or lower for CDs, money market and savings accounts[3].

Peer-to-peer (P2P) lending

Banks are facing scrutiny since the financial crisis in 2009, which was brought on by poor risk management practices. As a result, banks have taken a conservative position and it has become difficult for consumers to find loans. In addition, traditional banks operate using well established but inefficient practices that place many layers between borrowers and investors. Borrowers go through an extensive application process and then once loans are granted, they are packaged, securitized and sold to investors through a variety of investment vehicles. Each of these layers adds some overhead, consuming part of the margin between the borrower and lender.

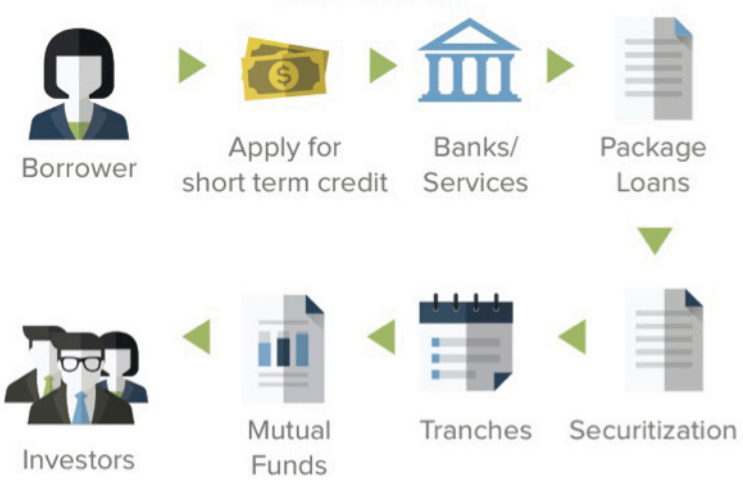

Figure 2: Retail Lending Layers (Source: Lending Club)

Peer-to-peer (P2P) lenders, also called “marketplace” lenders, compete directly with banks by offering better rates and a streamlined experience using a shared marketplace.

Figure 3: Marketplace Lending Layers (Source: Lending Club)

In this case, borrowers and investors pay fees to the market, but otherwise interact directly, eliminating much of the overhead. Zopa, a peer-to-peer lender in the UK, was operating in 2012 with a spread of 3%, in comparison with 10% for traditional banks[4]. The largest P2P lender in the US is LendingClub, with $4B in loans issued in 2014. A snapshot of rates in Q4 2014 includes the following rates, where the letters A through G are used to denote risk categories, with progressively higher expected default rates. Investors have full control over which loans they choose to fund. The minimum investment per loan is $25, allowing investors to spread their risk over a large number of loans.

Risk	A	B	C	D	E	F	G
Interest	7.32%	10.82%	13.63%	16.25%	19.20%	22.99%	24.42%
Expected default rate	1.74%	3.54%	5.04%	6.60%	8.24%	10.36%	11.41%
Return	4.80%	6.48%	7.81%	8.92%	10.21%	11.84%	12.28%

Table 1: LendingClub Risk Categories

LendingClub charges an origination fee when loans fund, but does not charge interest; borrowers pay interest directly to the investors. A large majority of the loans issued are for “debt consolidation.” Borrowers are attracted by rates that are lower than their credit cards and investors are attracted by rates that are much higher than they can achieve from banks.

Risk Assessment

Risk and P2P lenders differ substantially in how they assess and manage risk. In the case of banks, the bank assumes the risk; if the borrower defaults on a loan that the bank holds, the bank loses the money, not the depositors. For example, average credit card interest rates are currently 14% and defaults are currently around 4%, so the effective yield for credit card lending is 10%. 10% is a reasonable rate of return. However, should the economy experience a downturn that causes the default rate to rise, the banks assume the losses. In fact, the 2009 financial crisis was caused by unexpectedly high default rates (due to poor risk assessment) causing cascading losses through the industry. Since then, banks have become more conservative, perhaps excessively so, in giving access to credit.

P2P lenders generally operate on a different model where the investor assumes the risk. Investors fund

individual loans directly and, if a loan defaults, the investor's money is lost. If default rates rise, investors will suffer, but the P2P marketplace itself is not directly affected. As a consequence, investors will choose marketplaces where risk can be effectively assessed and managed. In fact, one of the attractions of P2P lending is that investors can hand-pick the loans that they fund, bringing the knowledge of the crowd to bear on risk assessment.

Traditionally, risk is assessed through the FICO credit rating system, which is based on a history of behavior, including debt load, delinquent payments and other factors. The predictive power of FICO scores is questionable; increasing reliance on credit scores has led to deterioration in loan performance even as FICO scores have increased over time[5].

As a result, P2P lenders are using new technologies to help assess risk.

- Neo Lending assesses applicants' LinkedIn networks, both for quality of the contacts and employment stability.
- Lenddo calculates its own credit score of 1 to 1,000 after looking through 100 databases and social networks for such things as an applicant's location and number of connections. In addition, Lenddo notifies the customers' Facebook friends if they haven't paid and friends' Lenddo scores could suffer if the customer fails to repay the loan[6].

Regulation

Regulation is another way in which P2P lenders and banks do not operate the same. In the US, banks are required by law to maintain 20% cash reserves. This was originally motivated to reduce the risk of bank runs, but it also dampens monetary expansion. For example, when $100 is deposited in a bank, the bank can lend only $80. If these are subsequently resulting in $80 of deposits, another $64 can be lent. This progression leads to a money multiplier of 5; that is, each $100 of deposits results in a maximum of $500 of money being created. P2P lenders do not have reserve requirements. All the money being deposited can be lent, leading to a possibly unbounded creation of money and possibly catastrophic consequences as the result of defaults.

At present, P2P lenders make up a small (but quickly increasing) part of the lending industry, so the economic risk is small. In addition, P2P lenders are targeting only unsecured loans, not mortgages. Should the industry grow to include mortgages, however, regulation would unavoidably be applied. This regulation would be driven by both national monetary policy and banks, which would want to level the playing field. This is not to say that P2P lending is not a threat to traditional banks. Should a bank charter become a requirement, it is well within the power of the marketplace to partner with a banking institution or for the marketplace to form a bank of its own.

