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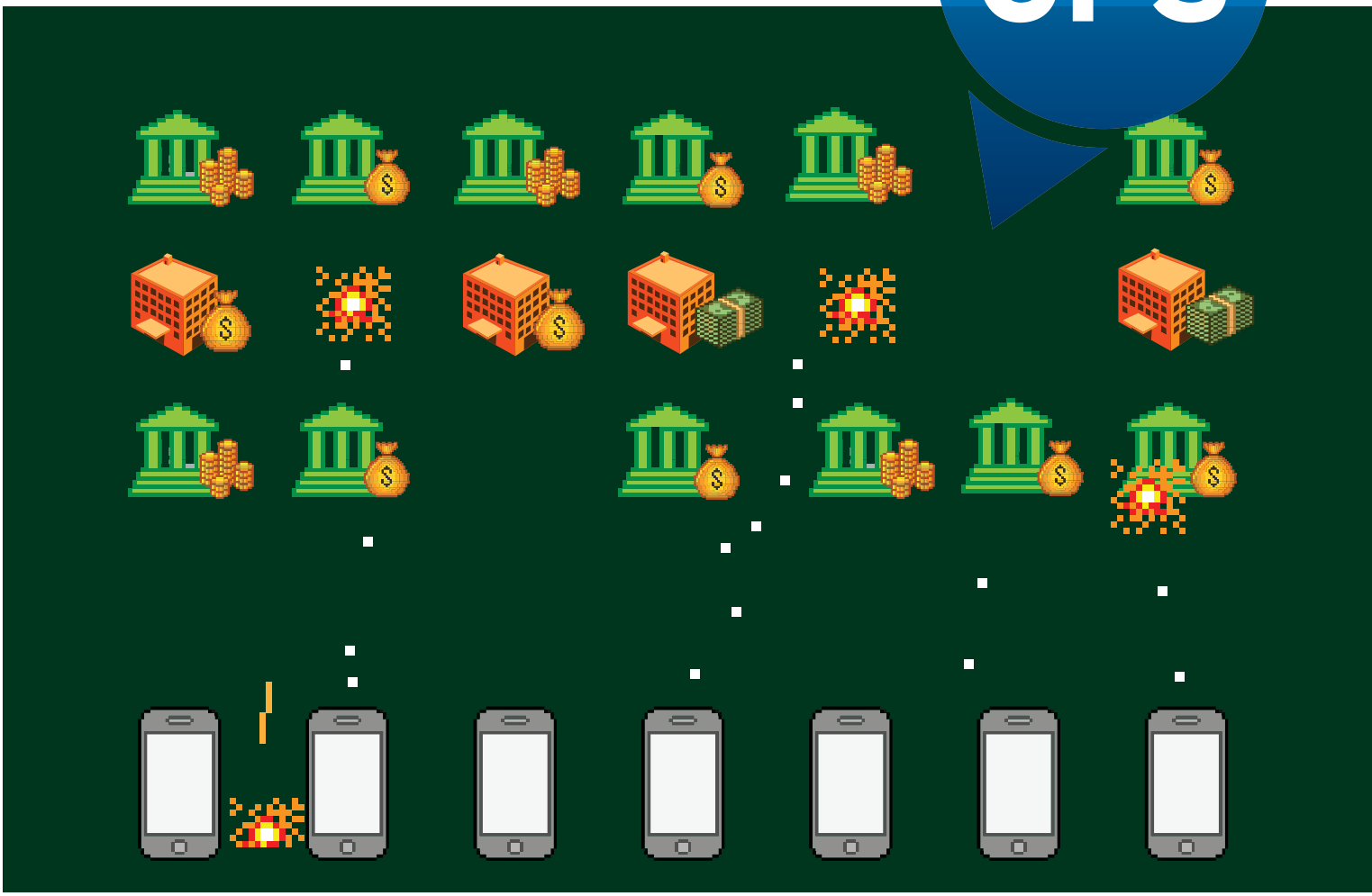

DIGITAL DISRUPTION

How FinTech is Forcing Banking to a Tipping Point

Citi GPS: Global Perspectives & Solutions

March 2016

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DIGITAL DISRUPTION

How FinTech is Forcing Banking to a Tipping Point

Kathleen Boyle, CFA
Managing Editor, Citi GPS

When I was growing up there was a weekly ritual in our house. My Dad would bring home a check on a Thursday night and leave it under the clock on the mantelpiece. Then by hook or by crook, my Mom would make it to the local bank branch on Friday, deposit the check, get cash, and return a few dollars back under the clock for Dad for the coming week. To my Dad, the clock was the first automated teller machine.

With advances in technology, the relationship that customers have with their bank and with their finances has changed. Customers rely less and less on walking into a branch for their banking needs, and instead have digital options to help them — ATMs, on-line chat, mobile phones, and Internet banking. So far these have been seen more as additive to a customer's banking experience but when do we go over the digital disruption tipping point and see a change in the fundamental banking business?

Investments in financial technology have growth exponentially in the past decade — rising from $1.8 billion in 2010 to $19 billion in 2015 — with over 70% of this investment focusing on the "last mile" of user experience in the consumer space. The majority of this investment has also been concentrated in the payments area and this is where banks are seeing the most competition with new entrants. Competitors already established in new marketplaces, such as PayPal for e-commerce payments in the US, or emerging in client segments traditionally underserved by banks (such as micro and small businesses) are starting to gain traction and ramp up their scale.

Despite all of the investment and continuous speculation about banks facing extinction, only about 1% of North American consumer banking revenue has migrated to new digital models. Although FinTech companies have the advantage of new innovation, incumbent financial institutions still have the upper hand in terms of scale and we have not yet reached the tipping point of digital disruption in either the US or Europe. Given the growth in FinTech investment, this isn't likely to continue for long.

In China, Internet giants have moved into financial services and gained considerable market share in e-commerce and third-party payments. These new entrants were faster than the banks to offer convenient, reliable, fast and cost-efficient alternatives to traditional bank payments. China's FinTech companies often have as many, if not more, clients than the top banks and their FinTech players often have well-resourced parent companies in e-commerce and finance that can sustain larger and more balance sheet intensive businesses that Western venture capital funded rivals.

As customers shift their behavior and move more towards digital solutions, banks will need to rethink their digital strategy. The authors believe an omni-channel strategy is the winning solution for incumbent banks over the next decade. This should be built around a competitive digital offering, a reduced and modernized branch network, and lastly, a targeted channel strategy for different segments of customers.

I wonder if I can put a digital folder with digital money under the clock on my mobile phone?

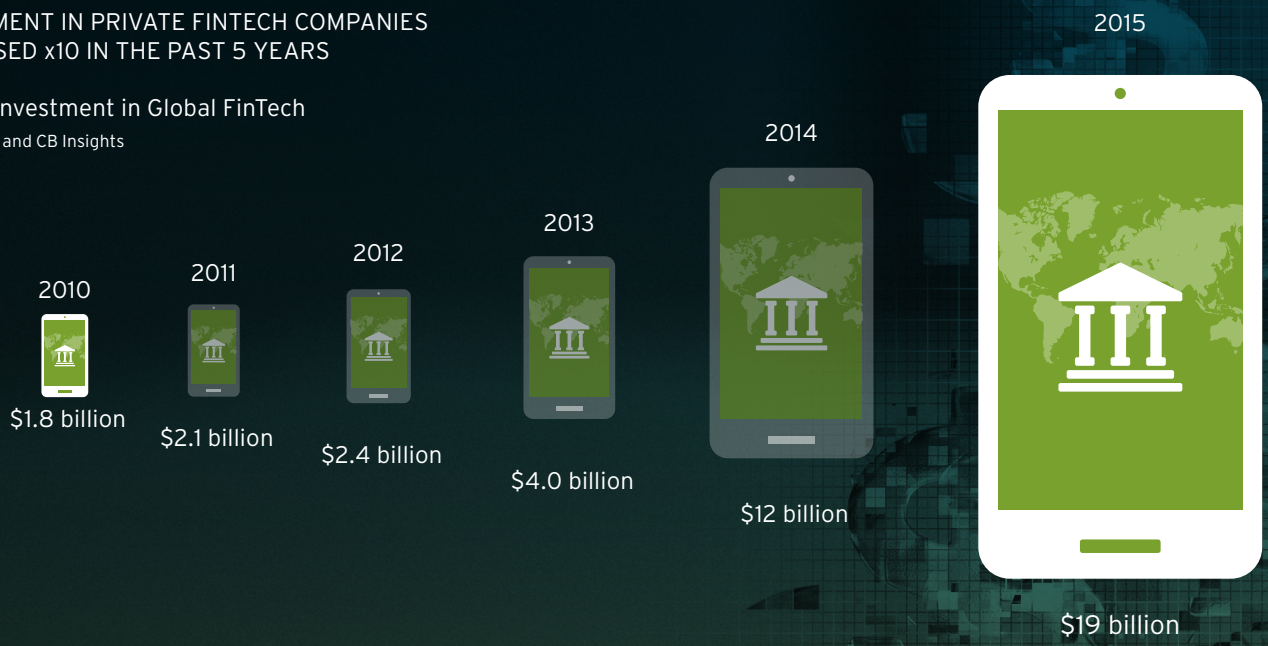
Disruption Tipping Point

Already past the point in China and getting close in the rest of the world

INVESTMENT IN PRIVATE FINTECH COMPANIES INCREASED x10 IN THE PAST 5 YEARS

Private Investment in Global FinTech

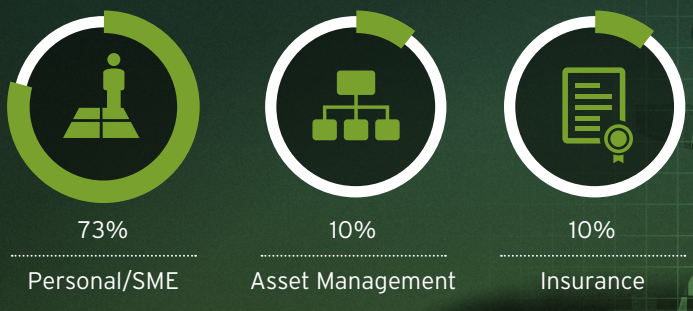
Source: Citi and CB Insights



FINTECH INVESTMENT HAS TARGETED THE MOST PROFITABLE AREAS OF GLOBAL BANKING

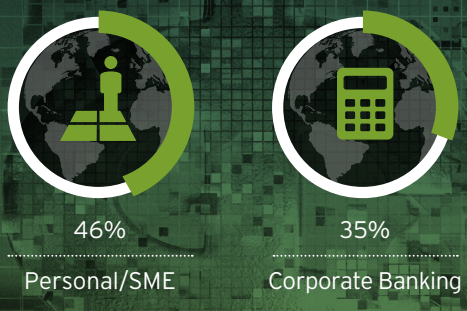
Capital deployment in FinTech sector

Source: CB Insights , KPMG, Crunch Base and Citi Research



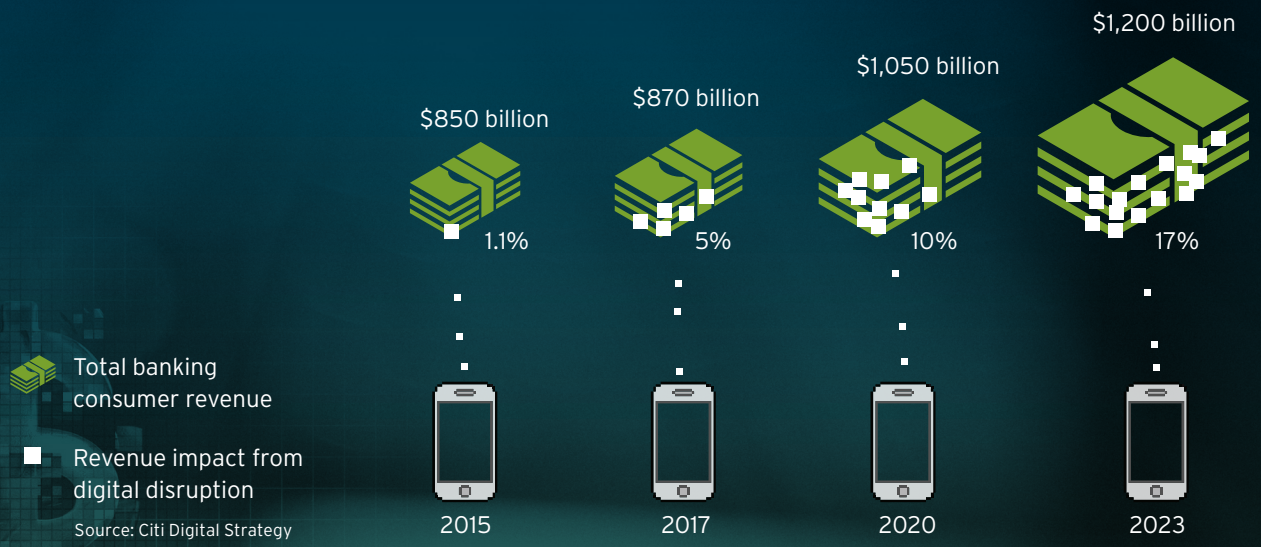
Global Banking profit by segment

Source: Company reports & Citi Research



THE US AND EUROPE ARE AT THE TIPPING POINT IN TERMS OF FINANCIAL INNOVATION

Impact of digital disruption on US Consumer Banking Revenue

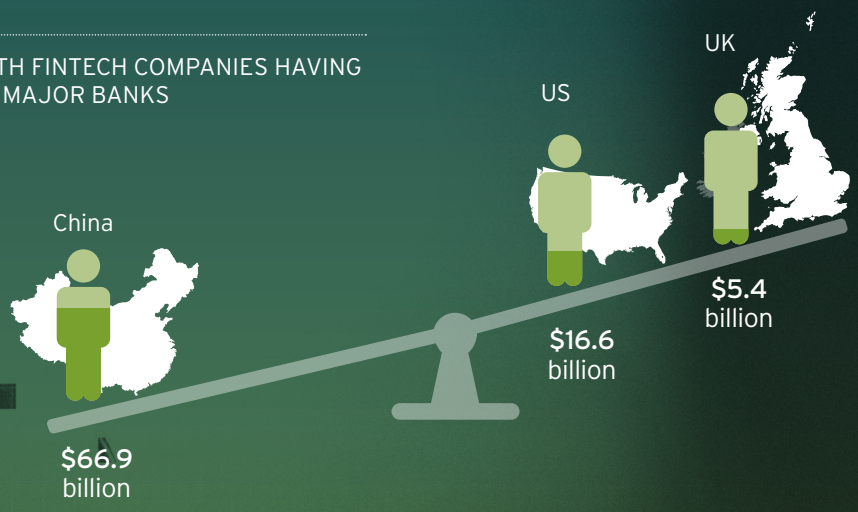


Total banking consumer revenue

Revenue impact from digital disruption

Source: Citi Digital Strategy

CHINA IS PAST THE TIPPING POINT WITH FINTECH COMPANIES HAVING SIMILAR NUMBER OF CLIENTS AS THE MAJOR BANKS



China is currently the biggest Peer-to-Peer (P2P) lender in the world

Source: Citi Research

China also has the largest e-commerce system in the world (gross merchandise volume)

Source: eMarketer, Citi Research

Contents

How FinTech Changes Finance

FinTech is changing the world of finance. In the US and Europe, we are at a tipping point, especially in consumer banking. The banks have clients and scale but the new FinTech entrants usually have the innovation edge, especially at the "client experience" interface. To remain competitive, banks need to get innovation before the FinTech companies get scale. In China, by contrast, we are past the tipping point: FinTech companies have both scale and innovation. India is the next biggest opportunity.

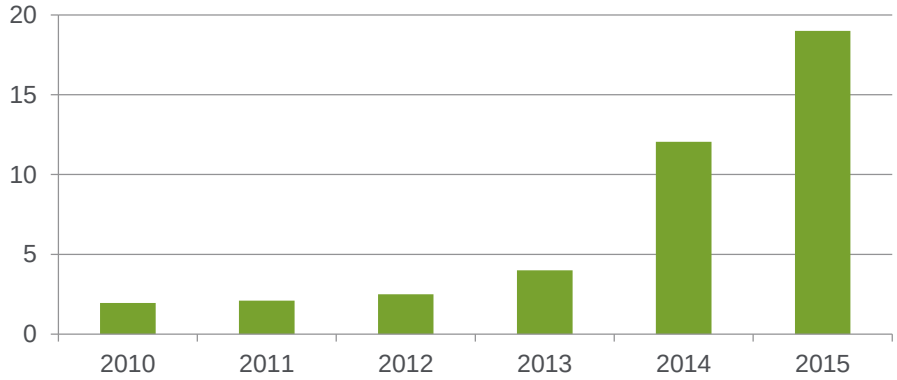
In this report we (1) identify where FinTech investments are being made by financial product and client segment; (2) assess where we are in the Disruption Cycle by segment and geography; (3) take a deeper look at innovation in each of the key product segments - payments, lending and savings; and (4) assess what banks can do to improve the efficiency of their businesses, both in terms of current headcount and distribution as well as long-dated options such as Blockchain.

Follow the Money

FinTech investment has grown exponentially in recent years

From California to China, the banking industry is increasingly being challenged by digital disruption. As Jamie Dimon, CEO of JPMorgan has noted: "*Silicon Valley is coming. There are hundreds of startups with a lot of brains and money working on various alternatives to traditional banking*." FinTech investments have grown exponentially in recent years: $19 billion of investment in 2015 was up two-thirds from $12 billion in 2014 and from low single-digit billions of dollars per year earlier in the decade. Given the recent shakeout in public equity markets, especially for marketplace lenders but also financial and technology companies in general, we may have a spill-over chill in private markets in 2016. This is not least from incumbent banking-funded Ventures units (see for example the February 2016 announcement by BBVA that it will increase its original $100 million FinTech fund to $250 million, now invested via Propel Venture Partners).

Figure 1. Private Investment in Global FinTech Companies ($bn)



Source: Citi and CB Insights; Includes first around and subsequent private investments

All About the Consumer

New entrants are targeting Personal and SME banking which account for about half of banking industry's profit pool

FinTech new entrants are targeting some of the most attractive and valuable profit pools in banking today. Citi Research analysts estimate that Personal and small and medium enterprise (SME) banking account for about half of the banking industry's profit pool and a higher proportion of the sector's equity value. Sifting through over a hundred FinTech private investments, we calculate that over 70% of the FinTech investments to date have been in the Personal/SME business segments. Why does

Business-to-Consumer (B2C) dominate? Firstly, consumer client behavior has changed. Smartphones have revolutionized information and content delivery in general and are now becoming important in financial services transactions across multiple continents. B2C solutions can "win" new clients with a better experience whereas Business-to-Business (B2B) solutions need to jump several more hurdles, including corporate clients' greater product/service customization and corporate procurement department's focus on safety and supplier risk, all of which increase switching costs.

Figure 2. Capital Deployed in Private FinTech Companies By Segment

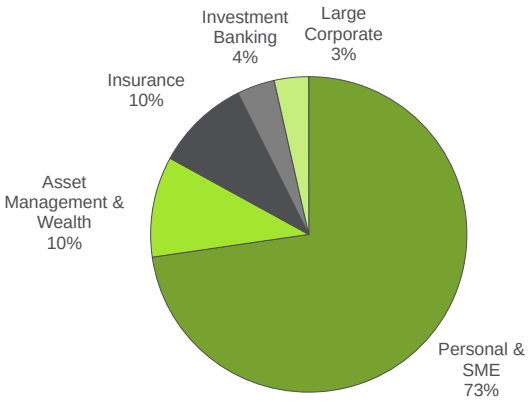
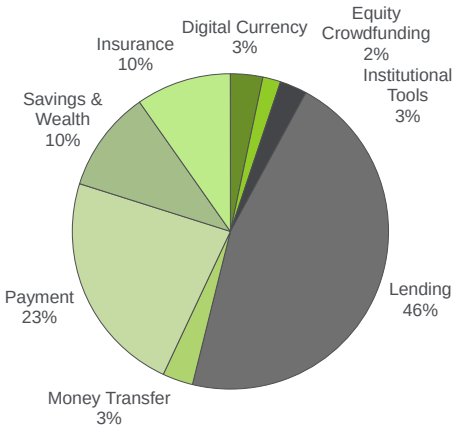


Figure 3. Capital Deployed in Private FinTech Companies By Business Area



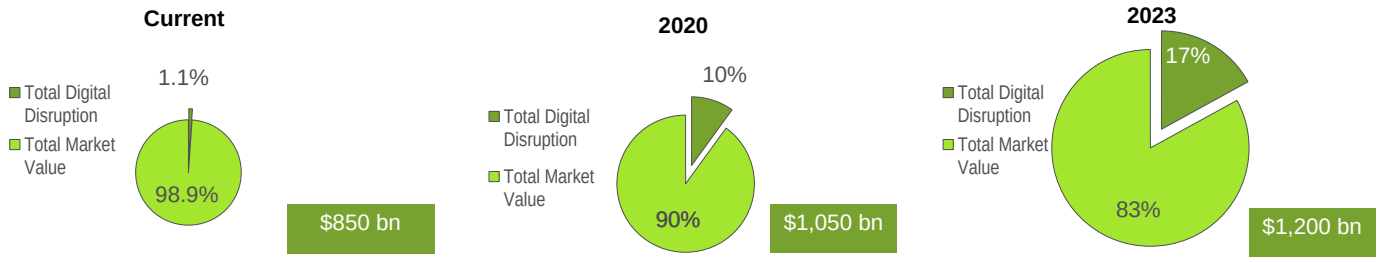
Source: CBInsights, KPMG, Crunch Base and Citi Research; Based on c120 private companies from CBInsights FinTech Periodic table Dec 2014; KPMG's top 50 most prominent FinTech innovators Dec 2015; Valuation based on Crunch Base Total Equity Funding for private companies and exit value for acquired companies

At the Tipping Point in the West

Only a small fraction of the consumer banking wallet has been disrupted so far in the US and Europe…

In the US and Europe, only a very small fraction of the current consumer banking wallet has been disrupted by FinTech so far. However, this is likely to rise. Greg Baxter, Citi's Global Head of Digital Strategy, notes that we are not even at "the end of the beginning" of the consumer disruption cycle in Western Europe and the US. Greg's team estimates that currently only about 1% of North American consumer banking revenue has migrated to new digital business models (either at new entrants or incumbents) but that this will increase to about 10% by 2020 and 17% by 2023. We are in the early stages of the US and European consumer banking disruption cycle, therefore we note that this estimate is subject to considerable forecast risk. However, an open question remains as to whether incumbent banks in the US and Europe can embrace innovation, not just talk about Blockchain and hack-a-thons, before FinTech competitors gain scale and distribution.