Threats and Opportunities

Banks are threatened by new lenders in several ways. First, highly efficient online marketplaces for unsecured loans offer far better rates to both borrowers and investors. Second, more effective risk assessment and management practices increase the quality of a lending portfolio. Third, non-bank lenders are not subject to the full set of banking regulations. Finally, banks are risk-averse and limit access to credit, which urges consumers to turn to other markets. These pose significant threats in the area of unsecured loans. Figure 4 demonstrates the growth rate for LendingClub loans. However, P2P lenders are not currently targeting mortgages, which form the majority of lending (about 75% of total debt is housing related).

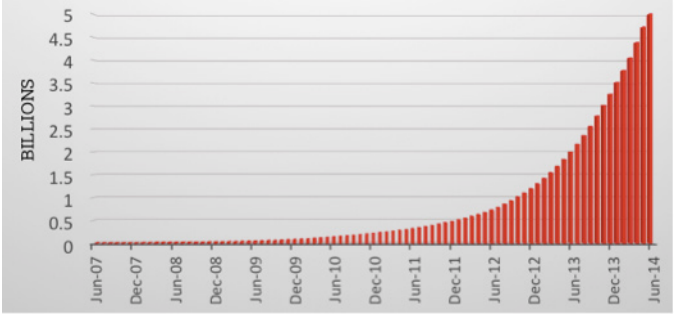

Figure 4: Total Issued Loans in USD for LendingClub since 2007 (Source: Lending Club)

III. Payments

Payments are an important part of the banking system revenue. In 2012, account-related and transaction-banking revenue comprised one-quarter of global banking revenue. In 2012 Banks handled $337 trillion in non-cash transactions, which is estimated to grow to $712 trillion, generating $1.1 trillion in revenue by 2022. Payment revenues are generated by transaction cost associated with every non-cash transaction. In order to understand the payment disruptions it is important to understand the business models for various types of payments. Credit cards are the most apparent form of non-cash transactions. We will explore the VISA business model to show the transaction cost breakup, the players and steps involved in completing the transaction.

Credit Card (VISA) Payment Model

VISA is a Technology company providing global payment solutions to the banks. Its payment product platforms are used by the banks to develop credit and debit card programs for their customers. VISA does not issue credit cards nor does it extend credit to the consumers. Instead, it operates an "open-loop payments network" to manage the exchange of information between different financial institutions.

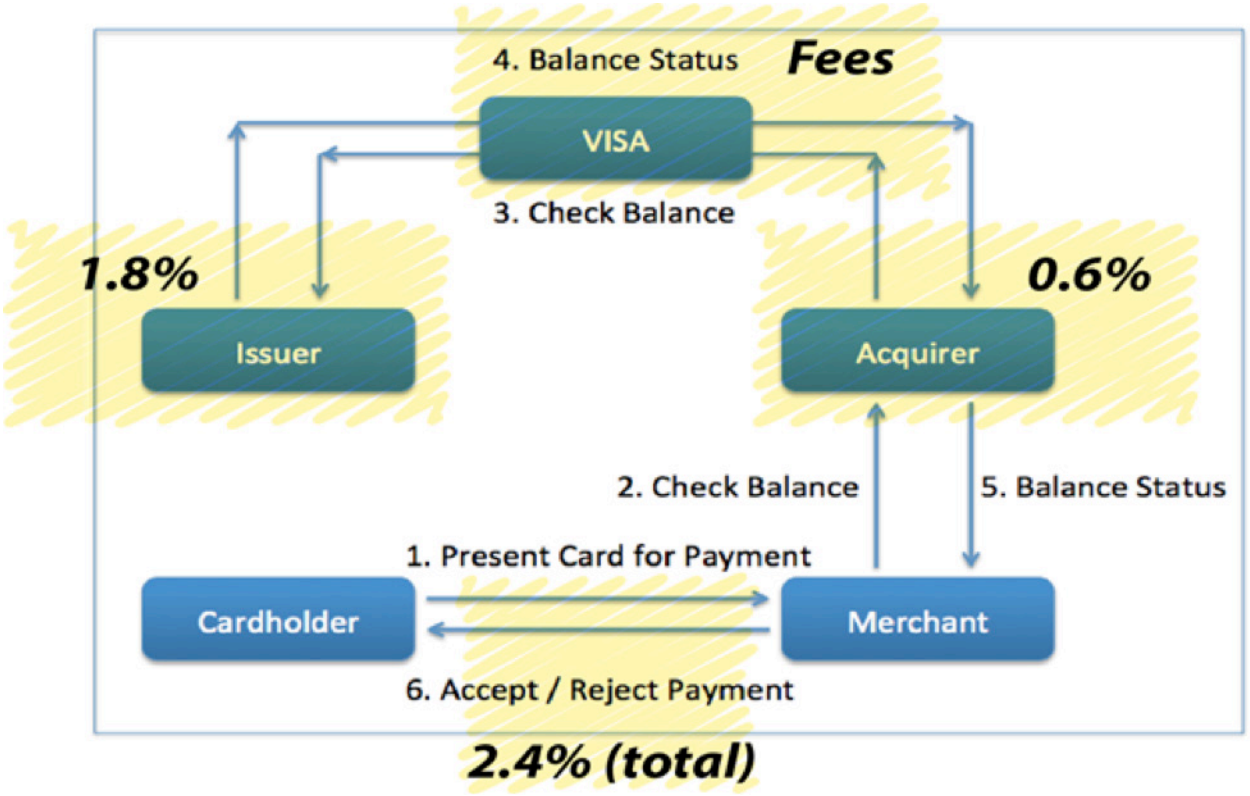

Figure 5: VISA Open-Loop Payments Network (Source: BMI Matters)

The diagram in Figure 5 explains what happens when a cardholder presents a card for payment to a merchant. The payment request is forwarded to the acquirer (the merchant's bank). The acquirer contacts the issuer (the client's bank) through the VISA network. The issuer shares the information on whether sufficient balance is available to carry out the transaction. The information is then routed to the merchant. If sufficient balance is available, the payment is accepted. Otherwise, it is rejected. The issuer bills the cardholder on a monthly basis. The cardholder pays those bills then.

The diagram also tells us how VISA and banks make money in the process. They make money from the transaction fees charged to merchants. A typical merchant fee is 2.4%, which would get unevenly split between the issuer at 1.8% and the acquirer at 0.6%. The issuer gets to keep more of the merchant fee because of a higher risk of payment default from the cardholder. VISA makes money on payment volumes, transaction processing and value-added service.

Threat: New Payment Enablers

New payment providers are emerging to enable customers to make easy to use, fast and secure anywhere-to-anyone payments. These IT competitors threaten to take an increasing part of the issuer/acquirer fees and negotiate to come up with different business models. This results in lower costs and decreased fees for the banks.

A more revolutionary threat is from IT companies such as Amazon or Apple becoming retail banks and replacing issuer/acquirer banks completely. The diagram in Figure 6 shows new players like Apple Pay, Google Wallet and Paypal Beacon emerging in this space.

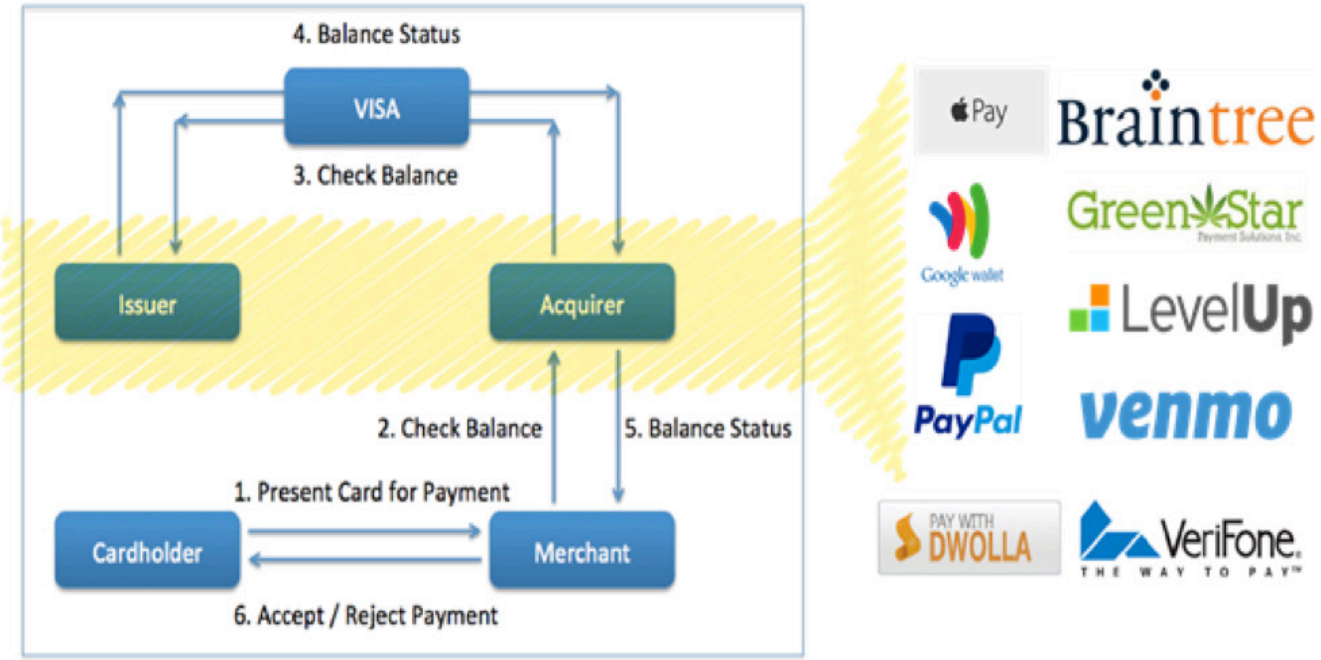

Figure 6: New Players Emerging in the Issuer/Acquirer Bank Space (Source: BMI Matters)

Threat: Payment Model is Replaced

Credit card payment network infrastructure powers everything from bank transfers to cutting-edge payment companies like Square. As shown in the diagram below, there are many steps and hefty interchange fees are levied in the traditional payment networks.

Startups such as Dwolla may radically alter the fabric of digital payments by building their own alternative to the credit card networks. Creating their own network from scratch helps avoid the hefty interchange fees levied by the credit card companies and can also offer instantaneous transfers.

The diagram in Figure 7 shows how the Dwolla network helps bring direct customer-to-merchant payments by bypassing conventional networks with multiple layers and bringing fundamentally lower transaction cost structure, such as “No Charge” for less than $10 transactions and $0.25/transaction otherwise.