Figure 4. North America Consumer Bank Case Study



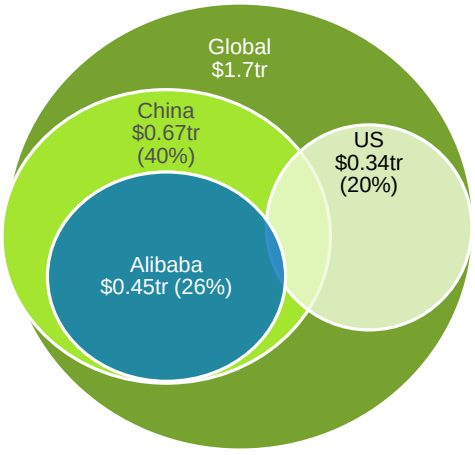
Source: Citi Digital Strategy

Past the Tipping Point in China

…but China is well past the tipping point with FinTech companies having as many clients as top banks and financial players

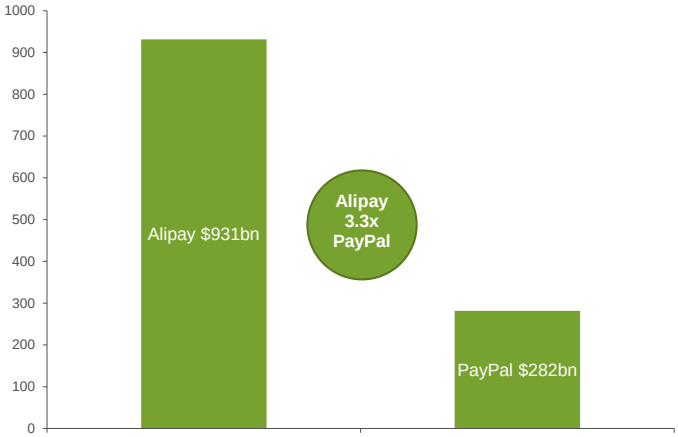
In China, unlike the US or Europe, we are well past the tipping point of disruption. China's e-commerce ecosystem is now larger than any other country in the world in terms of transaction volume. China's top FinTech companies (such as Alipay or Tencent) often have as many, if not more, clients than the top banks. China's top FinTech players (such as Ant Financial or Lufax) often have well-resourced parent companies in e-commerce or finance that can sustain larger and more balance-sheet intensive businesses than Western venture capital funded rivals. China's FinTech companies have grown fast due to a combination of: (1) high national Internet and mobile penetration, (2) a large e-commerce system with domestic Internet companies focused on payments, (3) relatively unsophisticated incumbent consumer banking, and (4) accommodative regulations. While the US and Europe also share high mobile Internet savvy, their local Internet leaders have not as yet strategically focused on payments/finance and their local consumer banks are more sophisticated.

Figure 5. Global E-Commerce Mainly Comes from China & US, 2015



Source: eMarketer, Citi Research; Based on Gross Merchandise Value (GMV)

Figure 6. Alipay Total Payment Volume Bigger than PayPal, 2015 ($bn)



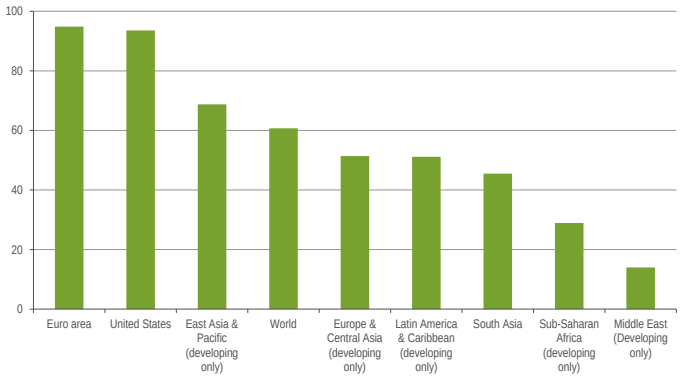
Source: Company Reports, Citi Research. Alipay TPV 2015 is estimated based on disclosure in 2014 adjusted for growth in Alibaba's gross merchandise volume

Emerging Market Financial Inclusion Revolution

High unbanked population, weak consumer banks and high mobile phone penetration make emerging markets ripe for FinTech disruptions

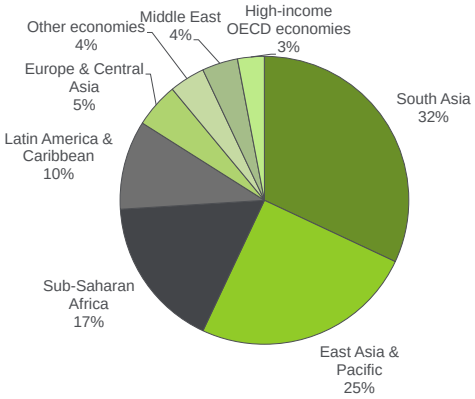
Emerging markets often have a high percentage of unbanked population, relatively weak consumer banks, and a high penetration of mobile phones. Hence, they are ripe for FinTech disruptions. Kenya has led the way for almost a decade now with M-PESA launching in Kenya in 2007 with currently 23 million active customers in 11 countries. In next door Somalia — associated in the past few decades with political instability instead of financial innovation — mobile money is having an arguably even more profound impact with about 40% of adults using mobile money. Similarly, in the giant Asian countries such as India, Indonesia and the Philippines with an almost 400 million unbanked population, mobile money can also help solve a societal problem. Not surprisingly, policymakers look favorably at FinTech as part of the solution to financial inclusion.

Figure 7. Percentage of Population (15+) with a Bank Account (2014)



Source: World Bank Financial Development Index, Citi Research

Figure 8. Distribution of Unbanked Population By Region (2014)



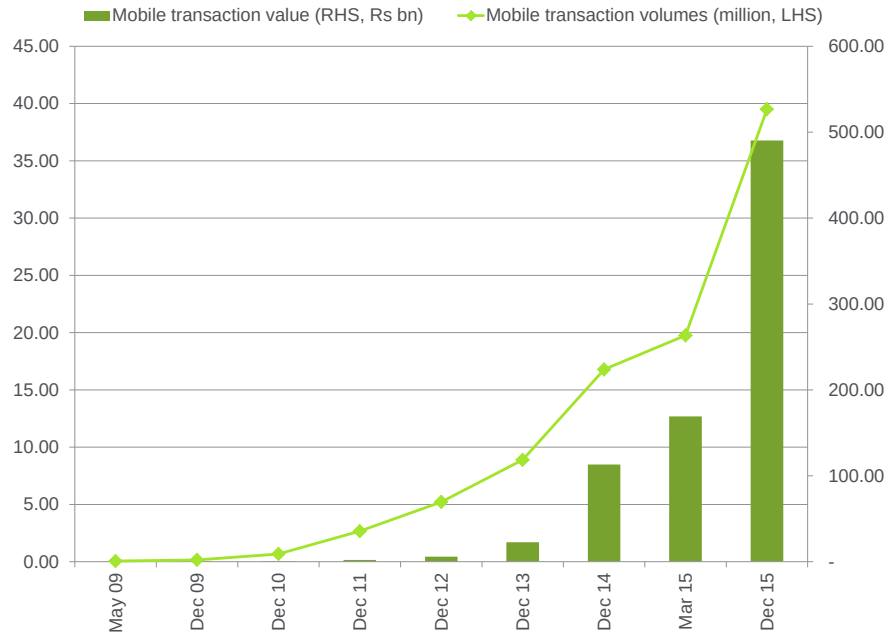
Source: World Bank Financial Development Index, Citi Research

After Kenya and China, Is India the Next Frontier in Digital Finance?

India is likely to be a big opportunity for FinTech

Emerging markets do not follow a single path to digital finance growth. The success of mobile money in Kenya was driven by a significant investment in mobile money, the growth of a viable non-bank agent network, as well as proportional regulation. By contrast, China has seen growth driven by a few Internet giants, such as the Alibaba ecosystem. In India, the adoption of the AADHAR national biometric identity program and the opening of over 200 million new bank accounts, have dramatically increased the customer base. India, by its sheer population size (1.2 billion and counting), low level of banking penetration, policy initiatives (such as the AADHAR program), and the ubiquity of mobile phones (~80% penetration), is one of the big opportunity spaces for FinTech. The latest data shows India's mobile banking transaction value increased 4x year-over-year in December 2015.

Figure 9. India – Rising Number of Mobile Banking Transactions



Source: Citi Research, RBI

Payment Space Intensely Contested

Payments have been most challenged by tech-driven new entrants

The payment space is the segment of finance that has been most challenged by tech-driven new entrants to date. From M-PESA in Kenya, Tencent's WeChat red envelope in China, and the PayTM wallet in India, non-bank payment options are increasingly well adopted in their home markets. Alipay and PayPal are leaders in e-commerce online payments. Although payment is a relatively small part of banks' revenue pool (~7%), the incumbent banks are at risk of losing important customer transaction data and client relationships. In the Nordic region, banks have been successful to date in innovating and defending the P2P consumer payment segment (e.g. DNB and VIPPS or Danske and MobilePay). So far, US Internet giants (e.g. Google, Apple, Facebook, and Amazon) lag their Chinese counterparts on payments and financial services. But given their consumer client reach and brand strength, it would be dangerous for incumbent banks to ignore their potential threats.

Marketplace or P2P Lending

Marketplace & P2P lending have grown quickly in China where they could make up 9% of total system retail loans by 2018

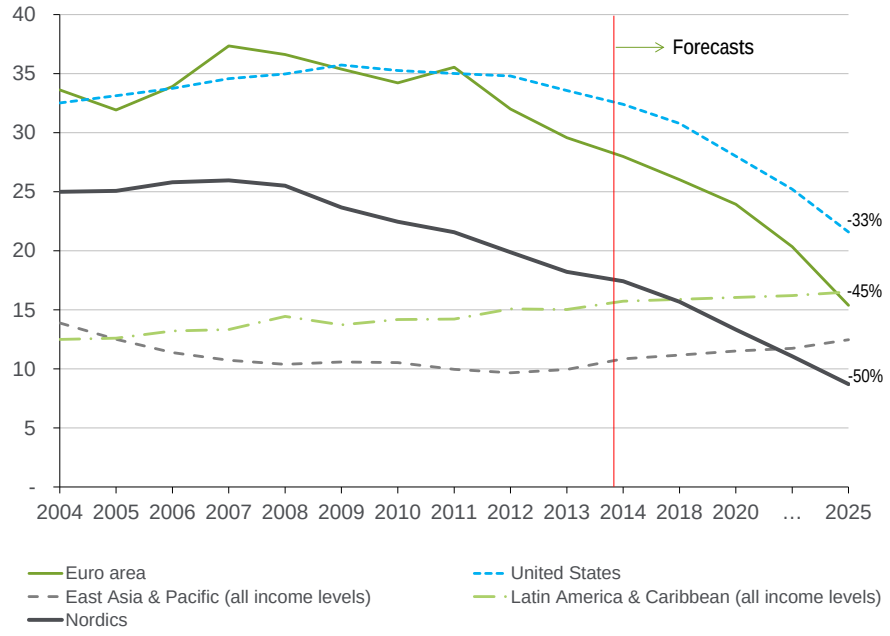
Online platforms that match borrowers and lenders have been around for a decade but have grown quickly in the last couple of years. Total loans lent by online platforms remain small at less than 1% of total loans outstanding in markets such as China, the US, and the UK. However, the Chinese market is growing fast – it is about 4x the absolute size of marketplace lending in the US and over 10x the UK. In China, peer-to-peer (P2P) cumulative lending volumes today amount to about 3% of system retail loans — but if we were to extrapolate the recent growth rate through the end of 2018, the Chinese P2P market would be about 9% of total retail loans. By contrast, the US P2P market is equivalent to just 0.7% of total retail loans and even if we extrapolate recent loan growth to the end of 2018, the US P2P penetration rate would only be slightly above the current Chinese level.

Banking's Uber Moment

Bank branch levels are forecast to fall significantly given their high cost, the increased ubiquity of mobile Internet, increasing FinTech competition and a sluggish revenue and profitability environment

Antony Jenkins, the former CEO of Barclays, talks about banks being at an "Uber moment" and argues that pressure from new technology-based competitors "*will compel banks to significantly automate their business*" and "*that the number of branches and people may decline by as much as 50% over the next years*." Mr. Jenkins may well be right. The consumer banks in the US and Europe are at a tipping point in terms of branch distribution. Northern Europe has already done a lot — Nordic and Dutch banks have cut total branch levels by around 50% from recent peak levels. We believe that from 2013 levels (the last reported branch/population data from the World Bank), developed market banks could cut branch numbers by another 30-50%. DNB, already operating in the developed market with the lowest branch penetration/population ratio, announced in late 2015 that they will further halve their branch network in 2016. The US banks have up to now lagged their Nordic and European peers on branch reductions. But with the increased ubiquity of the mobile Internet, increasing FinTech competition, and a sluggish revenue and profitability environment, we expect US banks to follow their EU peers in cutting branches.

Figure 10. Commercial Bank Branches per 100k Adults By Region



Source: World Bank, Citi Researech

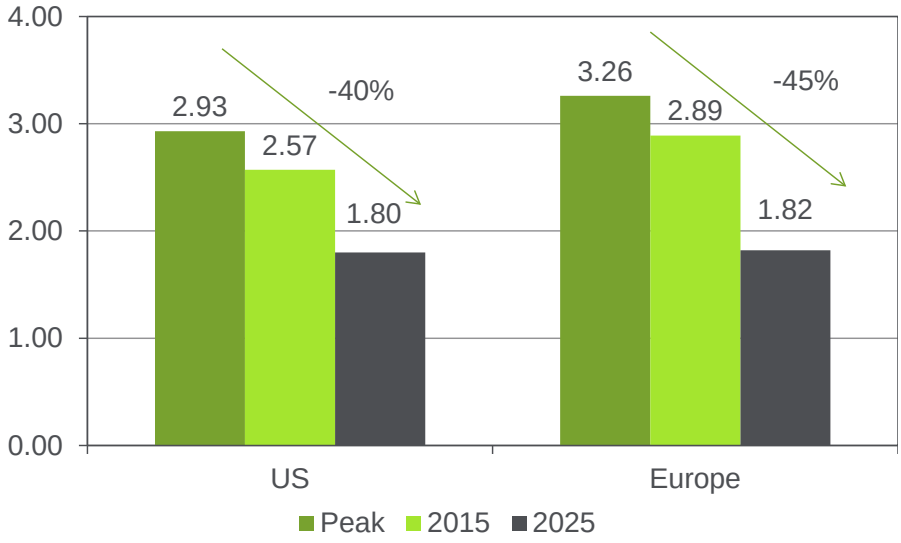
Halving Staff Numbers

A reduction in banks' physical networks could lead to a 40-50% decline in staffing levels from pre-crisis levels

As noted by Jonathan Larsen, Global Head of Retail and Mortgages at Citi, the value of consumer banking will be in connectivity and not physical assets, which Jonathan also refers to as banking's "Uber moment" (page 71). The future of branches in banking is about focusing on advisory and consultation rather than transactions. The return on having a physical network is diminishing. Branches and associated staff costs make up about 65% of the total retail cost base of a larger bank and a lot of these costs can be removed via automation. The pace of staff reductions so far has been gradual (~2% per year or ~11-13% from peak levels pre-crisis). We believe there could be another 30% reduction in staff between 2015 and 2025, shifting from the recent 2% per year decline to 3% per year, mainly from retail

banking automation. From peak staffing levels pre-crisis, this would result in a 40-50% decline, not far off Antony Jenkins' forecast. If the banking system in Europe, Japan, and the US operated with the same cost/income ration as the best-in-class Nordic region, it would remove $175 billion from their cost base (or 23%) and add 39% to the pre-tax profit of the banks in 2016.

Figure 11. At the Tipping Point of Full-Time Employee Reduction (million)



Source: ECB, United States Bureau of Labor Statistics, Citi Research estimates

Blockchain: The Next Big Thing?

Blockchain could be a catalyst for transforming existing legacy systems but it's still a "bleeding edge" technology

So far a lot of payments innovation has been focused on the "last mile", i.e. the user experience at the point of sale. The existing payment infrastructure remains the backbone. But Blockchain technology could be different. It could replace the current payment rail of centralized clearing with a distributed ledger for many aspects of financial services, especially in the B2B world. Blockchain positives are based around its characteristics including decentralization, programmability, and immutability. It could also be a catalyst for the transformation of many existing legacy systems that operate with a high degree of robustness but may not be the most cost or capital efficient way of doing business. However, there are also considerable negatives associated with the technology, not least of which is that it is currently still "bleeding edge" and lacks the robustness of existing payment systems such as Visa or SWIFT. But even if Blockchain does not end up replacing the core current financial infrastructure, it may be a catalyst to rethink and re-engineer legacy systems that could work more efficiently.

Disruption Tipping Point

Silicon Valley Is Coming

As far back as 1994 (BusinessWeek, October 31), Bill Gates argued that the world needed banking services but not necessarily banks and described banks as dinosaurs. In October 1994 Microsoft announced the purchase of Intuit Inc, the maker of Quicken personal finance software. BusinessWeek noted that "Eventually, Microsoft hopes to offer everything from mutual funds to brokerage services over its network" (BW, Oct 31, 1994). This initiative was however short lived and was called off in 1995 due to a long-winded and complex regulatory approval process.

The death of banks has been foretold for years

The death of banks has been much foretold in recent decades. Bill Gates and Microsoft in the 1990s were clearly ahead of their time when it came to predicting the demise of the bank sector. About a decade later, several US, UK and European banks did collapse and get bailed out by the Government or bought by peers. However, this was typically due to aggressive lending, funding or M&A and not due to competition from tech companies.

Almost two decades after Bill Gates foresaw banks facing extinction, the growth of the Internet has led to financial services facing new competitive threats. The growth of the Internet has created an e-commerce ecosystem with its own online payment systems, such as PayPal or Alipay. It has provided a platform for a new generation of credit intermediators, the P2P or Marketplace lenders. "Technology is at a turning point," noted BBVA's Chairman Francisco Gonzalez several years ago (Economist, May 2012).

Mobile Internet and smartphone penetration have been a game changer in consumer and SME finance and payments

The recent mobile Internet and smartphone revolution has created a game changer in consumer and SME finance and payments. Smartphones in the US and Europe are increasingly part of the SME and micro-enterprise payment space (e.g. Square or iZettle). Apple Pay and Android Pay debuted in 2014 and 2015 respectively and allow consumers to make payments via phones, tablets or watches. The original mobile device based payment service, M-PESA, launched in Kenya as far back as 2007.

Technology does not just change distribution models and service patterns. It is not just a question of fewer branches and more apps, albeit we will come back to that topic later in this report. The definition of financial products themselves may need to be rethought. John Stumpf, Wells Fargo CEO, noted in late 2015: *"…we'll probably be the last generation to use the term credit card and debit card. It will probably be debit access and credit access and it will be likely loaded on to a mobile device.*"

The incumbent banks are aware of the change underway

The incumbent banks are aware of the change underway. In his 2015 Annual Shareholder Letter, JP Morgan CEO Jamie Dimon noted: "*Silicon Valley is coming. There are hundreds of startups with a lot of brains and money working on various alternatives to traditional banking. The ones you read about most are in the lending business, whereby firms can lend to individuals and small business very quickly and (these entities believe) effectively by using Big Data to enhance credit underwriting.*"

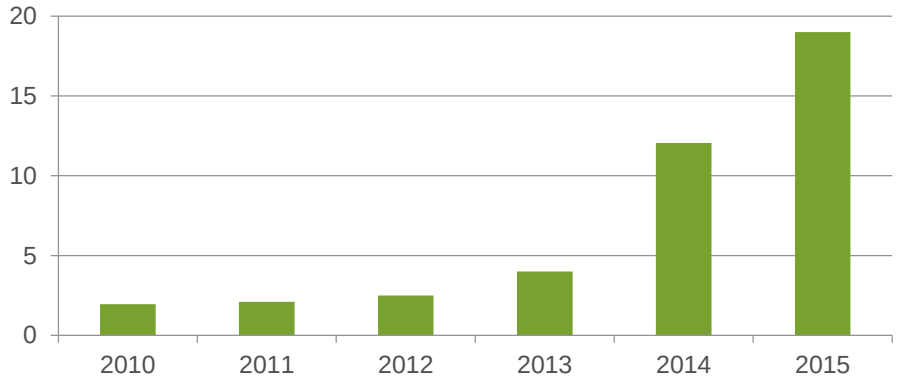
In the same Shareholder letter, Jamie Dimon also noted: "*Competitors are coming in the payments area. You have all read about Bitcoin, merchants building their own networks, PayPal and PayPal look-alikes …. there is much for us to learn in terms of real-time systems, better encryption techniques, and reduction of costs and "pain points" for customers*". On repeated occasions, Jamie Dimon has noted that "*Silicon Valley is good at getting rid of pain points. Banks are good at creating them*."