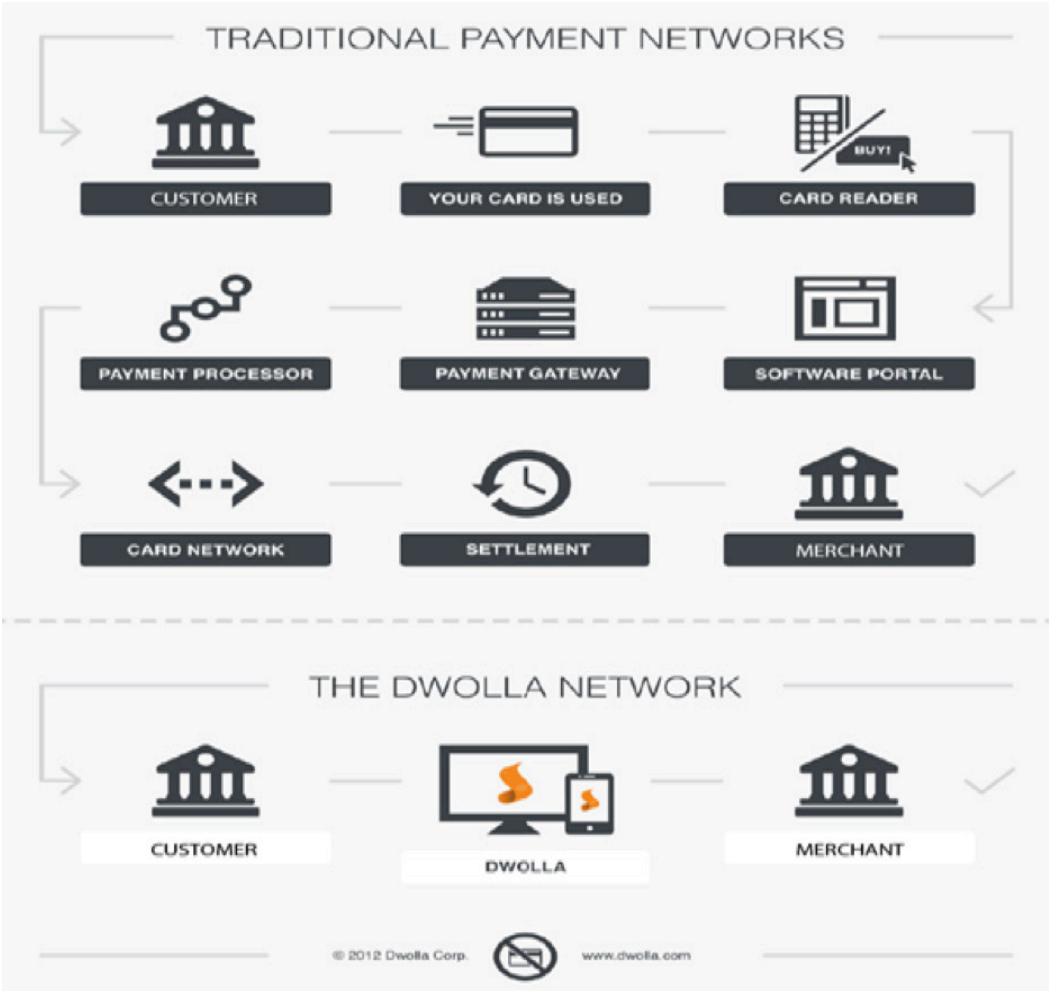

Figure 7: Traditional Payment Networks vs. the Dwolla Network (Source: Dwolla)

IV. Customer Engagement

Customer engagement is critical to the growth and survivability of the banking business model. It includes:

- Acquisition of customer
- Sales of product and services
- Relationship management including conflict resolutions
- Brand and loyalty management

Traditionally, banks have used their branch networks for strong and profitable customer engagement. Banks leveraged the mainframe-to-client server technology-driven transformation to strengthen the engagement model, driving improved convenience for the customers while improving their top and bottom lines. Branch networks remained central to that transformation.

The early days of Internet-led transformation augmented this trend. It never really disrupted the engagement model and core value propositions of the customer engagement model. Investment in branch networks (e.g. $50B/yr to operate branch networks by 25 top banks in US) continued to provide attractive ROI. However, as shown in Figure 8, more recent mobile broadband-based Internet, along with chang-

ing demographics from baby boomers and millennials and their behaviors, are disrupting the customer engagement model.

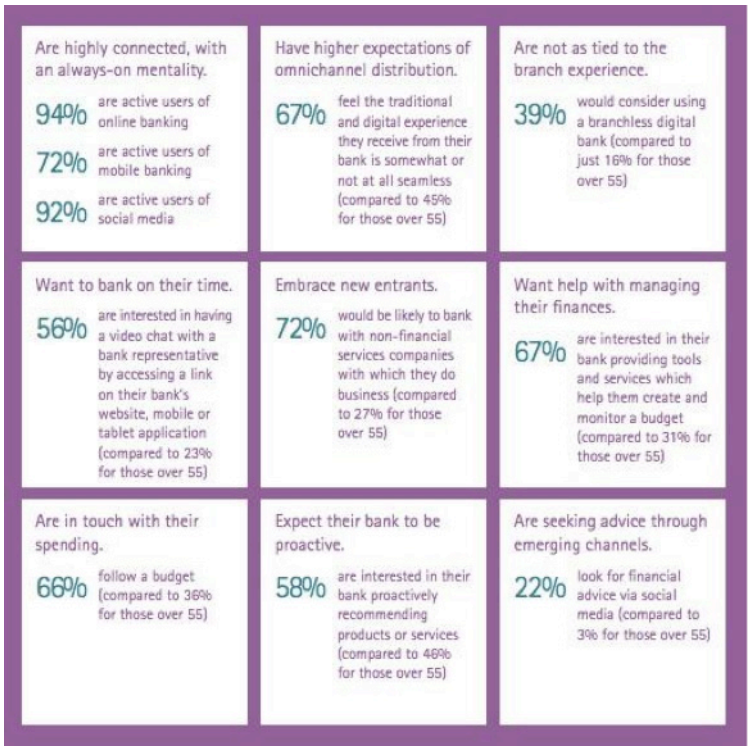

Figure 8: Millennals and Money

Customers are expecting financial services to be available at any place, at any time and in any way they want it. They are also expecting banks to be proactive in anticipating their needs and providing them personalized services. The engagement model is transforming from “how do I find/acquire and most profitably serve my customers” to “how do customers find me and use my services in real-time where, when and how they want them?”

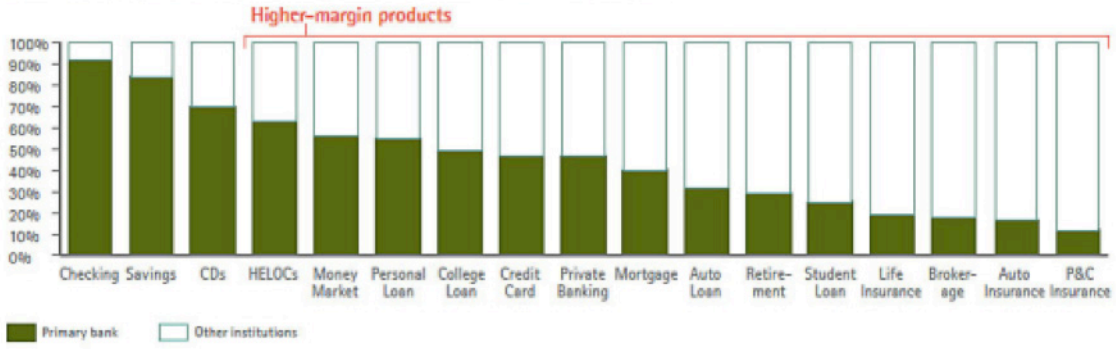

Figure 9: Who Did You Buy Financial Services Products From in the Last Year? (Source: Accenture Retail Banking Survey)

As shown in Figure 9, customers continue to use branch bank networks for basic banking services such as checking, savings, CDs and high touch issue resolutions. Branches continue to help build brand and trust. However, many other providers started to offer high-margin products on the Internet decoupled from the banks and its branch networks. Customers’ comfort with Internet and changing behaviors has started to disrupt sales of the higher-margin products impacting banks’ top and bottom line.