"Hundreds of Startups with a Lot of Brains and Money"

Global FinTech investment was $19bn in 2015, up from $12bn in 2014

Former Wall Street CEOs, leading policymakers and storied Silicon Valley venture capital firms have all invested in FinTech. And the volumes are growing. Between 2010 and 2013, global FinTech investments per year amounted to low single digit billions of dollars. In 2014, this jumped to $12 billion – and then up two-thirds to an estimated $19 billion in 2015.

Figure 12. Private Investment in Global FinTech Companies ($bn)



Source: Citi and CB Insights; Includes first around and subsequent private investments.

So where are the FinTech dollars — and yuan, pounds and kroner — going to?

1. By client segment, consumer and SME are the focus.
2. By product, payments and P2P lending are active.
3. By geography, the US, China, the UK, and Sweden lead the way.

75% of FinTech capital deployed to date has been in the Personal or SME banking segments

Based on our analysis of the business mix of top FinTech private companies, as set out in Figure 13 - Figure 14 below, we estimate that ~75% of the capital deployed to date has been to new ventures targeting the Personal or SME banking segments. In terms of the number of companies, just under 60% of our sample were focused on Personal and SME banking.

Figure 13. Capital Deployed in Private FinTech Companies By Segment

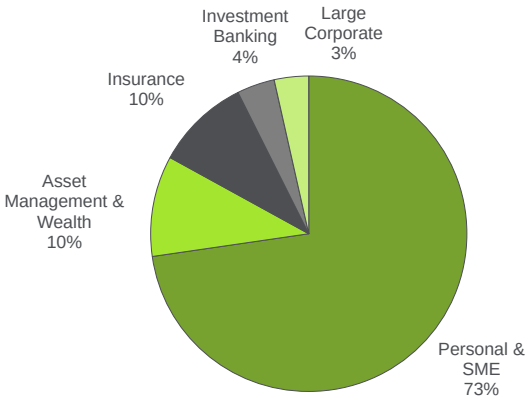
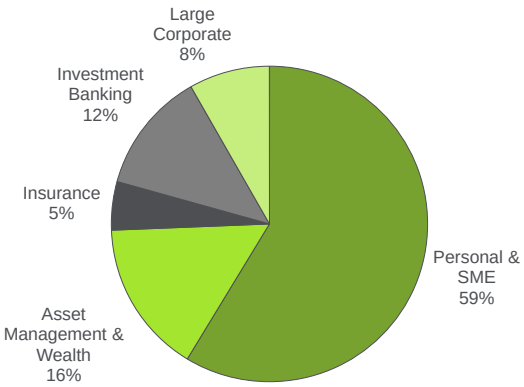


Figure 14. Number of Private FinTech Companies By Segment



Source: CBInsights, KPMG, Crunch Base and Citi Research; Based on c120 private companies from CBInsights FinTech Periodic table Dec 2014; KPMG's top 50 most prominent FinTech innovators Dec 2015; Valuation based on Crunch Base Total Equity Funding for private companies and exit value for acquired companies

Where Are the FinTech Dollars Going?

By screening around 120 prominent FinTech investments, we have taken a more granular approach to the business segments and products where new capital is being allocated to potentially "disruptive" competitors that may be a threat to the current incumbents, either in terms of market share or margin shifts. So far FinTech investments have a clear bias towards the consumer and SME segment.

Payments are the most contested area for banks with competitors already stabled in new marketplaces

By product, payments are the most contested area for banks with competitors already established in new market places (such as PayPal for e-commerce payments in the US) or emerging in client segments traditionally underserved by banks (such as micro and small business, the target segment for Square in the US and iZettle in Europe and Latin America).

In the private market, of the capital invested in the leading FinTech companies, 26% of the total has been allocated to companies focused on consumer payments versus a massive 47% for consumer/SME lending. By number of companies, the payments and lending space is broadly similar in number.

Figure 15. Dollar Invested in Private FinTech Companies By Product and Customer Segments

	Payments	Savings and Investment	Lending	Capital Markets	Insurance	Overall
Personal/SME	26%	10%	47%	0%	10%	92%
Corporate	3%			0%		4%
IB/Markets				4%		4%
Overall	29%	10%	47%	5%	10%	100%

Source: CBInsights, KPMG, Crunch Base and Citi Research; Based on ~120 private companies from CBInsights FinTech Periodic table Dec 2014; KPMG's top 50 most prominent FinTech innovators Dec 2015; Valuation based on Crunch Base Total Equity Funding for private companies and exit value for acquired companies

Figure 16. Number of FinTech Companies By Product and Customer Segments

	Payments	Savings and Investment	Lending	Capital Markets	Insurance	Overall
Personal/SME	28%	15%	29%	1%	5%	79%
Corporate	8%			1%		9%
IB/Markets				13%		13%
Overall	36%	15%	29%	15%	5%	100%

Source: CBInsights, KPMG, Crunch Base and Citi Research; Based on c120 private companies from CBInsights FinTech Periodic table Dec 2014; KPMG's top 50 most prominent FinTech innovators Dec 2015

Figure 17. Capital Deployed in Private FinTech Companies By Business Area

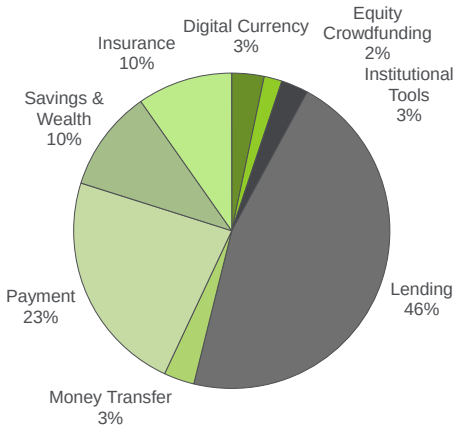
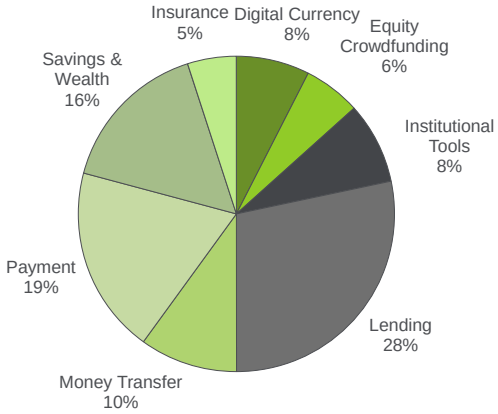


Figure 18. Number of Private FinTech Companies By Business Area



Source: CBInsights, KPMG, Crunch Base and Citi Research; Based on c120 private companies from CBInsights FinTech Periodic table Dec 2014; KPMG's top 50 most prominent FinTech innovators Dec 2015; Valuation based on Crunch Base Total Equity Funding for private companies and exit value for acquired companies

Different Is Better than Cheaper

A lot of FinTech dollars are being invested in consumer banking and finance, with payments and lending attracting particular attention. However, not all FinTech new entrants will have a sustainable competitive advantage. Companies that are trying to solve a financial need in a different rather than simply a cheaper way are more likely to maintain their innovation edge for longer.

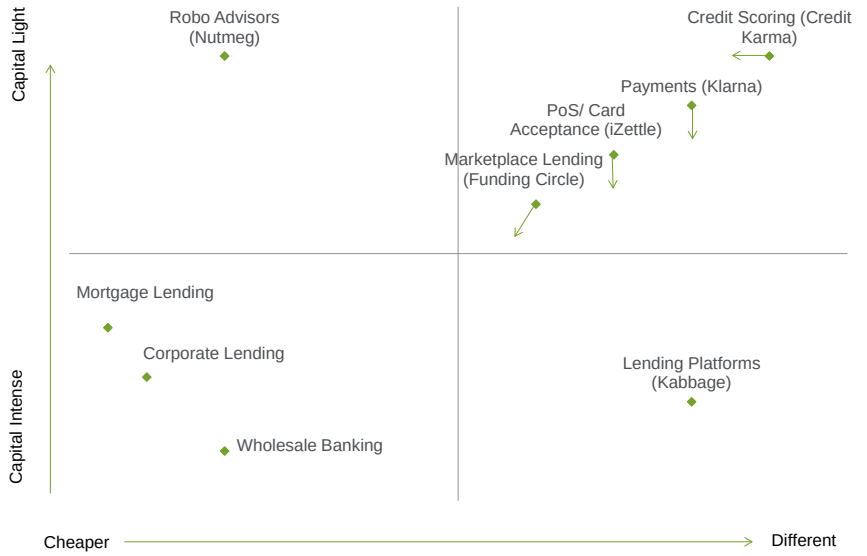
Companies that are different are harder for incumbents to compete with

Business models that are based on a lower cost-to-serve may be easier to replicate by incumbents, albeit the new entrants may have several years before incumbents copy (or buy) them. It is harder for incumbents to compete with companies that are different. This does not need to be technologically different. It can be a different target market (iZettle) or a new business model (Credit Karma and Funding Circle).

Less capital-intensive activities are more likely to be disrupted by FinTech

Similarly, activities that are less capital intensive — such as online payment of point-of-sale (PoS) — are also more likely to be disrupted by FinTech-based business models. For small and medium enterprises or higher risk consumer credit lending, Marketplace lenders can provide an alternative for clients often under-served by traditional banks. However, lending activities are balance sheet intensive and more exposed to credit risk appetite.

Figure 19. For FinTech Competitive Edge, Different and Capital Light Is Key



Source: Citi Research

Revenue Risks for Incumbents by Customer

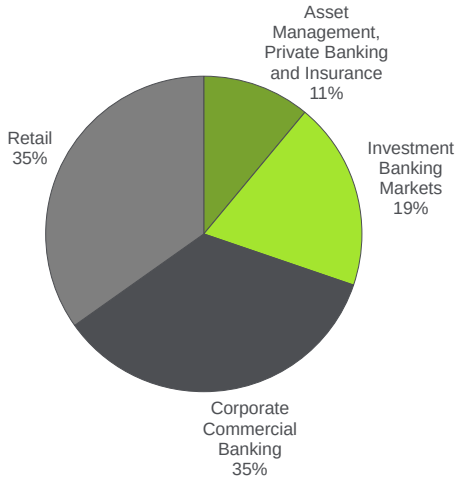
The greatest challenge for incumbent institutions is in the consumer and SME space

As of today, the greatest challenge for incumbent institutions, both in terms of potential market share loss to new entrants, share shift between traditional competitors or margin pressure from increased competition is in the consumer and SME space, especially in payments and unsecured lending (as we saw in Figure 13 - Figure 18). By contrast, there have to date been relatively limited new startup investments in corporate and wholesale banking.

Retail banking is a large share of incumbents' profits…

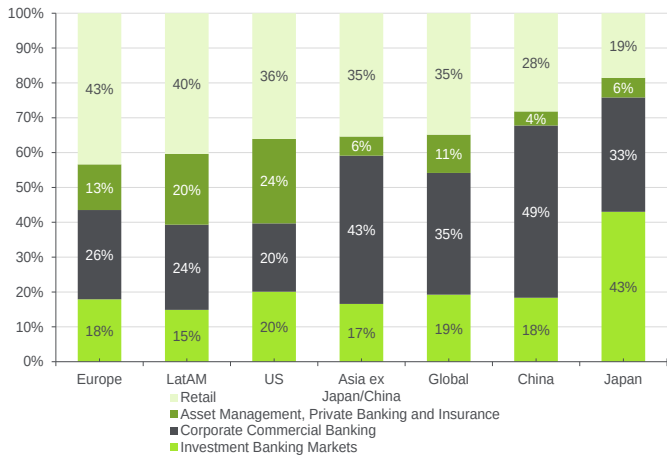
So first for the bad news: at a segment level, retail banking is a large share of incumbents' profits. Globally, we estimate that retail banking accounts for about 35% of the normalized profits of Citi Research's bank coverage universe. For US and European banks in Citi Research's coverage universe, it is around 40% of profits and closer to half of the market value of these companies given the higher price/earnings (PE) multiples accorded by investors to retail versus wholesale banking.

Figure 20. Global Banks – Profit Split by Business Segments



Source: Company Reports and Citi Research Estimates

Figure 21. Banks Profit Split By Region



Source: Company Reports and Citi Research Estimates

…but most of the FinTech competition has been in the relatively new ecosystem of e-commerce

And is there good news? So far, most of the market value in FinTech has been created by companies that are embedded in the still relatively new ecosystem of e-commerce, such as Alipay in China or PayPal in the US. For banks in many countries, this is an opportunity lost rather than a loss of existing earnings. The payment segment is only ~7% of the income of our sample of leading banks, with personal/SME payments only half of that share.

Of course, as e-commerce grows (two of the three largest retailers in the world by market are online companies) banks are giving up future growth opportunities. In addition, while the current profit loss may be small, letting other intermediaries get in between the bank and their clients opens up risks for the future.

Figure 22. Global Banks Profit Breakdown By Product and Customer Segments

	Payments	Savings and Investment	Lending	Capital Markets	Overall
Personal/SME	4%	12%	29%	1%	46%
Corporate	3%	6%	21%	5%	35%
IB/Markets	0%	3%	6%	10%	19%
Overall	7%	21%	56%	16%	100%

Source: Citi Research Estimates; Based on the banks under Citi coverage; The profit split by customer segments are based on company reports or analyst estimates; the profit is then allocated across products; the profit splits by product segments is estimated base on selected banks that discloses revenue splits by products.

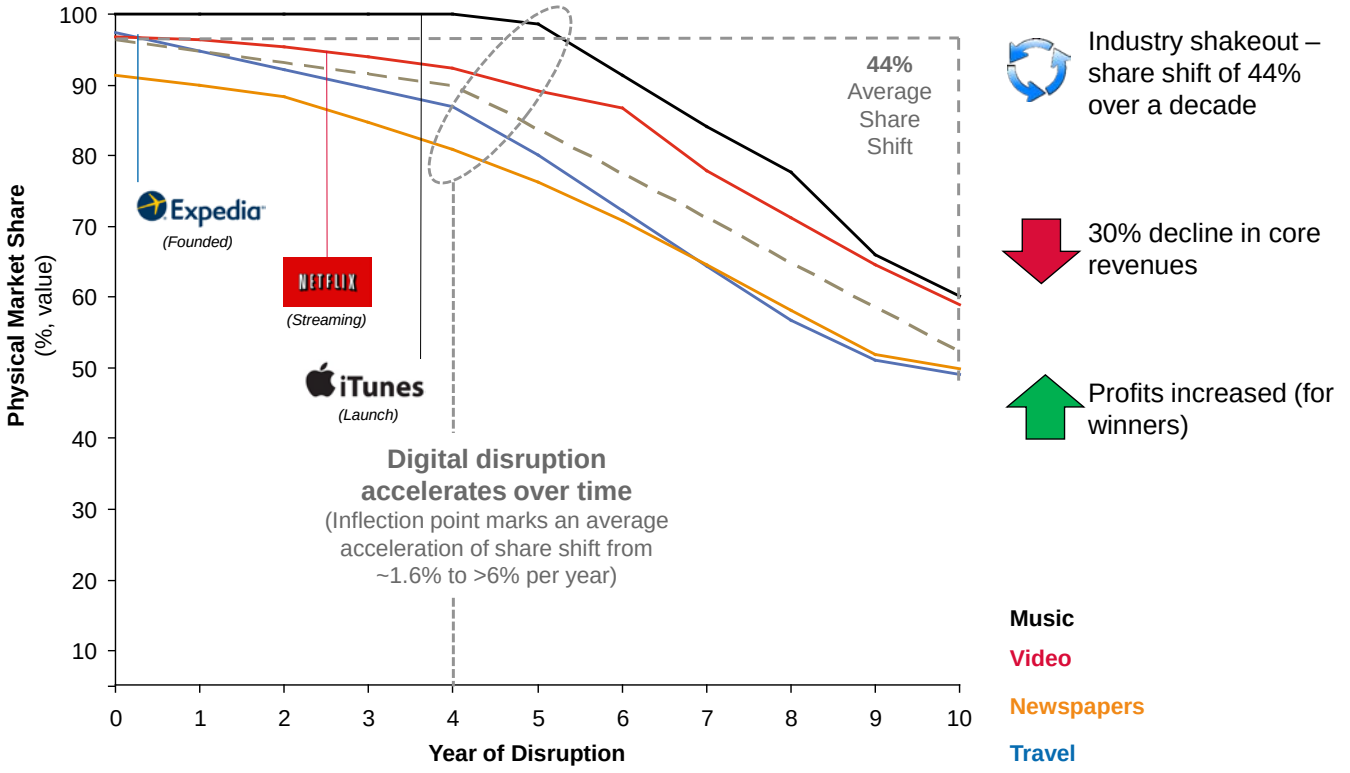
Digital Disruption Tipping Point

On other industries, there has been a 44% share-shift from physical to digital business models over a 10-year period

Time and again, we have seen digital disruption fundamentally erode value across many industries including: music sales, video rentals, travel booking, and newspapers. In each of these cases, incumbents either transformed or became marginalized. According to Citi's Digital Strategy team, digital disruption in these industries resulted on average in a 44% share-shift from physical to digital business models over a 10-year period. Further, digital disruption accelerates over time – market share shifts gradually (~1.6%/year) until an inflection point around year 4 when traditional share declines rapidly accelerate to >6% per year. (Figure 23)

Further, Citi's Digital Strategy team also concluded in their analysis that digital segments are significantly more concentrated than traditional segments with an average of ~80% top-3 share vs. ~45% top-3 share in physical segments.

Figure 23. Digital Disruption Could Result in 30% Decline in Core Revenues



Source: Citi Digital; Citi Research; Investor presentations & annual reports

Similar disruptive forces have already begun to impact the Financial Services industry particularly in consumer banking and payments. We are starting to see significant investment in this space and are also witnessing the emergence of new business models resulting in unbundling of Financial Services.

Yet for all the attention being garnered by FinTech propositions, disruption is still at the periphery. Lending Club's loan volume is less than 0.5% of total loans in the US while assets under management at the robo-advisers are only scratching the surface of the wealth industry. At the present, there is limited revenue loss in developed market banks' core business from FinTech.

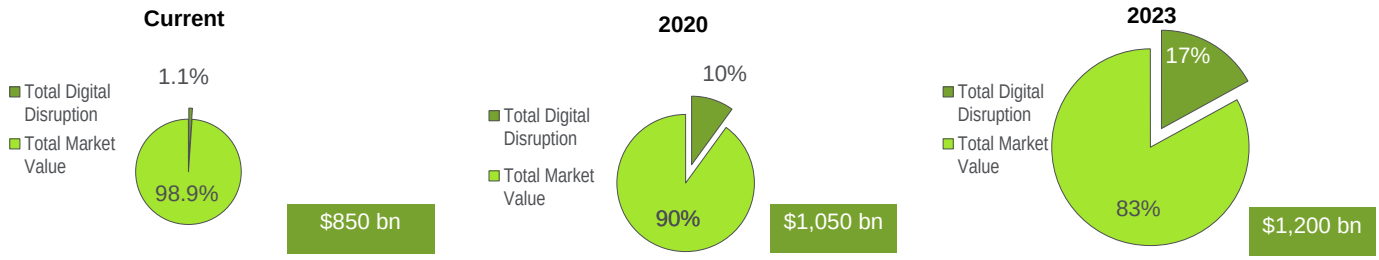
However in China, unlike the US or Europe, we are well past the tipping point of disruption, especially in the e-commerce ecosystem. China's top FinTech players often have as many – if not more – clients than their top banks. And unlike in the West, China's top FinTech players often have well-resourced parent companies that can sustain larger and more balance-sheet intensive businesses than VC funders.

Disruption Tipping Point: Where Are We in the US?

In the US, only a small portion of consumer banking industry revenues has migrated to new digital business models so far…but that is expected to grow

According to Citi's Digital Strategy team, the revenue impact from digital disruption is peripheral today but is growing rapidly and will be substantial in the medium term. Only a small fraction of the North American consumer banking industry's revenues have migrated to new digital business models so far — just 1% today forecast to rise to 10% of revenue by 2020. But the migration should accelerate from here. By 2023, around 17% of US consumer bank revenue could migrate to digitally-enabled business models, according to their analysis. This estimate is based on an aggregation of bottom-up product-by-product level distribution forecasts.

Figure 24. North America Consumer Bank Case Study

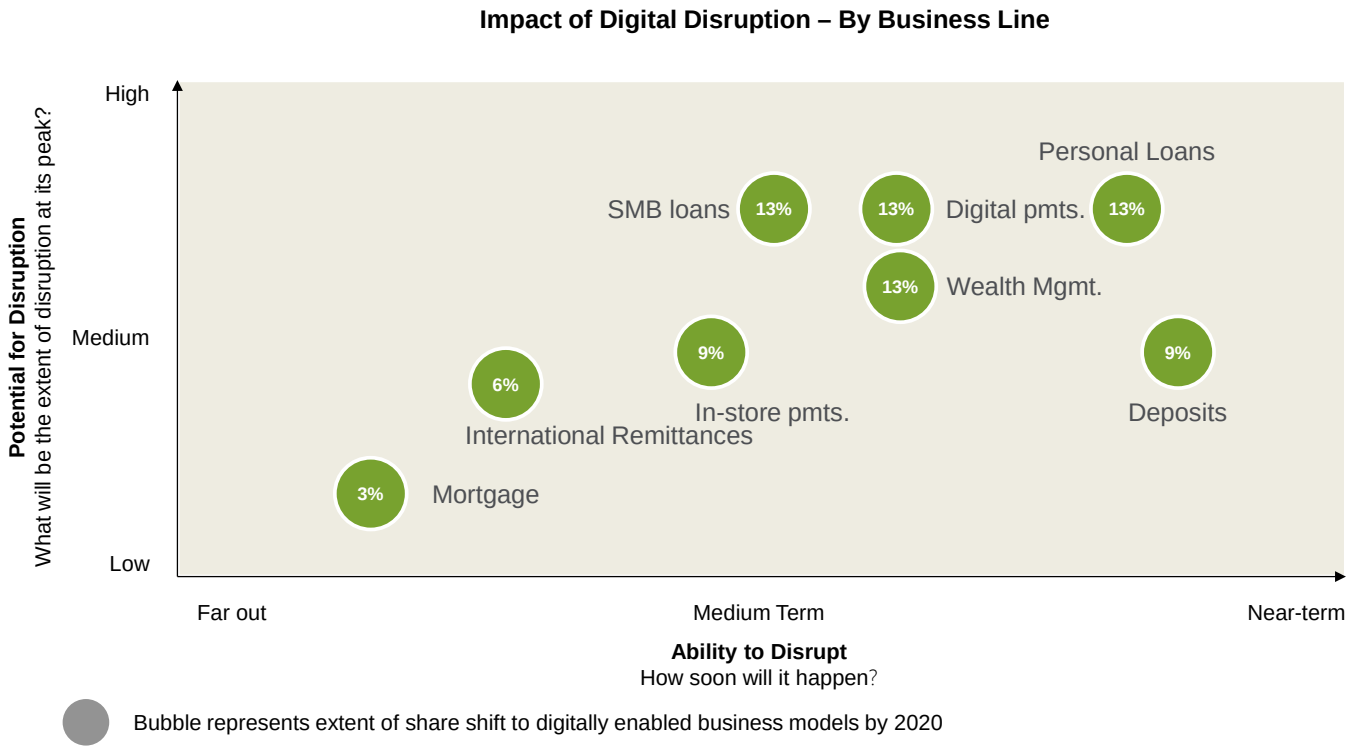


Source: Citi Digital Strategy

Payments, lending and personal finance management have been the most active in terms of investment activity and could be where disruption manifests itself

While it's impossible to say exactly how this disruption will manifest itself, based on current tail winds, the Digital Strategy team estimates that certain products are likely to see a greater share of disruption than others (Figure 25). For example, payments, lending and personal finance management have been the most active in terms of investment activities. We have seen exponential growth in P2P lending with several leading players such as Lending Club having recently gone public. Emerging payments have attracted not only upstarts but tech giants, telcos, and large retailers. Just in the last 18 months, we have seen the launch of wallets by several wallet proponents including Apple, Samsung, Chase and Citi MasterPass. SamsungPay boasts of five million registered users who have processed over $500 million in the first six months (across Korea and the US).

Figure 25. Impact of Digital Disruption – By Business Line



Source: Citi Digital Strategy

Finally, it must be highlighted that there are several factors at play, and it's extremely difficult to estimate how disruption will play out or the extent to which it will be realized. This analysis provides a directional lens to the extent of potential share shift to digitally enabled business models and highlights revenues "at risk". We are already starting to see evidence of bank-led digital-only propositions and partnerships between traditional financial institutions and FinTech players. We have witnessed several banks partnering with payment providers, P2P lenders being funded by traditional financial institutions, banks leveraging white-labelled banking, robo advisory capability from FinTech's to launch their own digital proposition — to name a few examples.

Disruption Tipping Point

A Strategists View: Q&A with Greg Baxter

Greg Baxter is the Global Head of Digital Strategy at Citi, leading Citi's digital agenda across businesses and geographies. Greg has held a number of senior technology, consulting, and business roles across Asia, Europe, and North America. Prior to joining Citi, Greg was a Partner and UK Board member at Booz & Company, where he held leadership roles across the financial services, public sector, and technology practices.

For a universal, diversified bank in the US or Europe, what are the products and client segments most at risk from disruption from FinTech new entrants?

The digital revolution represents a power shift from corporations to consumers, and so it is no surprise that the consumer business, and particularly the digitally native segments, represent the most attractive and responsive target for disruptors. Within that, disruption has focused more on "front office" (or experience-based) services, such as origination, both because it represents a more profitable part of the value chain (approximately 60% of value-chain revenue against 40% of the cost base) and because it does not require the regulation, scale, capital, or infrastructure associated with middle and back-office services. In terms of specific products, payments disruption is a great example of transforming a consumer experience, either through aggregation, simplicity, or even making the payment disappear into another experience (think Uber). Following payments, personal financial management and lending are leading the pack. Interestingly, lending is crossing from its consumer base to the first rung of corporate segments and small and medium sized enterprises. However, one thing we should remember, digital disruption will not discriminate. It is a pervasive technology that will eventually transform every business model for every product and every segment. While we may debate where it starts, the end-game is a lot clearer.

Why are VC investments in FinTech focused on B2C?

The costs and propensity to switch are much lower for consumers versus corporates – which means faster adoption for B2C FinTech. For corporates, exit costs and disruption can be substantial, with contractual commitments, balance sheet implications, and solutions that are often integrated into their systems, processes, and human capabilities. B2C solutions can also "win" with a better experience, whereas B2B solutions need to jump several more hurdles, including productivity, efficiency, functionality, safety, scalability, and maybe most challenging of all, the corporate procurement department. Procurement folks are appropriately concerned about startup "supplier risk". All of this makes B2B a tougher disruption space than B2C. All that said, while B2C is the most mature of the FinTech markets, B2B is clearly accelerating now. And, we should not forget the third and maybe larger wave coming with "industrial FinTech" – where financial transactions and ultimately decisions will become incorporated into "things". If we think the playing field is yet to settle in the B2C space, industrial FinTech is unchartered territory.

Where are we in the disruption cycle for consumer banking? How does this differ in the US vs. other developed markets such as the UK, Australia or Europe?

We are not even at "the end of the beginning". While fiendishly hard to estimate, we don't think fundamentally new business models have displaced more than 2-3% of consumer banking revenue in the US, and corporate displacement is even lower. The good news is that there is time for established players to get their business models right. But, there are two important considerations. First, there is an inflection point coming — I suspect it is still a few years out — and players had better be ready before that tipping point arrives. The second observation is that the disruption will initially eat industry growth, taking new segments (e.g. underbanked) and new product categories before ultimately turning on traditional revenues. The first sign of disruption is stagnant growth in the "old world", predictably followed by the second and more concerning one — shrinkage. While the timing may vary around the world, the trends will be consistent — incumbents that adapt will thrive, those that don't face a challenging future. On global differences, I expect FinTech disruption will expand from its West Coast focus on "experience" into content and platform disruption, driven largely by financial centers with deep expertise – London and New York being the two leading examples. There are also some differences in Government approaches which may impact the rate of FinTech disruption. European Governments, and more specifically the UK, are adopting a pro-FinTech philosophy, whether through open banking application program interfaces (APIs) or new challenger licenses.

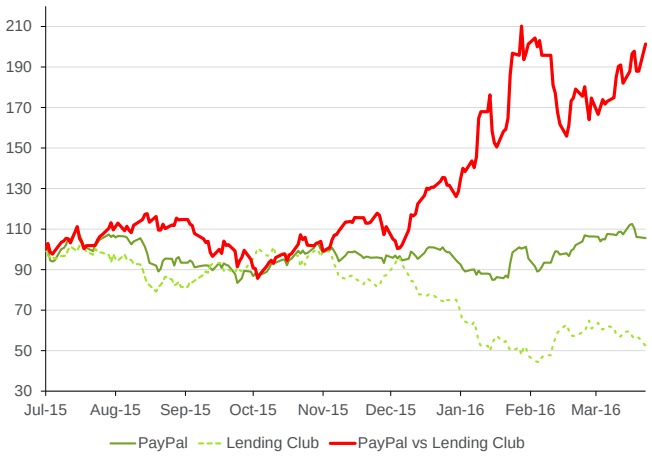
Is China furthest ahead in terms of digital disruption in consumer banking/finance and why is that?

The transition from physical to digital financial flows has been breathtaking in China — a perfect storm based on a fundamentally better product, experience and distribution platform, and driven by new digital communication and commerce platforms. E-commerce is just one example, where 96% of sales are conducted without a bank. There are a few reasons why China has taken off. The traditional banks lacked competition and coverage, resulting in limited or no choice for most people. Against that, consumers were being exposed to far better experiences, real time communication, commerce, and connectivity. As the growth of mobile platforms exploded, it was a natural extension to build finance products on top, starting with P2P and then e-commerce. These new products reflected the underlying platform: real time, client centric, hyper connected – a big change from the traditional banks. To add fuel to the fire, the Government trialed lighter regulations that allowed these new companies to offer better interest rates on deposits than the traditional banks – it was a stampede from old to new. Another market well worth watching this year is India. The Government has been busy putting in place critical enablers which have set the stage for a revolution in financial inclusion and innovation: a national identity program, a financial inclusion program which has added close to 200 million accounts, a national payment network, a peer-to-peer payment platform, and new "light" banking licenses in payments and smaller finance to encourage new entrants.

Looking at the equity market values of quoted FinTech companies, the largest value is accorded to the payment companies while the marketplace lenders have in recent months sold off heavily: why is this?

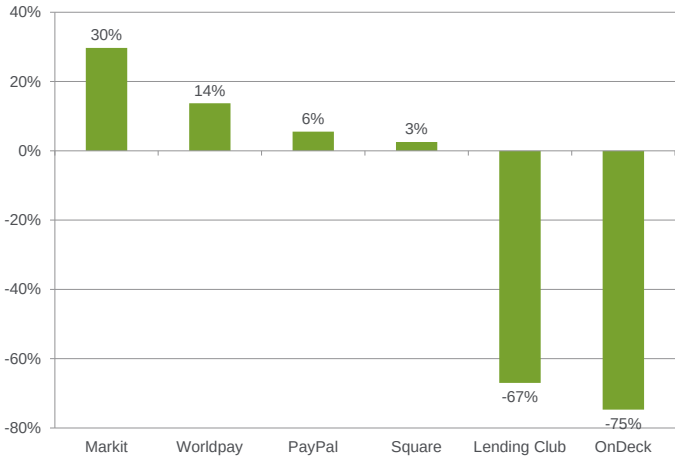
Payments are an attractive market for disruptors. At a macro level the global market continues to grow at a healthy margin. At a micro level, you can create meaningful value for consumers by delivering a better experience, whether through aggregation of underlying products, faster payment options, more convenience, or integrating payments into other experiences. One-touch payments being the hottest of those trends today. For merchants, anything that reduces friction and abandoned shopping carts (physical or digital) addresses one of their great challenges. These payment solutions typically sit on top of the existing infrastructure, which means the FinTech disruptors do not carry the costs of onboarding, fraud, network infrastructure, or credit risk. As banks start to launch their own payment platforms with better experiences, tighter integration to the client's financial life, and tokenization, the competition in this space will get hotter.

Figure 26. PayPal Outperformed Lending Club by ~100% Since IPO



Source: DataStream, Citi Research; Share price indexed to 100 on 6th July 2015, the date of PayPal IPO

Figure 27. FinTech Company Share Price Performance Since IPO



Source: DataStream, Citi Research; Price since IPO. Priced as of 28 March 2016

For lending platforms, I think the market is reacting to three concerns. First question is how well the business model stands up to increases in interest rates and a more difficult credit cycle. The second is the influx of competition and the corresponding impact on margins and risk profile of the loan book. And third is the regulation risk, and how it may impact client targeting, capital requirements, and risk retention. Added together, the market is wondering if these business models should be subjected to the same scrutiny as regular financial institutions, rather than technology companies.

Will the relationship between FinTech companies and Banks be more one of competition or collaboration?

There will continue to be competition, particularly at the "experience" layer where players compete over the customer relationship. However I believe collaboration will be the dominant trend, as FinTech moves into content and platform innovation. The reason is that each participant needs what the other has, but has found it extremely hard to replicate. The "Industrialists" need innovation, and the "Innovators" need industrialization. In finance, industrialization means customer base, capital, liquidity,

distribution, regulatory expertise, risk management, reputation for safety, and banking licenses. Innovation means agility, speed, creativity, focus, technology skills, and an entrepreneurial cultural. The two capability sets are almost asymmetrical.

If you were a VC investor or an entrepreneur, what area of FinTech would you focus on investing in or helping set up a new venture?

Ask any bank what their fastest growing cost is and the answer will be regulation, compliance, and cyber-security. I believe there is a significant and largely unaddressed need for "reg-tech" solutions to tackle compliance and regulation with new techniques and tools. I think that big data and advanced analytics will be key to solving this, so that's my intersection: regulation and big data.

After a successful launch, I would reinvest in my other three ideas. (1) creating the "fit-bit" of your financial life, so that your collective financial well-being is being monitored, managed and personally trained continuously; (2) focusing on financial inclusion, by developing simpler and consumption based (on-demand) financial products for under/un-banked segments; and (3) payment enabled sensors that allow anything to become a sensor-driven, rules-based payment device.

Disruption Tipping Point

A Venture Capitalist's View: Q+A with Johan Lundberg

Johan Lundberg is an experienced payment professional, previously an advisor to Nordic banks regarding next generation payment solutions. He has co-founded payment startups such as Betalo (the first bill payment engine to combine card infrastructure with Nordic Giro systems) and Zignsek (a security verification platform). In 2014 Johan founded NFT Ventures (Next Financial Technology), a VC firm that invests in FinTech companies in Northern European countries.

Why did Stockholm emerge as one of the largest FinTech centers in Europe?

The Nordics are a front runner in the overall transformation of banking. There are a number of factors that make Stockholm a strong innovation hub for FinTech: (1) High efficiency within traditional banks - focus on cost, this has led to increased focus towards electronic solutions and innovative services; (2) High penetration of mobile/Internet banking and customers' receptiveness to new services makes it easy to adapt new services; (3) Highest degree of electronic payments on a global perspective. Sweden hasn't had cheques since late 1980s; and (4) Heritage of innovation and building international corporations both within traditional business and within the new economy (e.g. Spotify).

Nordic banks are already very efficient and are leaders in digital innovation among global banks. So what is the value proposition of FinTech companies?

The Nordic FinTech startups have a clear focus on cost efficiency and customer experience. This combination is outstanding and will always be needed in the development of all industries. FinTech companies are using strong industrial knowledge in combination with latest successes in other sectors, such as the gaming industry ("bidding technology"). The banks have an important role to fill in the future, but the landscape will change. We see a divide of the revenue streams between customer interfacing service providers and specialist product-focused "box companies". Banks, and others, will serve as aggregators of client volume.

What works and what doesn't among FinTech startups? Could you please give us some example of companies you have invested in?

I would say that all services/products that a bank offers could be a potential FinTech company. It's more about the way the service contributes to a better customer experience and/or lowers the cost base. The Nordic FinTech entrepreneurs are a bit unique, they are more mature (average entrepreneur aged between 38-45), they have been active in the payment/banking industry, have delivered before, and are realistic in their plans and predictions. NFT Ventures has invested in a company founded by experienced bankers in their mid-50s who have built a trading platform that allows efficient trading of small ticket bond trades ignored by traditional banks.

What are the exit strategies for investments? Is there a bubble in FinTech?

We have many options: business partners, banks, insurance companies, media groups, industry leaders, second tier competitors, and other private equity/venture capital companies.

If FinTech investments are no more than 4% of the total IT spend within the banking/financial industry it is NOT a bubble. The valuation of FinTech has gone down since August 2015. We see more healthy valuations today, which is good for FinTech investors.

Revenue Risks: Country Analysis

Emerging market banks are most at risk of market share shift and lost future retail growth opportunities from FinTech disruption

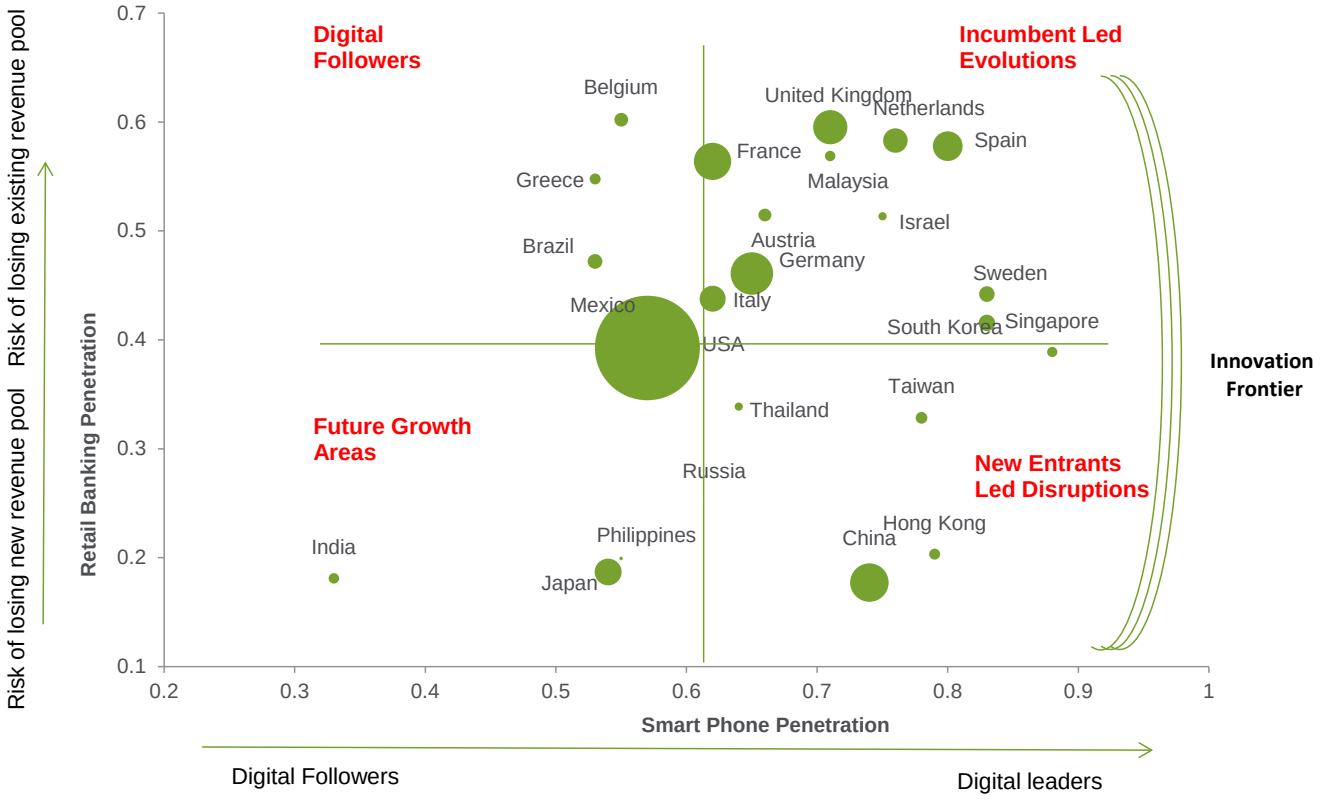
So which countries are most at risk from FinTech disruption? In our view, new entrants have a greater chance of success in markets with underdeveloped or fragmented banking systems accompanied with a high level of digital readiness. Emerging market banks are more at risk of market share shift – or more likely lost future retail growth opportunity. Smartphone penetration is higher than banking penetration in many emerging market countries and many emerging markets are digital leaders while they are banking laggards.

Banks, emerging market banks in particular, often tend to focus on the wealthy and mass affluent segment of the population. Where wealth is concentrated in a small segment of the population there is a long tail of lower value bank customers that can be captured by FinTech companies with a lower cost to serve model. Another important factor is the more pragmatic regulatory environment in some emerging market countries such as China and Kenya towards FinTech innovators.

Chinese banks are among those with the biggest risk of digital disruption

In Figure 28, we identify Chinese banks as being among those with the biggest risk of digital disruption. China's smartphone penetration is as high as in developed markets but the banking system is focused on large corporates. Technology giants such as Alibaba and Tencent are leveraging on their ecosystems and vast customer bases to venture into financial services through the provision of efficient payment systems and Internet banking. China's P2P lending market which focuses on personal and small business is now the largest in the world, several times bigger than the US or UK.

Figure 28. Mapping the Risk of Digital Disruption



Source: Consumer Barometer with Google (smart phone penetration), Company Reports and Citi Research; Retail bank penetration is measured as retail loans% total loans. Size of the bubble is retail bank loans, the larger the bubble, the higher the retail bank loans.

What's Chinese for Unicorn?

US and Chinese companies dominate in the FinTech world

Among non-quoted FinTech companies, US and Chinese firms dominate. The two largest FinTech unicorns are Chinese. Outside the Chinese giants, the majority of the next ten most highly valued private FinTech companies are based in the US, interspersed with a few firms based in the UK, Sweden and India (see Figure 29).