Many disruptors are emerging in all aspects of financial transactions in customers’ lives, offering digital channel alternatives in developed and emerging markets. They are disrupting the branch network-based

bundled customer engagement model with the online digital channel-based unbundled engagement model. This is disintermediating banks from their customers, revenue growth and profits. To counteract this, banks will need to rethink their customer engagement model and innovate and transform themselves at a higher velocity than what they have been used to in the prior technology-driven transitions.

V. Customer Money Management: Mobile Money

Mobile money refers to an emerging alternative banking service offered by mobile operators. It can be viewed as a natural extension of their billing system already in place. Without delving into technical details, it is easy to understand the key aspects of mobile money. Firstly, account-billing services are generalized to handle banking transactions such as payments and deposits. Secondly, the communication infrastructure is already in place to transport those transactions, including security features, such as encryption and authentication. Finally, worldwide network interoperability enables international transactions, such as remittances. With some over-simplification, if you have a mobile account, you have a mobile money account; you just don't know it yet.

Mobile money takes on a special importance in emerging markets, due to a confluence of factors[7]. First, government infrastructure, from transportation to police, is barely functional, especially in remote (rural, rugged) areas. Second, banks have low penetration, focusing on the rich and urban. Most people are "unbanked," operate in a cash economy and have practically no interaction with banks. Again, this issue becomes more acute in remote areas. Finally, mobile operators have very high penetration and coverage well into remote areas. They are often the only reliable infrastructure around. There is already mutual financial trust between operators and customers due to mobile billing transactions, which extends easily to mobile money.

The numbers are staggering: in emerging markets, there are four times more mobile accounts than bank accounts. Some 2.5 billion adults are unbanked and 1.7 billion of these have mobile accounts. Figure 10 illustrates the geographical disparity in banking penetration worldwide.

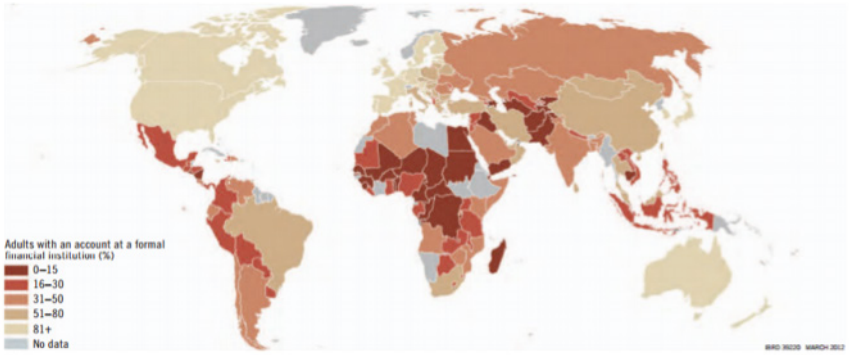

Figure 10: Global distribution of Unbanked[8]

The unbanked issue is not just one of convenience. Operating in a cash economy under an absentee government has many pitfalls: people are discouraged from saving and investing in their future, which affects their resilience to financial setbacks. They are also in plain danger, as they become easy prey to extortion and theft.

The Gates Foundation has identified access to financial services as critical to lifting people out of poverty. This includes them in the financial system and empowers them to weather crises and grasp opportunities[9]. In particular, it highlights digital payment platforms as the tools to deliver financial services to the poor—profitably and at scale. Mobile money clearly fits this description.

Opportunity and Threat

There is a big opportunity for mobile money to address the unbanked segment in emerging markets. In the short term, the mobile industry is cooperating with banks by reaching into an underserved population and easing its access to banking services. In Peru for example, Ericsson is working with the banking association to deploy mobile money services[10]. This cooperation provides an opportunity for banking to increase its penetration in the short term. Thus, the two systems could coexist and thrive in parallel. In the longer term, however, mobile money easily becomes a threat, by quickly filling the unbanked vacuum and choking off the growth prospects of banks.

In contrast, developed markets do not have a large unbanked segment and one would be tempted to discount the threat of mobile money. But we should consider another scenario, where mobile money gets deployed in emerging markets and has a few years to evolve into a highly efficient attractive service with huge scale. Then it comes into developed markets and competes head on with banks. Keep in mind that mobile networks are essentially the same throughout the world. So introducing mobile money would be "just a software upgrade."

VI. Customer Money Management: NeoBanks

Neo-banks are an extension of the prepaid card business. They provide synthetic bank-like services with internet-only operations, skipping branches completely[11]. A key aspect is the absence of credit, which removes risk, keeps regulation at bay and simplifies operations, enabling scaling.

The prepaid card business is very attractive; in the simplest form, the customer pays first and the balance is kept on the card itself, requiring very basic back-end support by the issuer. Financially, it is a great deal for the issuer. In addition to paying various fees, the customer provides an interest-free loan and often forgives some or all of the principal as cards get lost. It is no wonder that the prepaid segment is growing quickly, quadrupling between 2007 and 2014. Also, by 2017, the US government will issue $120 billion in benefits with pre-paid cards.

Neo-banks are an interesting study in contrast. On the customer side, they synthesize the look and feel of a traditional bank account, with checking and savings, bankcards and physical checks. They aim to have a low and clear fee structure, so customers know what they are getting. All transactions are immediately accounted for and there is no credit or overdraft protection. Neo-banks claim to empower their customers in that way, by allowing them to track their finances exactly. Although neo-banks do not have branches, they emphasize customer support, online or by phone.