Figure 29. Top FinTech 'Unicorns' Worth Over $1 Billion Ranked by Value

Company Name	Business Area	Target Customer	Category	Country of Domicile	Type	Raised	Valuation
Ant Financial	Payment	Personal & SME	Online payment	China	Private		$45-50bn
Lufax	Lending	Personal & SME	Peer-to-peer loan	China	Private	$1.7bn	$19bn
Stripe	Payment	Personal & SME	Online payment	US	Private	$280m	$5.0bn
Zenefits	Institutional Tools	SME	HR software	US	Private	$583.6m	$4.5bn
Credit Karma	Lending	Personal	Credit scoring	US	Private	$368m	$3.5bn
Adyen	Payment	Personal	Online payment processor	Netherland	Private	$266m	$2.3bn
Klarna	Payment	Personal	Online payment	Sweden	Private	$291m	$2.25bn
One97	Payment	Personal	Online payment	India	Private	$585m	$2.0bn
Prosper	Lending	Personal	Peer-to-peer loan	US	Private	$354.9m	$1.9bn
Oscar Health	Insurance	Personal	Online health insurance	US	Private	$727.5m	$1.75bn
Zuora	Payment	Corporate	Subscription payment	US	Private	$242.5m	$1.5bn
FinancialForce.com	Institutional Tools	SME	Cloud-based accountancy software	US	Private	$186.3m	$1.5bn
iZettle	Payment	SME	Card reader for small businesses	Sweden	Private	$244m	$1.4bn
SoFi	Lending	Personal	P2P student loan refinancing	US	Private	$766.2m	$1.3bn
Housing.com	Lending	Personal	Home loans	China	Private	$154.2m	$1.3bn
Qufenqi	Lending	Personal	Consumer purchase financing	China	Private	$225m	$1.3bn
Funding Circle	Lending	Personal & SME	Peer-to-peer loan	UK	Private	$273.2m	$1bn
Jimubox	Lending	Personal & SME	Peer-to-peer loan	China	Private	$131.2m	$1bn
TransferWise	Money Transfer	Personal	International money transfer	UK	Private	$90.4m	$1bn
Mozido	Payment	Personal	Mobile payment and wallet provider	US	Private	$307.2m	$1bn

Source: Business Insider (Aug 21 2015), Financial Times; Crunch Base, CBInsights, Citi Research; Capital raised updated on 26 Feb 2016 based on Crunchbase. Valuation based on CBInsights or Business Insider.

Ant Financial is in a league of its own with a valuation similar to Uber or the quoted PayPal. It is "focused on serving small and micro enterprises as well as consumers" (alibabagroup.com) and is the online payments and finance affiliate of Alibaba. Ant Financial completed a funding round last year that valued it at around $45-50 billion (Financial Times, June19, 2015; Wall Street Journal, July 3, 2015). Ant Financial and Alipay are discussed in greater detail in the Alipay: China's PayPal and More section.

Ant Financial has a much broader range of businesses than PayPal. It is part of the Alibaba ecosystem and businesses operated by Ant Financial include Alipay (launched in 2004, an online payments company similar to PayPal), Alipay Wallet (a digital wallet that is integrated with Alipay to enable eCommerce and P2P payments), Yu'e Bao (the largest money market fund in China), Zhao Cai Bao (a platform that offers investment products such as loans to personal and SME customers), Ant Micro Loan (offering loans to SMEs) and Sesame Credit (a big data-based credit ratings provider). Ant Financial is also expanding outside China with its significant ownership in PayTM, India's largest digital wallet.

The next largest FinTech unicorn is Lufax. Starting in 2011 as a P2P lender, Lufax has diversified into a broader range of products, including wealth management and fund distribution. As Lufax's CEO Gregory Gibb notes, "*retail lending in China (by the incumbent banks) is still very early stage*" (WSJ, 16 April 2015). In its March 2015 funding round Lufax was valued at "*nearly $10 billion*" (WSJ, April 16, 2015). In the more recent January 2016 funding round, Lufax raised $1.2 billion at "*a valuation of $19 billion*" (FT, January 2016).

Payment & E-Commerce: China Leads

China's Internet giants have been successful in financial services

China has some of the world's largest FinTech companies. They benefit from the distribution power of the Internet giants of China – Baidu, Alibaba, and Tencent. The successes of China's Internet giants in financial services may provide a road map to US/global Internet giants such as Amazon, Apple, Facebook, Google and Microsoft. But as we will read in this section, China also has some unique features. Chinese technology giants Baidu, Alibaba, and Tencent (collectively referred to as "BAT") are ahead of western peers (Google, Apple, Facebook, and Amazon, often referred to as "GAFA") when it comes to venturing into financial services. The market share of Alibaba and Tencent in Chinese third-party payments, at 33% and 10% respectively, is past the tipping point. By contrast, GAFA's market share in non-cash payments is estimated to be less than 2% in the US.

Figure 30. GAFA vs. BAT

GAFA	Number of Users 2015	Business Model	Finance Products	Volume
Google	Around 200m monthly unique users	data monetization	* Google Wallet (2011) *Android Pay (2015)	* Around 20m devices have Google Wallet installed in the US; 1-2 million active users in the US
Apple	800m (iTunes)	data, software and hardware	* ApplePay (2014)	* Around 24m Apple Pay compatible devices in the US;~4m users have used Apple Pay at least once and 1-2m users are 'active' users
Facebook	1,550m	data monetization	* Messenger Payments (2015)	
Amazon	304m	E-Commerce	* Amazon Lending (2012): Loan to sellers * Amazon Payments (2007): Online payment	* Globally more than 23 million customers (<10% of customers) have used the 'Pay with Amazon' service since 2013 * Payment volume from 'Pay with Amazon' increased 150% year-over-year in 2015
BAT	**Number of Users 2015**	**Business Model**	**Finance Products**	**Volume**
Baidu	590m	data monetization	* Baidu Wallet (2014) * Baidu Finance (2013): Including consumer credit, marketplace lending, wealth etc.	* 45m Baidu Wallet users * < 2% of third party payment (online + offline market share)
Alibaba	407m (number of active buyers over LTM)	E-Commerce	* Alipay (2004) * Yu'e Bao (2013) * Mybank (2015) * Zhima Credit (2015)	* 33% third-party transactions (online + offline) market share * Around RMB17trn ($2.6trn) transactions in 2015
Tencent	697m (WeChat)	data monetization	* Tenpay (2005) * WeBank (2015): online/mobile bank * Wilidai (2015): consumer credit	* 10% third-party transactions (online + offline) market share * Around RMB 5trn ($0.8trn) transactions in 2015

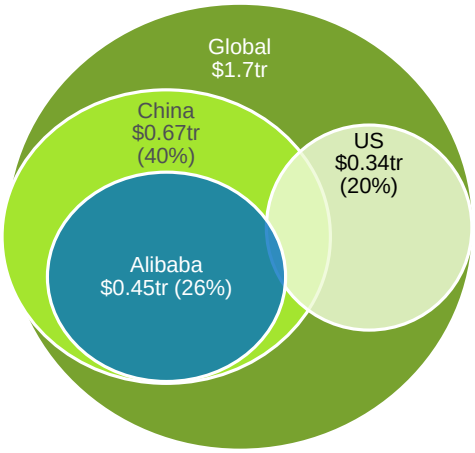
Source: Company reports, Citi Research

China's internet giants have found success due to (1) early entry; (2) the e-commerce ecosystem, (3) their large user base and (4) the strategic importance of finance to their business models

We attribute the FinTech success of the "BATs" in China to the following factors:

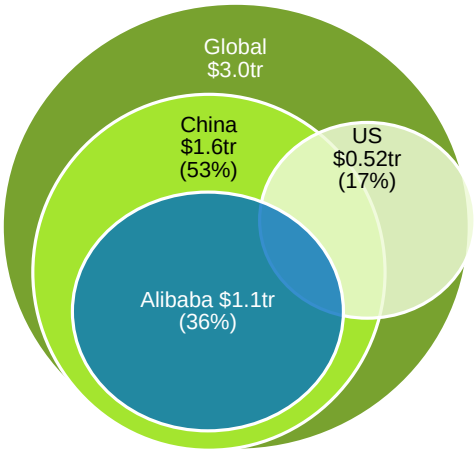
- **Early Entry:** Alipay and Tenpay were created over a decade ago by their Internet parents initially to facilitate e-commerce or online gaming payments. Among the GAFA's, Google was the first to venture into payments in 2011, seven years after Alipay.
- **The E-commerce Ecosystem:** Global e-commerce is growing rapidly with a gross merchandise volume (GMV) of $1.7 trillion globally in 2015 and is expected to grow to $3.0 trillion by 2018 according to eMarketer estimates. China has by far the largest e-commerce ecosystem in the world ($672 billion or 40%) and is expected to grow 133% to $1.6 trillion by 2018 — over half of global e-commerce. Alibaba's GMV is close to $500 billion in 2015, more than double that of Amazon. Alipay is hence the largest on-line payment gateway, with total payment volume (TPV) in 2015 over 3x that of PayPal.

Figure 31. Global E-Commerce Mainly Comes from China & US, 2015



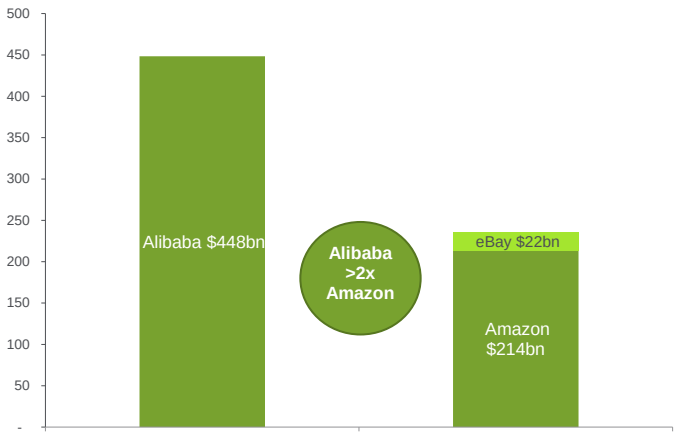
Source: eMarketer, Citi Research; Based on Gross Merchandise Value (GMV)

Figure 32. China E-Commerce Market Share is Growing, 2018



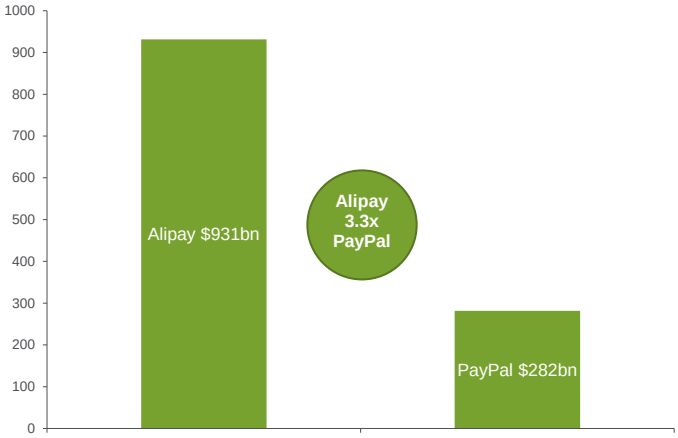
Source: eMarketer, Citi Research; Based on Gross Merchandise Value (GMV)

Figure 33. Alibaba GMV Larger than Amazon, eBay Combined 2015



Source: Company Reports, Citi Research; Amazon GMV estimated to be 2x of Net Sales as around half of the sales on Amazon are from third-party merchants

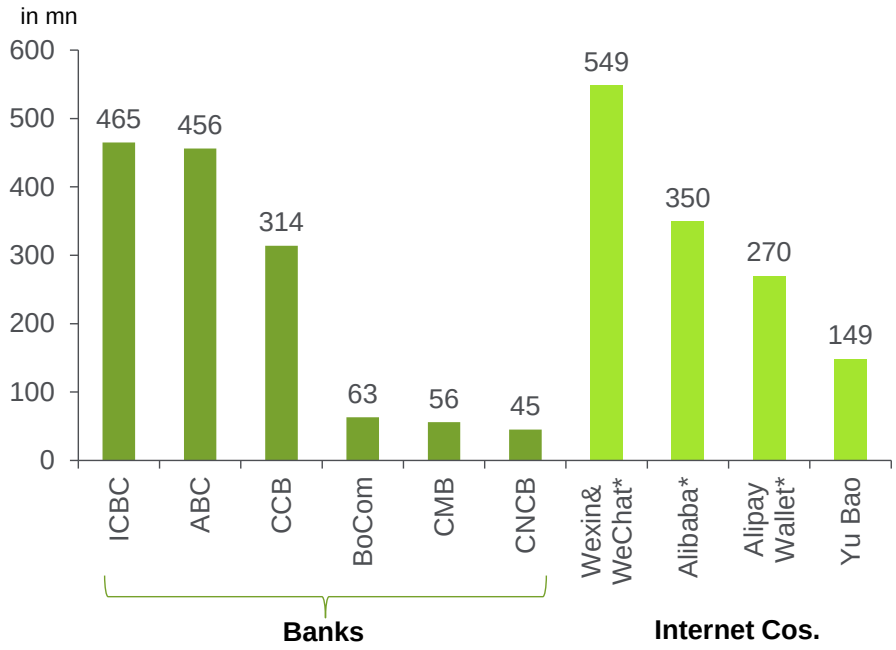
Figure 34. Alipay Total Payment Volume Bigger than PayPal 2015 ($bn)



Source: Company Reports, Citi Research; Alipay TPV 2015 is estimated based on discloser in 2014 adjusted for growth in Alibaba's GMV.

- **The Large User Base:** China is ahead of developed markets in monetizing the social network for payments. Tencent has developed a leading P2P payment system in China, leveraging on the 550 million users in its social network WeChat (a messaging app that integrates messaging and blogging, similar to WhatsApp and Facebook combined).

Figure 35. Retail Customer Numbers at Banks and Internet Companies, 2014

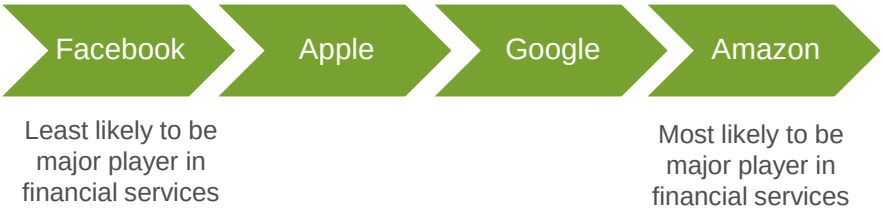


Source: Research; *Number of active users

- **Strategic Importance of Finance to BATs vs. GAFAs:** Finance is strategically important for the BATs. Having started online to facilitate e-commerce or gaming, in a country with a relatively under-developed consumer banking system, payment is now also seen as core to their online-to-offline (O2O) strategy. In the last two years, Alipay has recruited over 130,000 offline merchants including restaurants, supermarkets, taxis, and hospitals. While this is a small number vs. the 17 million point-of-sale terminals in China, the number is rapidly growing.

  Similar to BATs, the leading US Internet companies have a massive user base. However, they operate in an existing, well-developed consumer payments system and financial services are not as strategically integral or important for the leading Internet companies as it is for their Chinese counterparts. Among their financial peers, Amazon is more likely to be a major player in financial services due to its focus on e-commerce. For Google and Apple, Android Pay and Apple Pay are part of their broader strategy to further enhance customer stickiness to their operating system ecosystem.

Figure 36. Finance Is Likely to be More Strategic for Amazon than Facebook



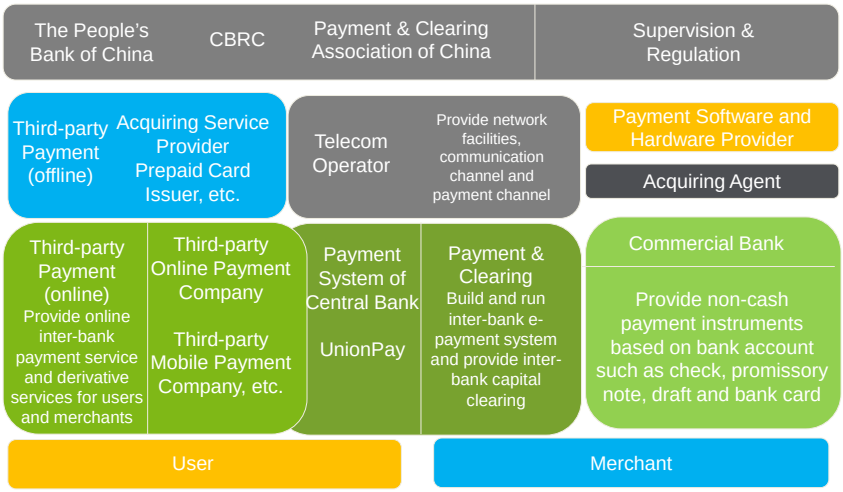
Source: disruptivefinance.co.uk

China's Vibrant Payment Innovations

Key players dominate the Chinese payment industry

China's payment industry is dominated by a few key players including the traditional commercial banks, the monopolistic card scheme UnionPay, and the third-party payment companies. Leaving the third-party payment companies aside, the payment ecosystem is very similar to the "four party" payment system in the US or Europe that involves: the card holder, the card issuing bank, the merchant, and the merchant acquiring bank. These parties are connected together using a payment network. In China, UnionPay is the monopolistic card network.

Figure 37. Key Parties in China's E-Payment Industry



Source: iResearch

What's Third-Party Payment?

Third-party payment companies facilitate payments on e-commerce platforms

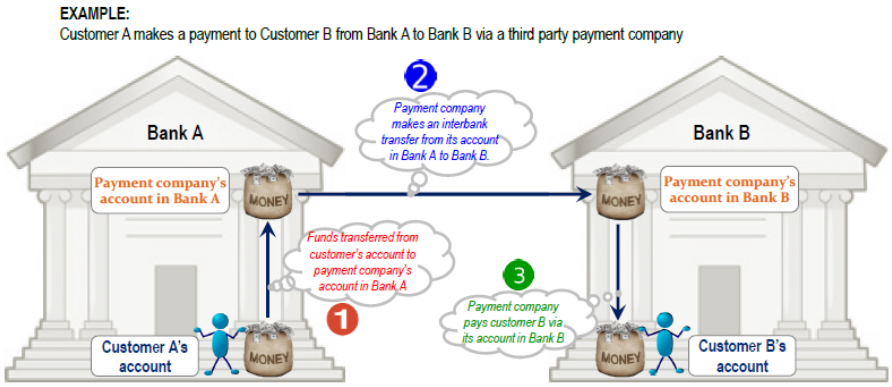
Third-party payment is an authorized (licensed) non-bank organization that facilitates payment. The third-party payment companies are licensed by the People's Bank of China (PBoC). There are three types of licenses 1) online/mobile payment 2) point of sale license and 3) pre-paid card issuance. As of end of 2014, there were 269 licensed third-party payment companies in China, of which 117 companies have online/mobile payment licenses, 62 have point of sale licenses and 166 are licensed for pre-paid card issuance. A company can have multiple licenses to perform more than one function. Alipay for example has two and a half licenses enabling it to do the online/mobile payment, the point of sale as well as issuance of pre-paid card (online only – hence half) licenses.

The third-party payment companies were initially created to facilitate payment on e-commerce platforms. The 'third-party' serves as a middle man and provides escrow between the buyers and sellers. When a buyer purchases an item online, the money is transferred from the buyer to the 'third-party'. The third-party will then notify the seller to ship the goods. Only when the goods are received and accepted by the buyer, is the money transferred from the third-party to the seller.

Recently, these third-party payment companies have diversified from e-commerce into P2P payments and offline payments

In recent years, the third-party payment companies have diversified beyond e-commerce and expanded to P2P payments and offline payments. Third-party payment companies have accounts open with a network of commercial banks and act as an intermediary for interbank payments. The payment flow from a payer's Bank A account to a beneficiary's account in Bank B is illustrated in Figure 38. Payments done this way have far higher success rates than traditional interbank payments.

Figure 38. Illustrative Diagram of Third-Party Payments in China



Source: Citi Research

Why Is It Successful?

Third-party payment is the most popular payment method by Internet users for many reasons.

1. **Under-Developed Banking System** – China's commercial banks were slow to adapt to digital banking and online payments. The rapid developments in e-commerce allowed third-party payment companies to offer convenient, reliable, faster, and cost efficient alternatives to traditional bank payments.

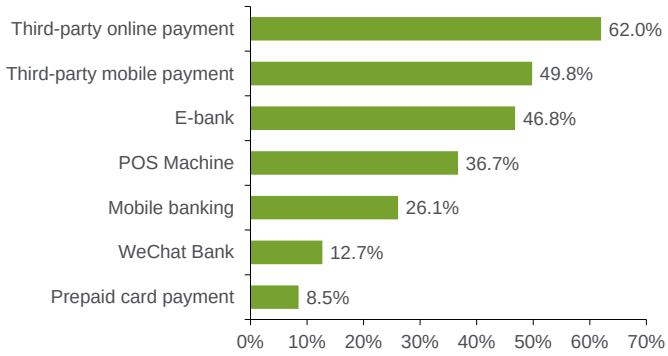
2. **Relaxed Regulation** – Regulation had been relaxed in the third-pay payment with no Know Your Client (KYC) requirement or transaction limit until recently (August 2015). In July 2015, the PBoC announced in a draft proposal to tighten regulations in the payment space, to introduce KYC requirements, and to impose daily and annual transaction limits. The initial proposal set a daily transaction limit in the range of RMB5k-200k (~$1-$31k). Despite the toughened regulatory stance on third-party payments, we doubt regulators will be able to protect the banks from digital disruptions in China because of the consumer behavioral shift that has occurred.

3. **Convenience** – Similar to developed markets, third-party payments improve the user experience. Alipay is the most used payment method for e-commerce platforms. The integration of Tenpay to WeChat, the largest social networking platform, simplifies the P2P payment.

4. **Security** – With the third-party payment companies acting as escrow, it significantly reduces potential e-commerce fraud. Hence, third-party payment is the most preferred on-line payment method for Internet users.

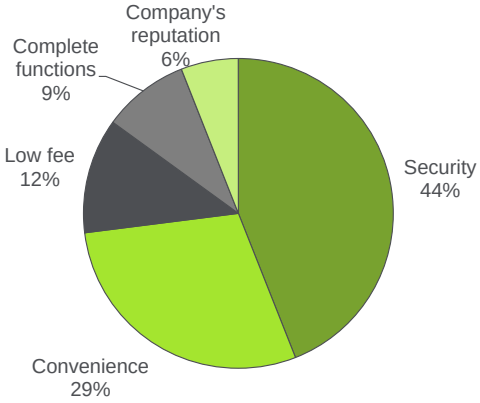
5. **Lower Fees** – P2P payments are usually not free of charge for interbank or inter-city transfers in China. Third-party payments provide a cheap alternative for small ticket money transfers. Maybe partially due to the pressure from alternative payments, Chinese banks are modernizing their digital offerings and reducing/eliminating transfer fees to maintain market share. ICBC, the largest bank in China, announced in February 2016 that it would provide free P2P money transfers through its Internet banking platforms. Tencent's Tenpay, on the other hand, announced around the same time that it was going to charge 10 basis points for cash in and cash out (transfer digital money in and out of bank account) on its digital wallets.

Figure 39. Most Often Used Payment Methods by Internet Users (2014)



Note: Data is collected from an online survey of 3,462 users conducted via iUserSurvey and iClick from Jan to Febr 2015
Source: iResearch

Figure 40. Most Important Reason for Internet Users' Choice of E-Payments (2014)



Note: Date is collected from an online survey of 4,141 users conducted via iUserSurvey and iClick from Jan to Feb 2015
Source: iResearch

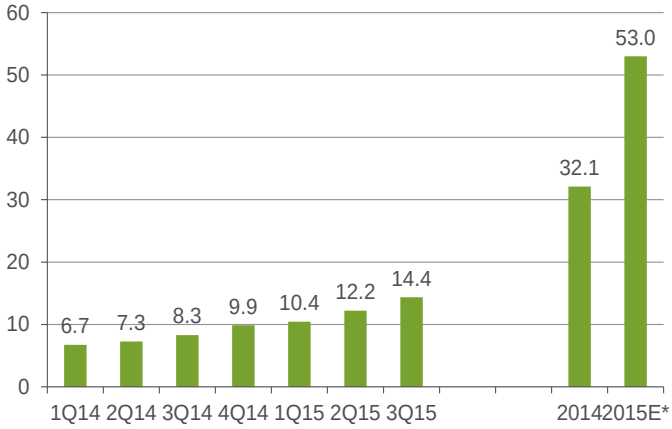
Sizing the Pie

Total third-party transaction volume in China is likely to have reached $8.1 trillion

According to data collected by analysis until the third quarter of 2015 and Citi estimates, total third-party transaction volume is likely to have reached RMB53 trillion ($8.1trn). This includes both traditional offline payment business, as well as the rapidly growing online and mobile payment business. ChinaUMS, a subsidiary controlled by UnionPay, is the dominant player in offline payments, while Alipay and Tenpay have higher market share in online and mobile payment thanks to the rapidly expanding e-commerce ecosystem.

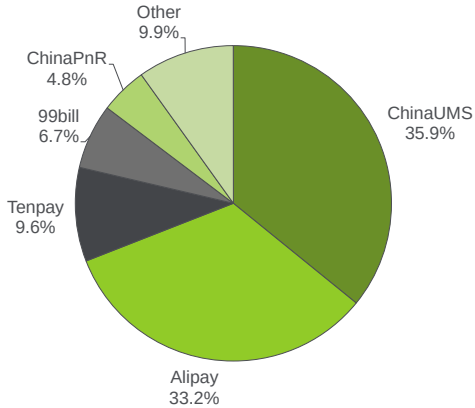
Overall, ChinaUMS has a market share of 36%, only slightly higher than the number two player, Alipay, at 33%. As Alipay and Tencent expand to offline payments through partnerships with supermarkets and convenience stores, the leading position of ChinaUMS could be eroded further.

Figure 41. China Third-Party Payment (Online + Offline (Trillion Yuan))



Source: analysys, Citi Research estimates

Figure 42. China Third-party Payment (Online + Offline Market Share)

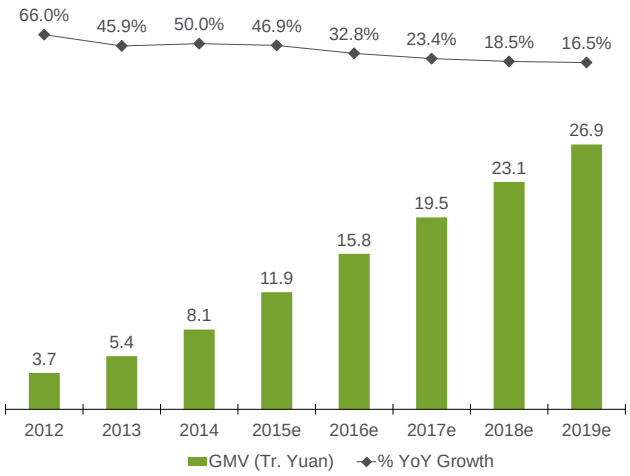


Source: analysys; Data as of 3Q15

Third-party payment volume is expected to grow exponentially due to a vibrant Internet/e-commerce culture

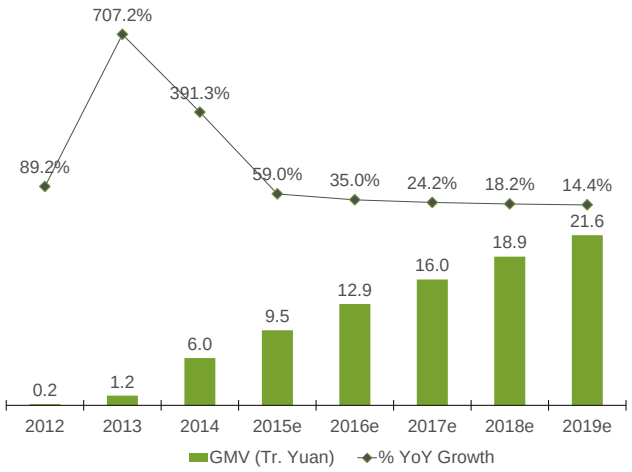
Moreover third-party payment volume is experiencing exponential growth thanks to a vibrant Internet/e-commerce culture. Payment volume (PC and mobile combined) grew 52% in 2015 to Rmb21.4trn ($3.3trn) mainly on the back of e-commerce growth and the adoption of mobile payments. After an explosive growth in the mobile payment space, the sector is also expected to return to a more sustainable and stable growth (Figure 43-Figure 44). To the incumbent banks, the growth of online and mobile payments may not be a big loss of their existing profit pool but an opportunity lost in a new and growing business.

Figure 43. China Third-party Online Payment Volumes



Note: Online payment refers to money transfers made on the Internet under the payment command of users via equipment such as desktop or laptop computer; Only non-financial payment companies above designated size are considered in calculation of GMV, excluding banks and UnionPay.
The data were calculated and estimated based on the financial results published by enterprises and interviews with experts by iResearch statistical mode
Source: iResearch

Figure 44. China Third-party Mobile Payment Volumes



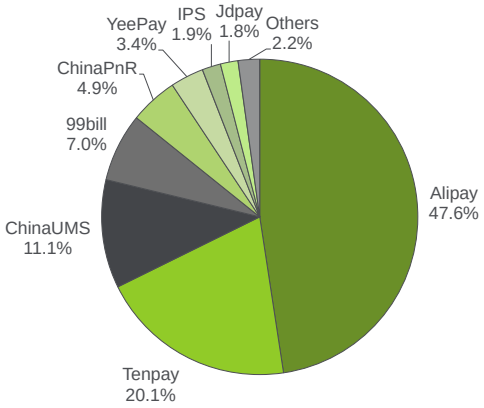
Note: Only third-party payment companies are counted in China third-party mobile payments GMV, excluding banks and UnionPay; MMS payment hasn't been counted in calculation of the GMV since Q3 2014.
The data were estimated based on the financial results published by enterprises and interviews with experts in iResearch statistical forecast model

Source: iResearch

Alipay leads in the online and mobile payments area with Tenpay, the number two player

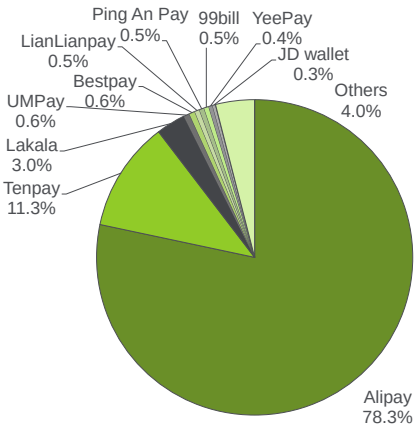
Online and mobile payments are led by Alipay, Alibaba's payment company. Alipay benefits from Alibaba's e-commerce ecosystem and commands 48% market share of online payment volume. Tencent controlled Tenpay is the second largest player with 20% online payment market share. In the mobile payment space, Alipay has a dominate position with market share close to 80%. Tenpay currently only has an 11% market share in mobile payments but is growing rapidly because of the success of WeChat's Red Envelope, which enables P2P payments between WeChat contacts. Alipay is investing heavily on its own version of Red Envelope in Lunar New Year 2016 to hold on to its leading position in mobile payments.

Figure 45. Players in Third-party Online Payments by Volume (3Q15)



Note: Banks and UnionPay are excluded. Only third-party payment companies are included. Data were calculated and estimated according to the interviews with experts and enterprises.
Source: iResearch

Figure 46. Players in Third-party Mobile Payments by Volume (1Q15)

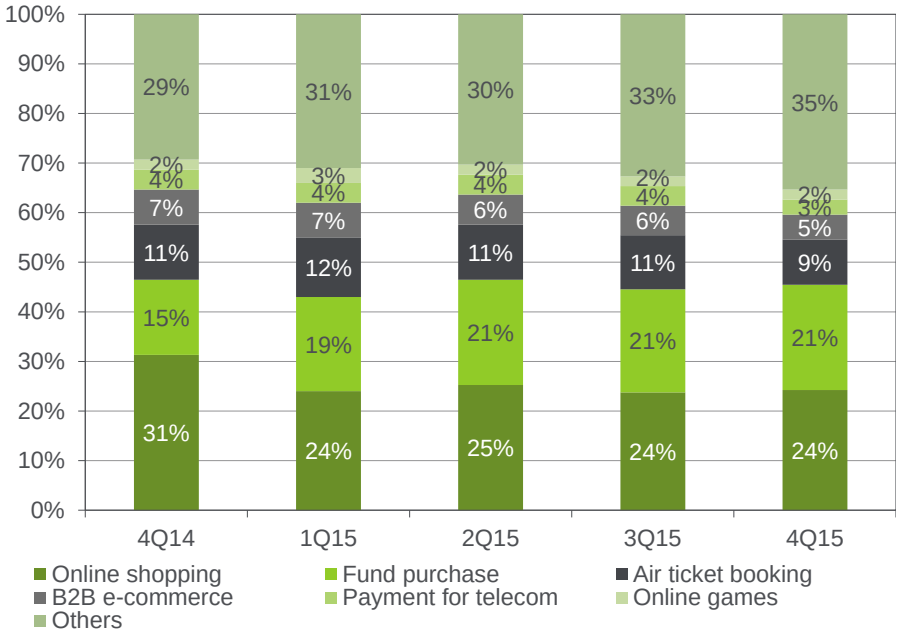


Note: Banks and UnionPay are excluded. Only third-party payment companies are included; Data were calculated and estimated according to the interviews with experts and enterprises.
Source: iResearch

Both companies are expanding from C2C and B2C e-commerce to O2O payments

Increasingly, Alipay and Tenpay are expanding beyond consumer-to-consumer (C2C) or business-to-consumer (B2C) e-commerce. Online-to-offline (O2O) payments through mobile and QR codes have been expanding mainly led by Alipay, Tenpay, and Lakala for areas like taxi rides, restaurants, supermarkets, medical treatments, and traffic payments. Third-party payment companies also offer P2P payments and are also expanding into B2B supply chain payments for SMEs. In the fourth quarter of 2015, the breakdown of online payment volumes were: online shopping 24%, fund purchases 21%, air ticket purchases 9%, B2B e-commerce 5%, telecom fees 3%, and online gaming 2% (see Figure 44).

Figure 47. China Third-party Online Payment Market Structure



Note: Online payment refers to money transfers made on the Internet under the payment command of users via equipment such as desktop or laptop computer; Only non-financial payment companies above designated size are are considered in calculation of GMV, excluding banks and UnionPay.
The data were calculated and estimated based on the financial results published by enterprises and interviews with experts by iResearch statistical model
Source: iResearch

Impact to Banks

More than just payments for online shopping

China's third-party payment system is effectively a "banking system" that sits on top of the traditional banking system; an added layer between banks and the customer. Transparency of the transactions inside a third-party payment company say between a merchant and an individual is low and banks lose sight of customers' transaction information and is thereby distanced from the customer relationship. Moreover, many third-party payment companies use payment as a gateway to get access to customers to gradually provide other auxiliary financial services such as deposit taking and wealth management (Yu-e Bao), lending (Ant Micro Loan) and on-line banking (MYBank). Payment gives them valuable access to customers and their transaction data.

Banks are being disintermediated

Not only is the customer relationship at stake, low cost deposit balances are also at risk

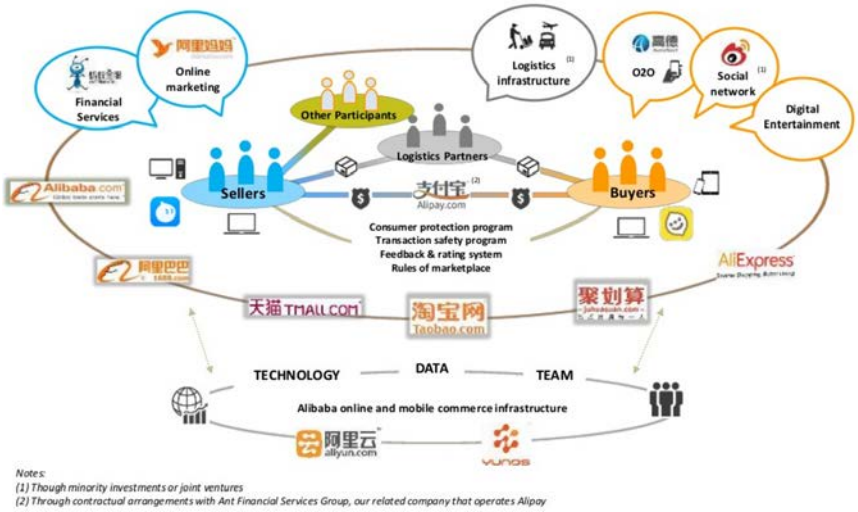
Financially, banks face reduced fee income as the number of interbank payment transactions may be reduced – third-party payment companies have their own treasury and transactions can be netted off or grouped. Banks could also be forced to reduce or remove entirely payment fees. ICBC announced in February 2016 that all P2P payments through online banking will be free of charge. The bigger financial loss (since fees tend to be low for payments anyway) could be low cost customer deposit balances as they are no longer determined by the banks' relationship with the customer but instead are driven by the designated partner banks by the third-party payment company.

Alipay: China's PayPal and More

Alipay is backed by Alibaba, the largest e-commerce company in China

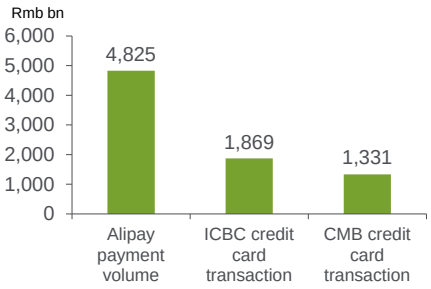
Alibaba is the largest e-commerce company in China and also the largest e-commerce company in the world. Its gross merchandise value (GMV) is close to half a trillion in 2015, more than double that of Amazon and similar to the GDP of Norway or Austria. Alibaba has three e-commerce brands: Taobao.com for C2C, Tmall for B2C and Alibaba.com for B2B. Each has a dominant market share in its segment. The leading position of Alibaba in e-commerce, together with its 350 million active users, created the perfect ecosystem for financial services such as online payment. Alipay is at the heart of the ecosystem to provide a secure and convenient payment between buyers and sellers.

Figure 48. Alibaba Group E-Commerce Ecosystem



Source: Company Presentation

Figure 49. Alipay Volume vs. ICBC, CMB Credit Cards (2014)



* Alipay payment volumes for 12mos to June 2014
Source: Company Reports, Citi Research

Ant Financial is the holding company for Alibaba's financial products, most notably, Alipay. Alipay, often called the PayPal of China, is much bigger than its American peer with a total payment value estimated above $900 billion, ~3.5x that of PayPal. Alipay has an almost 50% market share in third-party online payments and over 80% market share in third-party mobile payments in China (Figure 45 - Figure 46).

The success of Alipay depends on the e-commerce ecosystem of Alibaba and its large user base. Tmall — Alibaba's B2C shopping website — has 56% of the market share. Taobao – Alibaba's C2C shopping website — has around three quarters of market share. Alipay is the preferred payment solution on these platforms. Furthermore, Alibaba has around 350 million of active retail customers that rival the large banks in China (Figure 35). The leading position of Alipay in third-party payment is hard to be replicated or shifted due to the strong backing of Alibaba group.

Alipay aims to be more than just online payment processing for e-commerce. With the launch of an upgraded mobile application, Alipay offers an integrated payment platform to consumers and small businesses to enable payments for food, holidays, utility bills, managing payment transactions as well as P2P payments. But the application has been less successful than Tencent's Tenpay as Tencent's WeChat application is much more frequently used. Alipay invested heavily on its version of "Red Packet" in Chinese New Year 2016, hoping to build a social network on its payment application.

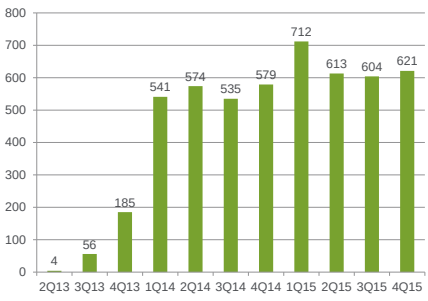
Another area that Alipay is targeting to grow is the offline payment space. As mentioned earlier, the offline payment space has much higher transaction value than online payment. In China, Alipay mobile payment (e-wallet) is accepted by restaurants, supermarkets, drug stores, and hotels. Customers can now use their unique Alipay QR code or barcode in the Alipay apps to pay. The expansion to O2O payment is a big potential threat to the existing payment network UnionPay, the only authorized interbank network linking the major banks' card operations in China.

Figure 50. How to Use Alipay to Pay Offline

Source: pconline

In our view, Alipay is the anchoring product for Alibaba to play a bigger role in financial services. Under the Ant Financial family, Alibaba has started to offer a full range of products including savings, lending and online banking. Yu'e Bao is a savings account that invests in money market funds. Zhao Cai Bao is a platform that offers investment products such as loans to personal and SME customers. Sesame Credit is an online credit scoring service. Ant Micro provides micro loans to small businesses. Ant Check is for consumer purchase financing and MYBank is a fully-fledged Internet-only bank. All these products are supported by Ant Financial Cloud, a cloud banking and financial service infrastructure.

Figure 51. Yu'e Bao AUM (RMB bn)



Source: Tianhong Asset Management Disclosures

Figure 52. Financial Products Under Ant Financial

Source: Company Website; Citi Research

Tenpay: Leader in P2P Payments

Tenpay is backed by Chinese Internet giant Tencent

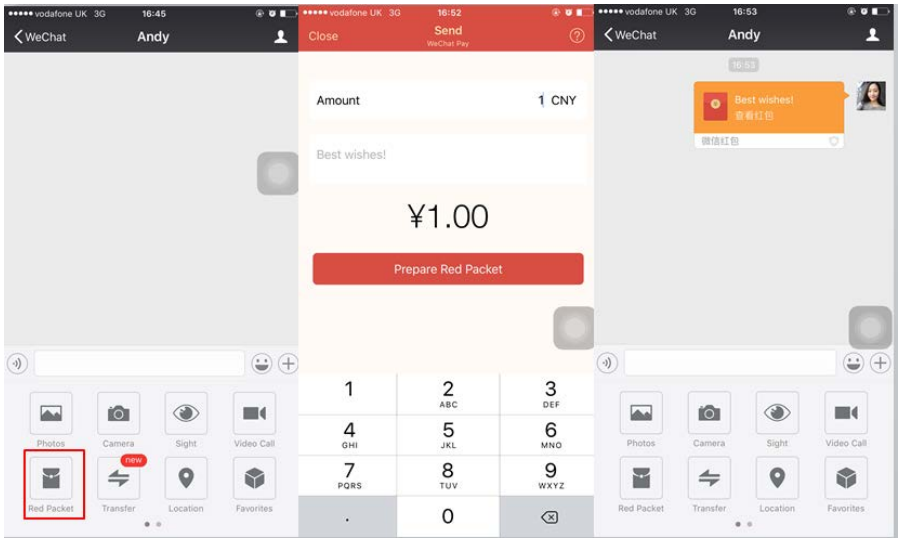
Similar to Alipay that is backed by the Alibaba ecosystem, Tenpay is backed by Internet giant Tencent, which is best known for the most widely used messaging system in China named QQ (PC & mobile) and WeChat (mobile). Tenpay was initially created to allow Tencent users to pay for online gaming and subsequently evolved into a comprehensive third-party online payment network. It has an almost 20% market share in online payments but a smaller 10% market share in mobile payments. Tenpay is gaining market share in mobile payment thanks to the wide adoption of WeChat Red Envelope and success of Didi Taxi (largest taxi hailing app in China).