On the operations side, neo-banks appear to be very different from banks. Clearly the absence of branches removes a whole layer of cost and complexity. Expanding from simple prepaid cards to bank accounts does require a sophisticated infrastructure, but we can guess that it is no worse than that of a traditional bank for the same function. Most importantly, the absence of credit removes risk and we speculate that this has two crucial impacts. First, neo-banks can maintain low cost. By keeping regulators at bay, they avoid the requirements banks must satisfy, which include keeping cash reserves to maintaining bureaucratic overhead. Second, neo-banks can scale. By skirting complicated risk management, which is likely to involve significant human oversight, they can grow quickly by expanding their infrastructure capacity.

Indeed, today neo-banks are not legally considered to be banks. Of the four current neo-banks in the US—Moven, Simple, BlueBird and GoBank—only the latter has a bank charter. Moven and Simple are partners with banks and BlueBird is backed by American Express. The combination of low cost operation and traditional bank-like customer experience seems to be working. Overall, neo-banks are already

a reality, with a 9% market share of banking in the US.

Threat to Banking

The emergence of neo-banks is happening at a time when banks are struggling with their branch deployments. Focusing on the US, the density of branches is excessive in comparison to similar economies and their number is on a slow decline. Also, many branches are being reduced in size as services are moved to the Internet. Figure 11 below highlights the declining role of branches over time, with only 15% of transactions taking place at a branch in 2013. In this light, the lack of branches is not much of a handicap to neo-banks in terms of customer interaction; however, the cost savings are significant. With their efficient operations and familiar bank-like services, neo-banks appear to be a deadly threat to banks. We speculate that the wild card will be regulation; neo-banks will try to avoid it by steering clear of credit, while banks should push government for consistent regulation and an even playing field.

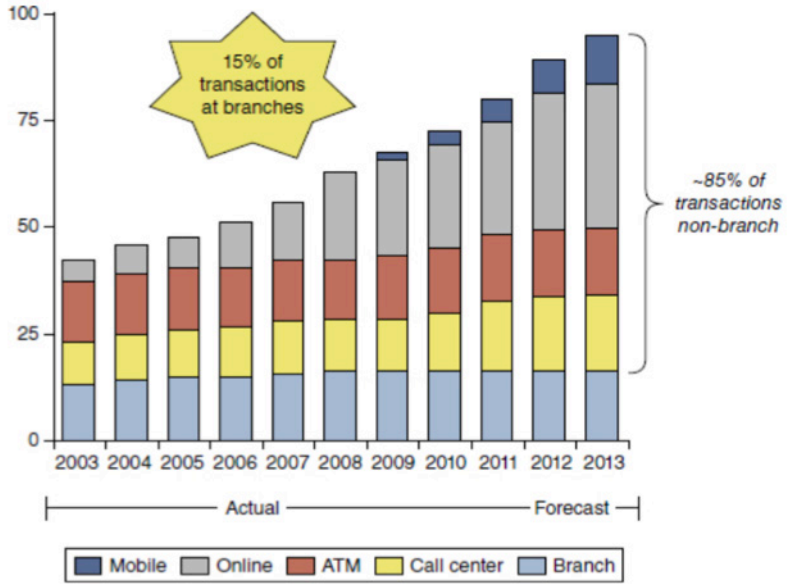

Figure 11: The Time Progression of Bank Transactions

VII. Future Trends: Bitcoin

Bitcoin is a form of digital currency and its main advantage is to eliminate the third-party intermediary and thus significantly lower the cost of the e-commerce transactions, especially across international borders. However, Bitcoin faces many challenges to serve as a stable payment platform for the mainstream use.

What is Bitcoin?

Like the U.S. dollar, the Bitcoin is a fiat currency in that it is not redeemable for some amount of another commodity, such as an ounce of gold. Unlike the dollar, a Bitcoin is not legal tender. It is not backed by any government or legal entity, nor is its supply determined by a central bank. The Bitcoin system is private, with no traditional financial institutions involved in transactions. Unlike earlier digital currencies that had some central controlling person or entity, the Bitcoin network is completely decentralized, with all parts of transactions performed by the users of the system.

Bitcoin is sometimes referred to as a crypto currency because it relies on the principles of cryptography (communication that is secure from the view of third parties) to validate transactions and govern the

production of the currency itself. Each Bitcoin and each user is encrypted with a unique identity and each transaction is recorded on a decentralized public ledger (also called a block chain) that is visible to all computers on the network, but does not reveal any personal information about the involved parties. The public ledger verifies that the buyer has the amount of Bitcoin being spent and has transferred that amount to the account of the seller. The public ledger is a unique attribute of Bitcoin and other crypto currencies because it solves the so called double spending problem (i.e. spending money you do not own by use of forgery or counterfeiting) and the need for a trusted third party (such as a bank or credit card company) to verify the integrity of electronic transactions between a buyer and a seller. Figure 12 below shows a detailed transaction flow for Bitcoin[12].

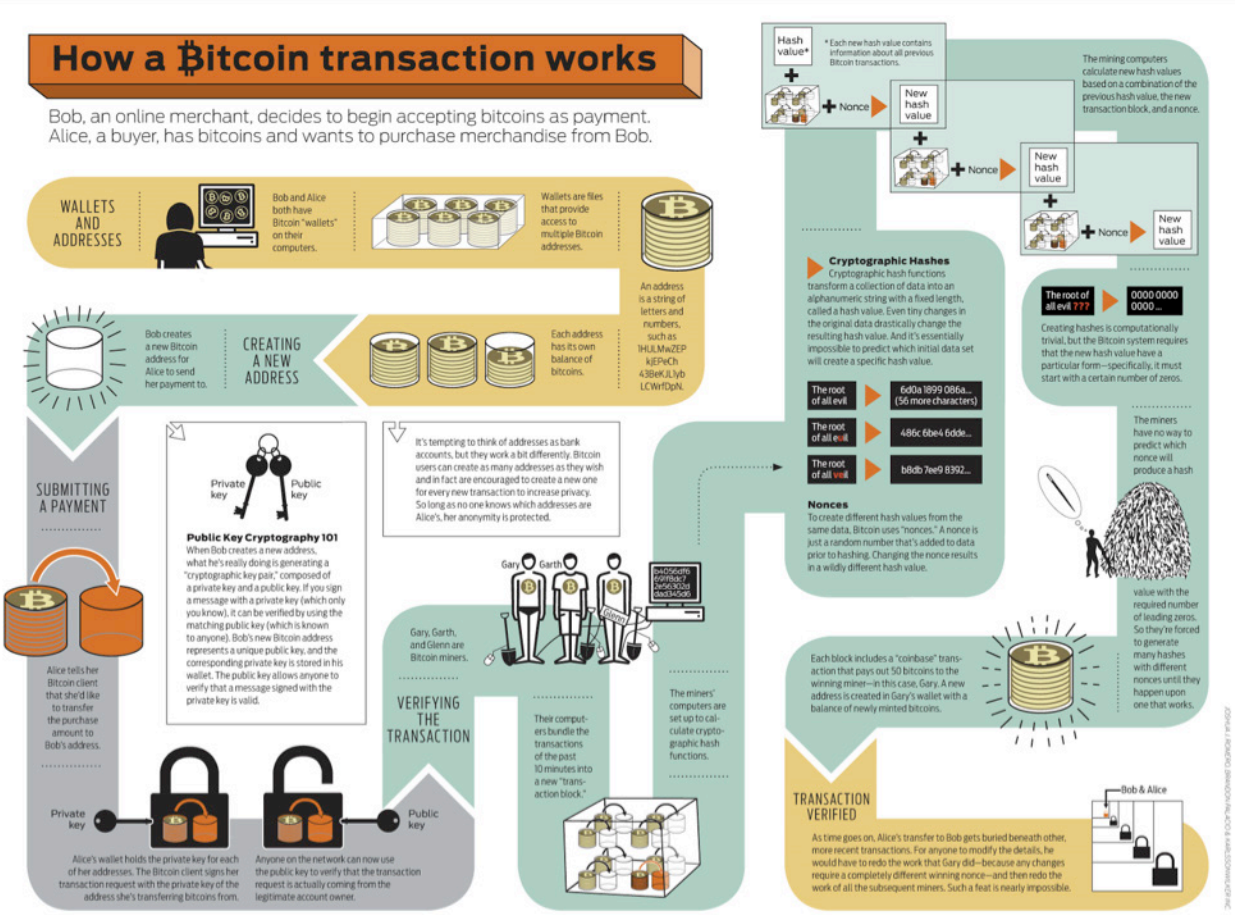

Figure 12: How a Bitcoin Transaction Works (Source: Bitcoin)

Benefits of Using Bitcoin

Cheaper and Broader Payment System

At the moment, many Bitcoin transactions are typically processed in a way where no fee is expected at all. However, for transactions that draw coins from many Bitcoin addresses and therefore have a large data size, a small transaction fee is usually expected. This is very significant to electronic vendors whose total margin is below 5%, where a normal credit card transaction costs somewhere between 2% and 3%. In addition, transactions across the border are very difficult. Amazon does not sell merchandise to other countries, mainly because credit card transactions rely on the underlying banking systems and each country has its own laws and regulations governing their banks. By using Bitcoin, a merchant can reach customers in other countries and significantly increase its market reach.

Increased Privacy

Bitcoin is often referred to as pseudo-anonymous. Bitcoin transactions are largely not traceable. You

do not have to be afraid of any organization being able to trace the source of your funds. This is a clear benefit in many areas of the world because governments that are supposed to guard against fraud are actually defrauding people by taking their savings partially or fully.

Enable Smaller Content Publishing via Micro Payment

Bitcoin can be split into smaller payments without additional cost. This will make a big impact to the content industry. For example, a magazine can be broken into individual stories and each individual article can be sold online.

No Erosion of Purchasing Power Due to Inflation

One of the biggest problems with our current dollars and other currencies used around the world is inflation. Over time all currencies lose purchasing power at a rate of few percent per year, mainly because governments keep printing more money. This process is basically a small tax on your accumulated wealth. With Bitcoin, this problem does not exist because the system is designed to make Bitcoins finite. Only about 21 million Bitcoins will ever be released (mined). The release of new Bitcoins is slowing down and it will stop completely within a few decades. We have a slowing population growth, which is projected to stop at around 10 billion by approximately 2050, which roughly coincides with the last Bitcoin to be mined. There will be roughly 1 Bitcoin for every 500 people.

Challenges Associated With Bitcoin

Cannot Revert or Track a Transaction.

This is not completely true. Using public ledger and sophisticated computer analysis, transactions involving large quantities of Bitcoin can be tracked. Paired with current law enforcement tools, it would be possible to gain a lot of information on the persons moving the Bitcoins. But because of this perception, Bitcoin is often associated with illegitimate activities, such as money laundering across the borders. Some governments such as Russia's ban its use.

Could Affect the Fed's Conduct of Monetary Policy

Bitcoin could have an impact on the conduct of monetary policy to the extent that it would (1) substantially affect the quantity of money or (2) influence the velocity (rate of circulation) of money through the economy by reducing the demand for dollars. This possible outcome highlights the likely importance of the economy's principal currency being elastic—its supply increases and decreases to meet the changing needs of the economy—and of the important role of the central bank in implementing such a monetary policy.

Slow Speed

A Bitcoin transaction can take between ten minutes to one hour. This could be an issue with many of the internet transactions.

Easy to Lose

If your credit card is stolen or somebody hacks into your bank account there is a good chance you will not lose any money, as banks will fix your balance. Even cash can be potentially recovered if the police act fast. But lost Bitcoins are los for good. There is no mechanism to recover stolen or lost Bitcoins. If somebody hacks into the wallet where the Bitcoins are stored, they are irretrievable. The best way to store your Bitcoins is on a disk that is disconnected from the Internet.

Too Speculative

Currently, Bitcoin prices fluctuate significantly. It is likely that the price will stabilize at around US $10 from the current US $400. Currently, the price is going up so quickly a web shop would have to adjust their prices almost daily if they wanted to accept Bitcoin. It is not very convenient.

In conclusion, Bitcoin or any digital currency has a huge potential to disrupt the banks as it completely bypasses the banking system and reduces the cost of sending money to almost zero. Therefore, Bitcoin takes the payment infrastructure of banks and turns it on its head. However, it still requires a few more years to grow into a mature payment system.