Figure 53. Tencent Online Payment Ecosystem

Source: Company Presentation

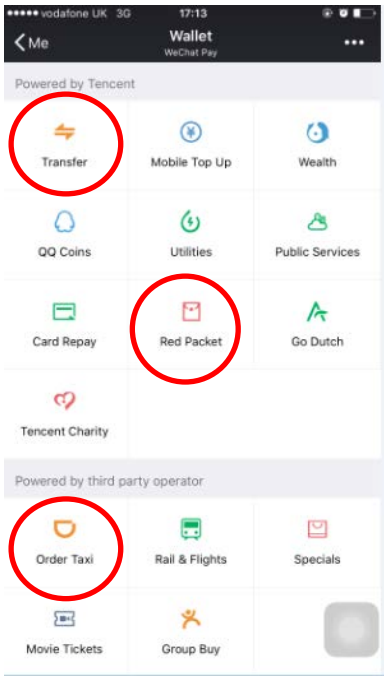
The success of Tenpay comes from its large user base. WeChat is the most popular mobile messaging application in China with 550 million active users, more than the number of retail customers at ICBC. WeChat is China's version of WhatsApp and Facebook combined. WeChat Red Envelope was launched just before Chinese New Year 2014 to allow users to send Red Envelopes of money to friends and families, a tradition of Chinese festivals. It has quickly gone viral because it's free of charge and convenient to use. Figure 54 shows how money can be transferred between friends with a few button clicks.

Figure 54. Simple Steps to do P2P Payments



Source: Citi Research

Figure 55. Fully Integrated Services on WeChat Platform



Source: Citi Research

WeChat Red Envelope has transformed P2P payments in China. WeChat offers more convenience than just sending money to peers. It's a digital wallet integrating other financial services such as wealth management, utility bill payment, taxi booking, and so on. WeChat users can book a taxi and pay through WeChat thanks to the integration of Didi Taxi, an Uber-like app with about 60% market share for taxi-hailing applications. To battle with the leading position of Alipay in e-commerce, Tencent now allows WeChat users to open online stores. Many WeChat users use the WeChat platform to promote small products to friends. All these initiatives should allow the market share gap between Tenpay and Alipay to narrow in the mobile payment space.

Similar to Alipay, Tencent is also venturing into other areas of finance. Tencent opened its online bank Webank end of 2014. It launched their first product "Weilidai (微粒贷)" in May 2015 to offer personal loans to online customers with an average loan size of Rmb20k to RMB200k ($3k-$30k) and 7-18% annualized interest rate.

Online Payments and Digital Wallets in the US

High credit and debit card penetration in the US has made it difficult for new systems to enter

High credit and debit card penetration in the US have made it difficult for newer systems to overcome.

Traditional credit- and debit-card based payment systems have had decades to establish themselves as the go-to standard for payment at the physical point-of-sale (POS) in many developed markets. A high card penetration rate among consumers, widespread card acceptance by merchants (including the presence of relatively expensive POS infrastructure and their integration into far more expensive back-end IT systems) and card loyalty schemes have all helped build "muscle memory" that is difficult for newer systems to overcome.

Thoughts on Alternative Digital Wallets

1. In the US, the only two non-bank entities that have managed to build scale against this backdrop have been PayPal (for online payments) and Starbucks (specific to its coffee shops). Why is this? Firstly, the User Interface (UI) is simple and easy-to-follow and the User Experience (UX) is positive in the sense it allows for a range of payments choices and in the case of Starbucks, a seamless omnichannel experience. Secondly, they both solve for ubiquity – the repeatable experience breeds “muscle memory”. Thirdly, there are non-payments benefits that build the relationship with the consumer. For example, Starbucks brings users its music store (in collaboration with Spotify).

2. Various other initiatives on mobile payments have failed to get off the ground in recent years. The telecom industry's SoftCard initiative (previously called ISIS, unfortunately) never got past a multi-year pilot phase thanks to several strategic and operational missteps. Its assets were eventually purchased in 2015 by Google and integrated into Google Wallet, a P2P payment service that had failed to reach ubiquity, and developed into Android Pay. The retailer-led initiative MCX never got off the ground in spite of what seemed like significant initial advantages — after all, merchants have access to individual store-level information, strong brands, foot traffic, and MCX seemed to have set up good technology relationships with the likes of Gemalto and FIS. A “remnant” form of this initiative may live on in the form of the Chase Pay and Walmart Pay initiatives.

3. It is too early to declare Apple Pay/Android Pay/Samsung Pay clear successes or failures. The latter two launched less than six months ago and while Apple Pay has launched nearly a year-and-a-half back, US merchants are currently in the process of upgrading their POS infrastructure to accept chip-based cards (due to the EMV liability shift instituted by Visa, MasterCard, etc.) and many are simultaneously upgrading to accept NFC-based payments as well. Due to these infrastructure upgrades, we expect the recent introduction of Apple Pay, Android Pay and Samsung Pay to accelerate this shift to mobile-payment acceptance. Ubiquity can help the process of behavior change needed to drive mobile payments.

4. Apple Pay is now seeking growth in Europe and Asia where people are more comfortable with the contactless payments. The UK market ticks all the right boxes for successful Apple Pay adoption following its launch in the summer of 2015. First, the contactless payment infrastructure is in place and well accepted by customers. Secondly, it launched in the UK with the widespread support of merchants (something it did not have right away in the US due to MCX). Lastly, as in the US, Apple Pay had the support of major banks.

A possible sticking point for the future roll-out of Apple Pay is that Apple is unlikely to get the type of favorable economics it got in the US, as it is rolled out in countries with a lower interchange fee — a portion of the fee is used to subsidize Apple's interest. Of course, these payment choices also require the use of specific hardware (the latest Apple or Samsung phones) which are not exactly inexpensive.

Figure 56. Klarna Key Statistics

Total end-customers	45,000,000
Total number of merchants	65,000
Number of transactions per day	400,000
Total transactions from start	315,000,000
Number of employees	1,400
Revenue (2014)	$320 million
Transaction volume per year	$10 billion
E-commerce market share - Northern Europe	10%

Source: Company reports, Citi Research

Klarna: The Most Successful FinTech Company in Sweden

Klarna is an alternative payment solution that facilitates a smooth online shopping experience. Founded in 2005 in Sweden, it now operates in 18 countries.

What is their unique selling proposition? According to Klarna, of 100 people that make it to the check-out in online shopping, only one-third finalize their deal. And for mobile users, this number drops to just 5-10%. What stops the user from completing the transaction is a combination of forgotten card details and passwords/user name or other issues such as insufficient available credit. Klarna says it kills all of these pain points by creating a smooth user experience with minimal user inputs and also offers credit at the point of sale.

Klarna has 65,000 merchants and 45 million customers today. For an existing Klarna user, everything is prefilled during the checkout process. Klarna owns the frame in the website browner and also acts as a merchant acquirer and charges merchants a couple of percent per transaction. The majority of the company's payments (70-80%) go through Automated Clearing House (ACH).

Klarna process around $3.4 billion in transaction volume per year in the Nordic region, about 15% of e-commerce market share, and around $6.5 billion in the DACH markets (European territories where German is an official language), or 10% of e-commerce market share. The company currently is expanding to the UK and the US.

Despite their high transaction volume, the bigger part of Klarna's revenue comes from its consumer lending business. The company extends credit to selected customers at the checkout point and is therefore effectively a white-labeled credit card. Klarna sees its credit decision engine as its "secret sauce" and it maintains a low fraud rate at an average of 3.7 basis points.

The yield on the credit is in the high teens to low 20's and the company is currently working on a loyalty module as part of its expansion into the US market. Its lending is funded through online retail deposits in multi-currencies as well as bank credit lines and their balance sheet turnover is high (3x revenue).

Klarna's next stage is to focus on increasing its share with existing merchants, exploring new verticals and geographies, credit innovation and further leveraging their customer base and data.

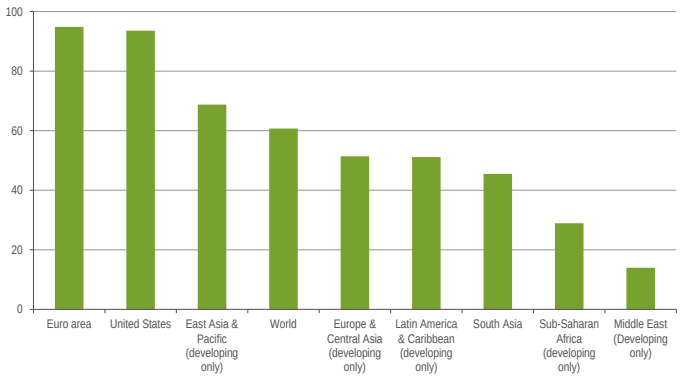
Mobile Money: A FinTech Revolution

Digital money had been eliminating customer frictions in developed markets, but it is in emerging markets where is could lead to a revolution in financial inclusion

Digital money, the migration from cash and checks to credit/debit cards, stored value instruments, and other non-paper based mechanisms, is now part of the fabric of the modern world. In the developed world, the financial innovations that promote a cashless society have been around eliminating customer frictions. Braintree, the underlying payment processor behind Uber, makes payments easy for customers. But it is in emerging markets that digital money could have an even more far reaching impact. Mobile and digital money is a revolution in financial inclusion.

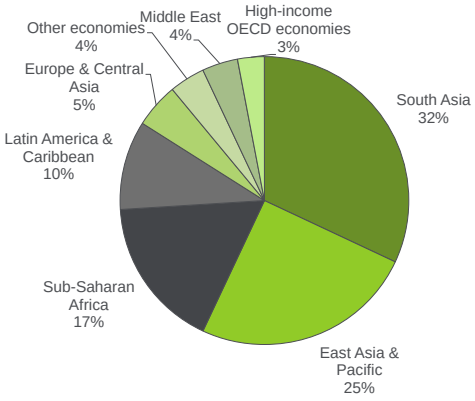
- **Increase Financial Inclusion** - There are 2 billion unbanked or underbanked people in the world, mainly — but not solely — in developing countries in Africa and Asia (Figure 57 - Figure 58). Banks only capture the wealthy part of the population, but mobile payment could help the poor have access to basic financial services. In Kenya, 45% (2014) of the population are unbanked vs. 88% (2015) of the population holding mobile phones. There are a number of country-level examples of successful financial inclusion initiatives in Kenya (M-PESA), the Philippines (via Amdocs) and Mexico. In emerging markets, the technology solutions are simple and often work with feature phones and SMS, i.e., they do not need an expensive smart phone to work.

Figure 57. Percentage of Population (15+) with a Bank Account (2014)



Source: World Bank Financial Development Index, Citi Research

Figure 58. Distribution of Unbanked Population By Region (2014)



Source: World Bank Financial Development Index, Citi Research

- **Cross-border Connectivity** - The world is more connected than before. International payments are not only for large corporates. It's also an increasing need by individuals and small businesses. $580 billion remittances are sent cross-border every year. This appears to be a pain-point that some companies (Currency Cloud, Saxo Payments, and Earthport) are trying to solve for.

- **Digitalize SME Collection** - Cash still accounts for the majority of SME point of sale transactions, especially in the developing markets. Cash accounts for 75% of corporate receivables and disbursements in emerging markets, and 25% in developed markets according to IFC Mobile Money (2011). FinTech companies such as Square and iZettle provide card acceptance for micro and small enterprises. Basware and Tradeshift provide invoice and payment automation.

Mobile Money Still in Infancy

Digital money in the developing markets manifests itself in the form of mobile money. Broadly speaking, mobile money can be defined as any monetary transaction executed with a mobile phone. These transactions typically fall into one of three categories.

Figure 59. Mobile Money 101: What is Mobile Money

Money Transfer	Mobile Banking	Payments
P2P money transfers, both domestically and internationally	Bank access via a mobile phone. Although to date, mobile banking has focused largely on basic services (i.e. checking account balances), some banks now allow clients to borrow through a moblie phone	Use of a mobile phone for financial transactions related to purchases of goods and services

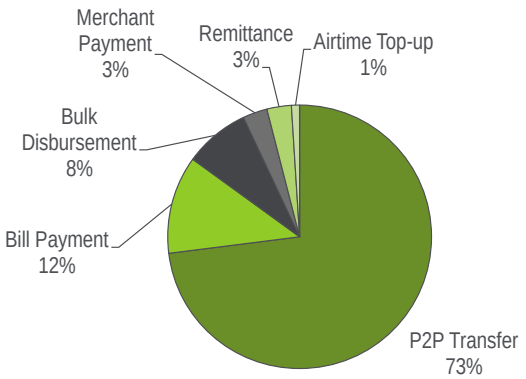
Source: Citi Research

Mobile money is still in its infancy both in terms of overall usage and the mix of transactions executed

It is important to note that in many respects, mobile money is still in its infancy both in terms of overall usage and the mix of transactions executed.

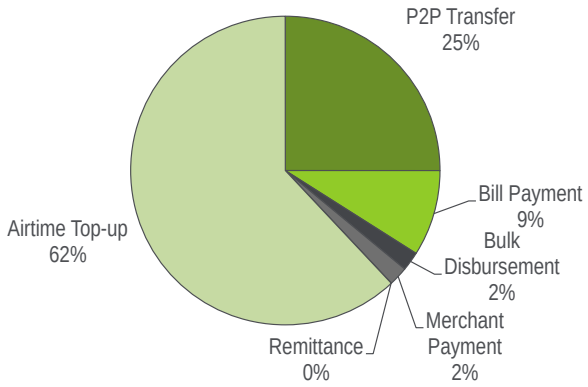
As shown below, when measured by transaction value, P2P transfers (i.e., transferring money from one person to another) dominate mobile money usage. When measured by volume, airtime top-up (i.e., purchasing pre-paid mobile phone airtime) dominates mobile money usage. That these two types of relatively basic transactions dominate mobile money usage reflects the fact that mobile money's potential has yet to be fully tapped.

Figure 60. Global Mobile Money Product Mix by Value, 2014



Source: Citi Research, GSMA

Figure 61. Global Mobile Money Product Mix by Volume, 2014



Source: Citi Research, GSMA

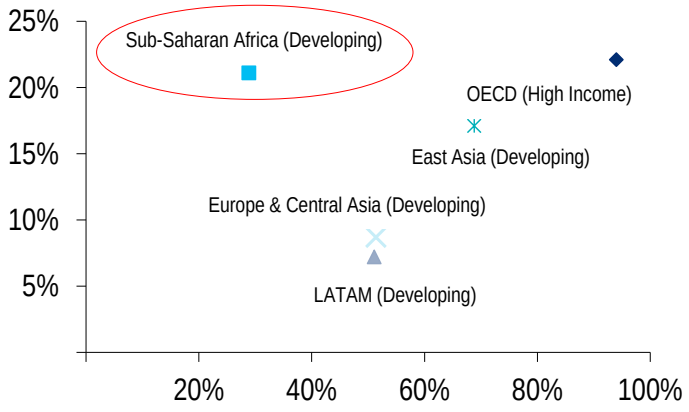
Within the broad FinTech and banking spaces, mobile money is somewhat of a conundrum. The conundrum centers on the uneven usage rates of mobile money in various countries. Unlike traditional banking penetration, mobile money usage does not appear to be driven by wealth or technological sophistication.

There is no direct correlation between traditional banking penetration and the usage of mobile money

Figure 62 below shows there is no direct correlation between traditional banking penetration and usage among the OECD countries and for four developing regions.

Although the traditional banking penetration of the high income OECD countries is close to 100%, mobile money usage for these countries is only ~22%. That usage is roughly on par with that of Sub-Saharan Africa. Within the group of developing countries, there appears to be no discernible relationship between traditional banking penetration and mobile money usage. It is noteworthy that Sub-Saharan Africa is an outlier: it has low traditional banking penetration but relatively high mobile money usage.

Figure 62. % of Population with Bank Account (x-axis) vs. % of Population with Bank Account that Made Transaction Using Mobile Phone (y-axis), 2014



Source: Citi Research, World Bank

One explanation for the low correlation could be related to bank access

One likely explanation for the relatively low mobile banking usage in high income OECD countries and relatively high mobile banking usage in Sub-Saharan Africa is related to bank access. More specifically, consumers in high oncome OECD countries have ample access to traditional bank channels whereas the opposite is true for consumers in Sub-Saharan African countries.

Figure 63. Traditional Bank Channels by Region per 100k People

		Developing			
	OECD (High Income)	Sub-Sahara Africa	LatAm	Europe/Central Asia	East Asia
ATMs	75.8	5.2	43.3	52	23
Bank Branches	25.6	3.9	19	21.4	9.5
Total	101.4	9.1	62.3	73.4	32.5

Source: Citi Research, World Bank

With ample access to banking services through traditional channels, consumers in high income countries may lack the incentive to set up and use a mobile money channel. For example, physically paying with a credit or debit card may not constitute a problem that needs “fixing.”

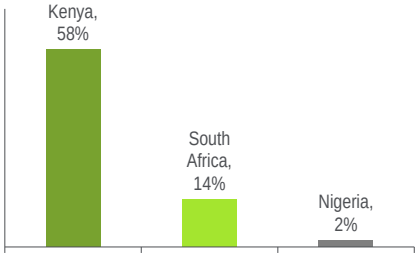
Providers of mobile money services need to convince consumers why they would benefit from mobile money (convenience, savings, etc.), and it appears this has largely not been the case so far. In contrast, in Sub-Saharan Africa mobile money has filled the void left by the pronounced lack of traditional bank channels.

Mobile Money Case Study: Kenya, Nigeria & South Africa

Mobile money usage in Sub-Saharan Africa has been among the highest in the world

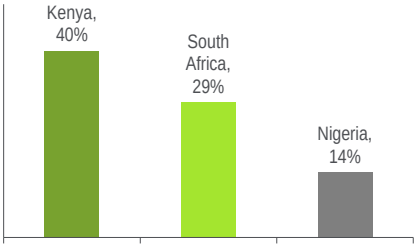
Mobile money usage in Sub-Saharan Africa has been among the highest in the world despite the lack of wealth in that region. We partially attribute this fact to the lack of traditional banking channels in that part of the world. Within Sub-Saharan Africa, however, there are notable differences in mobile money usage rates between countries. Kenya and Nigeria are examples of such differences.

Figure 64. Population with Mobile Money Account, 2014



Source: Citi Research, World Bank

Figure 65. Made Transaction from Bank Account via Mobile Phone, 2014



Source: Citi Research, World Bank

As shown above, mobile money usage is much higher in Kenya than in Nigeria. (This is despite the fact that Kenya's GDP per capita is roughly half that of Nigeria's.) Indeed, Kenya's M-PESA is considered the poster child for mobile money success.

Kenya has an advantage of a single mobile operator which allowed mobile money users to benefit from a positive network effect

Why has Kenya been much more successful in this regard than its Sub-Saharan peer Nigeria? Both countries suffer from very low traditional banking channels, so in both countries mobile money should solve the problem of lack of access. However, Kenya enjoys one advantage that Nigeria lacks: it has a single mobile operator. Safaricom's dominant market share (~70%) allows Kenyan mobile money users to benefit from a positive network effect. In contrast, Nigeria has multiple mobile money services, none of which has been able to achieve critical mass.

"*I think the Kenyan model was very different, I think around the same Safaricom started M-PESA, there were no other ways of paying or transferring money. In Nigeria to-date even if you were to give the telcos the licenses, you would never see another M-PESA because today we have… all kinds of other money transfer mechanisms… So honestly I don't think there's ever going to be another M-PESA success story in Africa.*" --- CEO of Guaranty Trust Bank, 2Q15 Earnings Call

And regulations in Kenya were favorable upon mobile operators handling financial transactions

Another key difference between the countries is the regulatory environment. Kenyan regulators have looked more favorably upon mobile operators handling financial transactions whereas in Nigeria regulators have required that banks custody funds. This creates a lack of incentive for mobile operators to develop mobile money services.

The M-PESA concept arrived in South Africa, Sub-Saharan Africa's largest banking market by profit, in 2010 as Vodacom and Nedbank partnered to try to replicate the success of Safaricom in Kenya. Eighteen months after the launch, the partnership had signed up in excess of 1 million customers, but has since removed all M-PESA commentary from investor reports. We can only conclude that this partnership failed to deliver sustainable returns.

In South Africa, credit/debit card penetration is a big hurdle to mobile money success

One of the biggest hurdles to mobile money success in South Africa is high-credit/debit card penetration (~3 cards per adult and ~11 card-accepting devices per adult). Unlike in Kenya, prior to the Safaricom success, there is already strong uptake of traditional transacting mechanisms, likely due to well-developed urban and rural branch networks. We suspect that functioning existing infrastructure in South Africa unlike most of the rest of the continent, is an inhibitor to new disruptive technology.

South Africa and Nigeria are, however, quite similar in terms of smart-device penetration. We estimate that for both countries, 36-37% of SIM cards are used in a smart device. This means that the technology is available but mobile transactional usage is still in its infancy.