VIII. Future Trends: Explosion in Company Valuation

So far, we have identified threats from several industries to banking. Most of these threats constitute a "clear and present danger," with Bitcoin perhaps being more of a future threat. Here we look further towards the future and argue that there are clear signs of a trend towards increasing disruption to banking.

We conjecture that venture capital investment is a good predictor of future success, in the sense that VCs will bet on a winning trend. One can argue that much of Silicon Valley is proof of VC prescience. Having adopted this conjecture, we look at companies in the transaction segment and see an explosion in valuation.

There are many companies in varying stages of maturity in the transaction segment. We focus on three related companies to illustrate our point. First we establish the basic facts: Venmo was founded in 2007, raised $1.3 million in funding and was acquired for $26 million in 2012[13]. Braintree was founded in 2007, raised $69 million in funding and was acquired by for $800 million in 2013[14]. Paypal, probably the most prominent name in payment, was founded in 1998, raised $197 million in funding and was acquired for $1.5 billion in 2002[15].

The common thread among the companies is that Paypal acquired Braintree, which had acquired Venmo. The big news recently is that Paypal will be spun off as a separate company from Ebay in 2015. As a standalone company, Paypal's value is estimated as high as $47 billion, compared to the current market capitalization of $65 billion for Ebay[16]. We illustrate the explosion in valuation for the three companies in Figure 13 below, where the y-axis is on a log-scale to cover the huge value range.

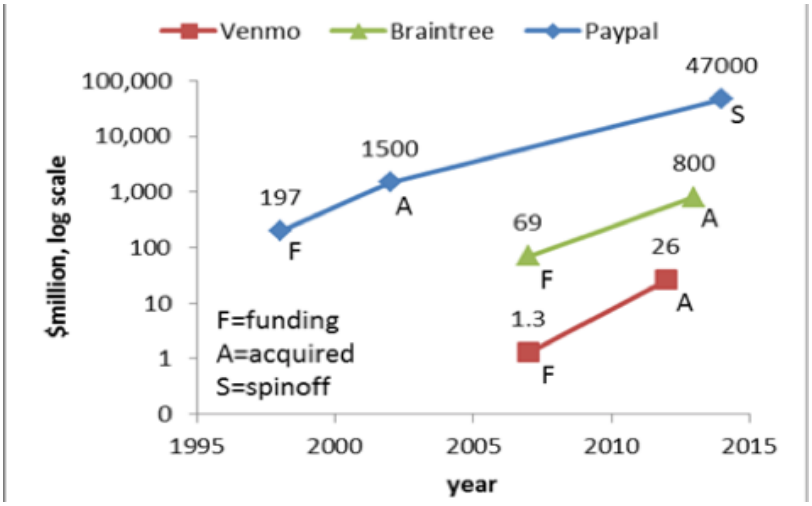

Figure 13: Valuation Explosion of Venmo, Braintree and Paypal

A new wave of funding is starting up. Stripe, founded in 2010, has developed a payment platform with links to Twitter and Facebook. Recently, VC firm General Catalyst has raised a $10 million fund specifically for seed stage startups that build applications on the Stripe platform[17]. The first company to be funded is Baremetrics, with $0.5 million in September 2014. Even in the fast paced startup world, it is puzzling that a four year old company is considered to be a stable platform for future innovation!

Threat to Banking

The high valuation of the companies in the transaction area is justified by their growth potential, rather than their current profitability. These companies can leverage this high valuation as a "license to print money" (pun intended). This money can be used to launch innovative services and applications without having to worry about immediate profitability. Such an approach would be too toxic to the banking culture for banks to even try. This creates a self-fulfilling prophecy with these companies diverting the growth from new services away from banks and further justifying their valuation.

IX. Conclusion

In short, banks have the money and other industries want it. Our study identified a number of key external threats from various industries, each leveraging its core strengths to carve out some of banking territory. For instance, new lenders exploit social networks to assess credit worthiness and crowdfunding to raise money. Neo-banks rely on internet infrastructure to provide a familiar bank-like customer experience. Mobile money uses the reach and the billing systems of mobile networks to serve the huge unbanked segment. Bitcoin relies on Internet security technology to bypass normal currency altogether and handle transactions in an alternative currency. Next we will summarize our findings about various external threats to banks, then briefly discuss how banks may react to those threats.

Threat Summary

- Lending
- Neo-lenders will significantly erode, but not replace, bank lending
- Mortgages are not (currently) under threat
- Disintermediated Customer Engagement
- Neo-banks take market shares from banks with reduced costs and good enough services
- Customer engagement is unbundled; customer open to financial services from many channels when, how and where she wants it; significantly impacting revenue and margins sustainability and growth
- Customer Money Management
- Mobile money already took off, especially in emerging markets
- Payments
- Nimble, secure money transfer networks to enable instant transfers
- Technology innovators own the digital experience/interface for payments
- Currency
- Digital currency (Bitcoin) further removes friction in the payment system, especially in the international transactions
- New Company Valuation
- High valued new companies, unencumbered by current profitability, divert growth away from banks.

Note that taken together, many of these threats also result in customers becoming further and further removed from banks. Eventually, the customer relationship is not the bank's anymore, making it very difficult to for banks to cultivate and exploit it.

Banking Response

Finally, we take a brief look at how banks can respond to external threats. First, they can ignore the threats and lose revenue streams. The banking sector has endured many crises, including devastating damage during the last recession, yet it comes back more or less the same. It may view the external threats as passing fads that will fizzle out, or find them so different from its business model that they cannot be emulated anyway. For instance, crowd-funded lending may be too foreign to banking to be

considered for inclusion. Second, they can adapt to the threats and find new growth opportunities. Banks are eminently placed to recognize which threats are worth co-opting and how to go about incorporating them into the business. If banks see an attractive revenue stream, they may be willing to make painful structural and cultural changes to take it over. For instance, mobile money may be a growth opportunity for banks by reaching out to the unbanked segment. Finally, banks can fight back against the threats and keep the status quo. Banks understand regulation and they have the political clout and government lobbying capability to use regulation to blunt the threats. Many of the banking alternatives are too new and regulators have not caught up yet. For example, neo-banks are not chartered as banks and are being subjected to very little oversight thus far. But banks can demand an even playing field; should they succeed, it would put a bureaucratic burden on neo-banks and reduce their cost advantage.

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