Standard Bank, Africa's largest bank, has claimed recent success in mobile transactions. In 2015, 490 million transactions were processed via mobile devices, compared to 247 million in 2014 (+99%). This compares to 515 million transactions processed via physical channels (ATMs/branches) and 947 million transactions originated via Internet banking. Mobile is not yet the dominant channel (only ~10% of volumes currently) for transaction origination, but evidence suggests that this trend is changing quickly.

India at the Tech Frontier: The Next Kenya or China?

India is a big opportunity space for FinTech

India is, by its sheer population (1.2 billion and counting), its low level of banking, and digital penetration, one of the big opportunity spaces for FinTech. But this mix is converging rapidly with a changing ecosystem, a mix of technology, Government intervention in infrastructure creation, and rising economics. India might not get to Kenya levels in terms of share of prepaid or digital money (90%+ payments still cash), but in scale and size, it should be many times larger.

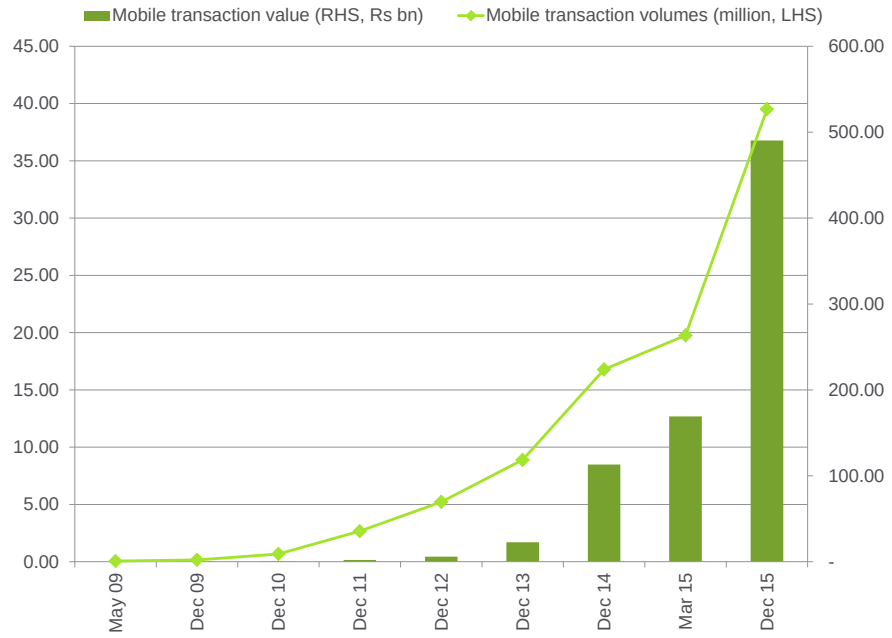
The Indian market can be viewed as a combination of: (1) A large opportunity (demographics, economics); (2) Enablers: What the government calls the 'J.A.M.' trinity of Jan Dhan (Financial inclusion), Aadhaar (National Identity card) and Mobile (the ubiquity of mobile phones in India); (3) Players: Along with traditional banks, the Reserve Bank of India's (RBI's) push to widen reach through the recent issuance of licenses for payments banks, small banks and the push for more 'Banking correspondents'; (BC) and (4) New Payments system. There's a lot going on at the same time.

The acceleration of smartphones and rising broadband connectivity is making the ecosystem more favorable to digital disruption

The ecosystem is changing. There is fairly natural expansion into mobile phones (~80% penetration), an acceleration into smartphones (~100m sold per year, +40% yoy), and rising broadband connectivity (100% access targeted by 2018). But the game changer lies in what have been historical challenges to banking access, and financial inclusion. This lies in two significant successes: (1) the Aadhar Identity platform which now covers over 900 million people, provides online identification and KYC, and has rapidly covered large segments of the population and (2) the Jan Dhan Initiative – which advocates bank deposits for all. Over the last 18 months almost 200 million new accounts have been opened, significantly enhancing reach.

This is now being built on by the RBI issuing multiple new bank licenses for payments Banks (11) and Small Finance Banks (10) – all of which will expand reach and offer networked access. That India now has over 600 million debit cards suggesting there's now a very large market, that's accessible, and increasingly inclusive. That the Government has increasingly started routing its social payments through these bank accounts - should further boost the use and comfort of these platforms.

Figure 66. India – Rising number of Mobile Banking transactions



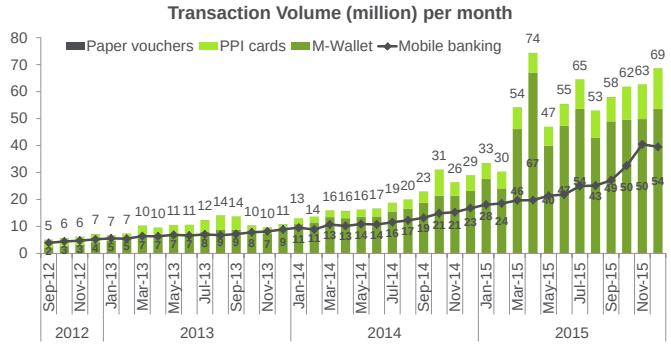
Source: Citi Research, RBI

Payments has been the primary sphere of activity with mobile wallets and mobile banking accelerating

The primary sphere of activity revolves around payments: there is mobile pre-paid money that has made some progress, there is much more activity with mobile wallets (competitive, scaling up fast), and the expansion of broader mobile banking is accelerating at a rapid pace. There is however a long way to go. While the infrastructure has made significant strides – the user case, especially for financial transactions, has yet to gain hold.

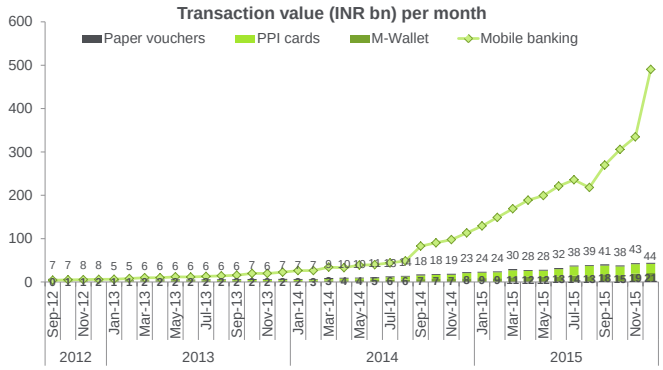
E-commerce payments are still dominated by 'Cash on Delivery' (50%+): significantly more expensive for sellers, with high rates of return — even as the payments infrastructure is in place. The user case has not been established for payments — perhaps due to convenience, cultural, or economic factors. That Uber has started offering 'cash payments' for its services in India (its second largest market now) reflects the relatively slower adoption of digital payments in India versus other markets, such as China or Europe/US.

Figure 67. India Transaction Volumes - Prepaid Payment Instruments and Mobile Banking



Source: Citi Research, RBI

Figure 68. India Transaction Value - Prepaid Payment Instruments and Mobile Banking



Source: Citi Research, RBI

Payments adoption has been low as conventional and regulated banks have a material starting advantage but there is an aggressive push to digital

That payments adoption has been relatively slow probably reflects a cultural/safety aspect, that the conventional and regulated (and safe, in public perception) banks have a material starting advantage. They have continued to dominate the savings market for deposits and payments: and the new environment is both an opportunity and a risk. The Indian banking market is split into two: the newer private banks, and the larger (nearly 70% market share) Government Banks. The private banks are leading the charge with aggressive push, product and marketing, and cognizance of both opportunity and risk. With the private banks positioned as universal banks with a large retail (asset and liability) focus and with the landscape still evolving, there is a carpet bombing approach that most banks are following.

We do see this approach continuing – with banks wanting to ensure that they do not miss any opportunity, or become vulnerable to a changing landscape. This is particularly so with the new payment/ mall bank licenses: including some to telecom operators and mobile wallet players, who could be a disruptive force for incumbents, who otherwise are in a sweet spot in the ongoing financial sector and FinTech disintermediation. The Government banks are selectively also upping their game, but will likely lag, and potentially be victims.

Figure 69. India – How the Payments Landscape Is Evolving

Segment	Progress
Immediate Payment Service (IMPS)	IMPS transactions went up 2X over the last one year from ~9.5 million transactions a month to ~20 million transactions a month In value terms, IMPS transactions went up 135% too (more than doubled)
Mobile Banking Transactions	Number of mobile banking transactions are up 135% (more than doubled) in the last one year (2015) In value terms, mobile banking transactions are up more than 300% (~4+ times yoy): about Rs490bn ($7.3bn) transacted per month on mobile phones in India
Mobile Wallets	Mobile wallet transactions by value also more than doubled (+149% yoy)
Credit Cards	Credit card usage (at POS terminals) is still growing smartly: number of transactions are up 24% in the last one year (2015) Number of credit cards are growing much slower at 12% but credit card transactions by value are growing much faster at 23%
Debit Cards	Debit card usage is also growing fast: 23% increase in transactions, but of that, the velocity is quicker in POS terminals (+47% yoy) vs. at ATMs (still a strong +20% yoy) The number of debit cards in the system grew a strong 27% over the year – much quicker than credit cards.

Source: Citi Research, RBI Data

As significant numbers come into the mainstream, we see significant growth in the financial sector

We see significant growth in the financial sector as significant numbers come into the mainstream, progressively become more active, and the economics continually improve for the banks. As they access these newer customers at lower costs, and as volumes rise we would expect the private banks to, as a group, consolidate their positions. But we do expect the market to widen out significantly: the ecommerce players will likely make a dent in the lending markets, mobile wallets should see some dominant players, the small and payments banks could surprise with some successes and a few Finco franchises could position themselves well. But most of all, we believe the velocity of financial activities and flows, will surge, offering more opportunities than risks to those who get it right.

Emerging Market Mobile Money

A Case Study: Q+A with Aditya Menon

Aditya Menon is a co-founder member of Citi's Global Digital Strategy Team and leads the teams' digital capabilities initiatives. Prior to joining Citi, he was a three-time entrepreneur, twice in the transaction banking space (in payments and trade-finance) and once in the mobile payments space with Obopay. He helped to start a bank as the first CIO for Yes Bank in India, and served as group CIO for mPhasis, prior to its acquisition by EDS/HP.

Why has mobile money been so successful in some emerging markets such as Kenya?

To quote my former CEO at Obopay Carol Realini in her book "Financial inclusion at the bottom of the pyramid" – "M-PESA is an early success story that demonstrates that basic banking services — keeping cash safe and facilitating cash transactions —can be provided to vast numbers of customers who once lived at the bottom of the pyramid and who now can be said to inhabit an open and accessible financial platform." In my discussions with the Hon. Prof. Njuguna Ndung'u former Governor of the Central Bank of Kenya, he stated that between 2006 and 2013 the percentage of population excluded from formal financial services shrank from 39% to 25%. I had first-hand experience launching Yu-Cash in Kenya as M-PESA's first competitor and my view is that a number of key factors contributed to the run-away success of M-PESA. Firstly, a significant investment of over $15m in building out a scalable mobile money and agent servicing platform. Secondly, the growth of a viable non-bank agent network backed by significant investments in a "paint Kenya green" campaign that saw the number of agents grow to over 25,000 in the years between 2007 and 2013. In speaking with Michael Joseph (CEO of M-PESA) in Kenya, he attributed a key factor of success to effective training and cash management policies in handing agents and utter simplicity in the user experience for the customer. In June 2014, there were120,000 agents across all bank and non-bank providers in Kenya that conducted 74 million transactions valued at $2.2 billion. (Prof Ndung'u). The third key factor is proportional regulation that enabled a number of schemes including M-PESA and notably Equity Bank's agent model to thrive.

Do you think large Asian markets such as Indonesia or Philippines could be the next Kenya for mobile money?

Philippines and Indonesia both share a geographical topology that has a highly distributed population spread across thousands of islands. In the Philippines, SMART Telecom occupies a pride of place with 50+ million subscribers across a population of 93 million. They have SMART money which offers mobile banking as well as a prepaid Master-card to millions of subscribers and also successfully partnered with a number of financial institutions to offer a variety of payment services. Globe Telecom focused on the worker remittance market and has seen great success with G-Cash, which has a small but highly profitable franchise due to the emphasis on inward remittance to fund mobile wallet accounts. Although both these products have been in play since 2007, they have not seen the explosive growth of M-PESA, I believe due to my earlier observation of the number of agents per-capita being far lower. Transposing this theme onto Indonesia, we can observe that Indonesia has regulatory barriers that require every agent to obtain a money transmitter license in order to cash-out whereas cash-in is permitted without this licensing. This has been a severe barrier to the creation of a distribution network, even for established m-wallet players like TELCEL. A more fragmented telecom market in both Indonesia and the Philippines will require the growth of inter-operable networks for mobile money to flourish, a role that the central bank can certainly facilitate in the respective markets with the facilitation of a real-time 24x7 cross bank / cross payment provider network.

Why is China so far ahead of India for digital finance? Is China unique or will its experience in other emerging markets?

China has seen the growth of a few whales – Alibaba group that controls ~50% of online and ~75% of mobile payments and Tencent that controls 20% of online and 10% of mobile payments in China. The growth of on-line mutual funds offering 5-7% interest as compared to 3.3% for time deposits and 0.35% for demand deposits saw a huge flight of capital from traditional banks and providers to on-line investment products. In the off-line space the virtual monopoly of one player – China Union Pay is also a unique situation. India has seen a huge growth in e and m commerce in the past 24 months (90% growth 2015-2016 and 44% CAGR 2015-2020) fuelled by a few key players, Amazon, SnapDeal, FlipKart and PayTM, as well as a huge inflow of investments into the space notably from Softbank, Alibaba and others. As we can observe, there appears to be balanced but slower growth of P2P and P2M payment growth in India when compared to China, however India remains more fragmented and from a digital money perspective India is making the transition from need to value whereas China is already playing the more advanced market experience game with a GDP per capita of ~$12.8K compared to India's ~$5.8K, as well as a larger middle class that can participate in the digital economy.

Who leads mobile money innovations in emerging markets? The banks, telecom companies or it is government led initiatives?

Ability to innovate and succeed is highly local to each market. We saw the conditions for lift-off in Kenya, and moderate success in the Philippines with Globe and Smart, however we have not seen any runaway success in India, despite attempts by Nokia, Airtel and others. Telcel in Indonesia has plateaued due to their agent distribution problem and other players are yet to achieve lift-off. In India we have seen the steady growth of government supported inter-bank mobile payment volumes though IMPS from 10.2 million transactions in Jan 2015 to 24.4 million transactions in Jan 2016. Other factors in India such as AADHAR biometric identity program and the opening of over 200 million new bank accounts have also dramatically increased the base, especially for government disbursements. Banks have seen limited success in their mobile-money endeavors to date in emerging markets, with some notable exceptions being Equity Bank Kenya and FNB South Africa. The Indian regulator has recently licensed 11 or so payments banks in an effort to energize mobile money adoption, but these organizations will face significant headwinds with restrictive regulations that don't allow them to undertake any lending activities.

How important can mobile money and digital finance be for the financial inclusion agenda in emerging markets?

Citi partnered with Imperial College London to examine this space and some of the key findings from our third annual symposium in Jan 2016 show that a 10% increase in digital money adoption can lead to 220 million people coming into the formal financial sector resulting in $1 trillion in net new flows in the formal economy, $100BN in increased tax collections, a reduction of $120 billion in lower costs of cash handling at retail, $185 billion in benefits from digitizing government benefits and so on. It's therefore imperative to understand the role of governments, and industry in growing digital money adoption in emerging markets starting with need and then rapidly transitioning the support to value and experience, each of the stages requiring the growth of an overall ecosystem.

Marketplace Lending: The Challenges Are High

Despite marketplace lending being around for over a decade, it has only really taken off in the last few years

Marketplace lending or P2P lending offers online platforms to match borrowers and lenders with the aim of lowering the borrowing cost for borrowers and increasing returns for lenders. Marketplace lending has been around for over a decade but has only seen a take-off in growth over the last few years. Zopa, founded in 2005 in London, is the world's first P2P lending platform.

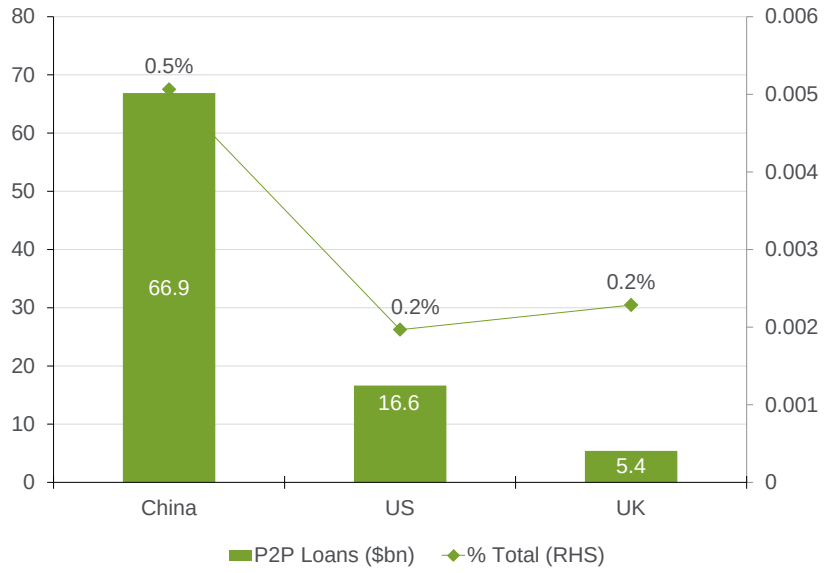
Figure 70. Marketplace Lending

Source: Citi Research

Total loans lent by P2P platforms are less than 1% of total loans outstanding but the market has been growing exponentially

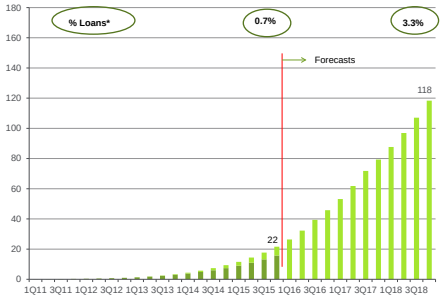
We are still at an early stage of development for marketplace lending. Total loans lent by the P2P platforms are less than 1% of total loans outstanding. Nevertheless, the market has been growing exponentially, especially in the last three years. In the US, P2P lending is dominated by two players Lending Club and Prosper, which together account for over 90% of cumulative lending. The UK has the largest P2P lending market in Europe and China has the largest P2P market in the world. China's cumulative lending of RMB440 billion ($67bn) is close to 4x that of US and over 10x that of UK. In China, P2P cumulative lending volumes today amount to about 3% of system retail loans — and if we were to extrapolate the recent growth rate out to end-2018, the Chinese P2P market would be about 9% of total retail loans. By contrast, the US P2P market is equivalent to 0.7% of total retail loans and even if we extrapolate recent loan growth out to end-2018, the US P2P penetration would be only slightly above the current Chinese level.

Figure 71. China Has the Biggest P2P Lending Market in the World, 2015



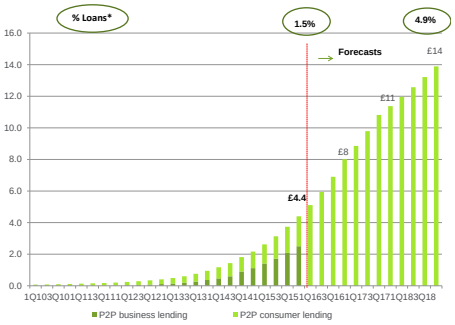
Source: Citi Research; Company Reports and Central Bank Data. % Total system loans (including both corporate and retail loans).

Figure 72. US P2P Finance Cumulative Lending ($bn)



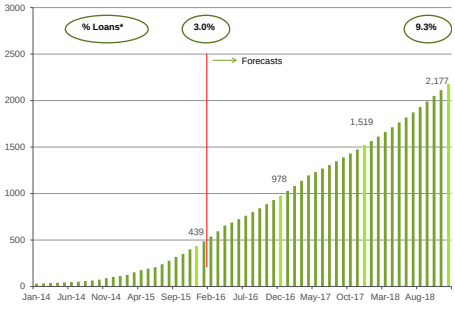
Source: Company Reports, Citi Research; As % of Retail Loans (Mortgage and Consumer Credit) in US

Figure 73. UK P2P Finance Association Members Cumulative Lending (£bn)



Source: P2P Finance Association, BoE, BBA, Citi Estimates; As a % of credit cards, consumer and SME loans (Total £290bn in 2015)

Figure 74. China P2P Finance Cumulative Lending (RMB bn)



Source: Wangdaizhijia; As % of Retail Loans in China

P2P lending platform targets consumer credit and small & micro business lending which is currently unserved or under-served by the existing banking system

P2P lending platforms target segments that are unserved or under-served by existing banking system such as consumer credit and small and micro business lending. Traditional banks are not particularly good at serving this customer segments due to tougher Know Your Client/Anti-Money Laundering (KYC/AML) requirements as well as tightened lending standard post global financial crisis.

Like any marketplace platform, liquidity is crucial for the functioning of P2P lending platforms. The increasing participation of institutional money on these platforms could increase funding liquidity and enable the P2P lenders to take on a bigger market share.

But the marketplace lending business model is yet to be tested through the credit cycle. As the platform gets bigger, increasing regulatory scrutiny and requirements could increase the operating costs of such platforms.

China: The Largest P2P Market in the World

The drivers of China's P2P lending includes under-served consumer and SME customers, search for yield, tighter regulations in banking and overall, consolidation and china's unique O2O model

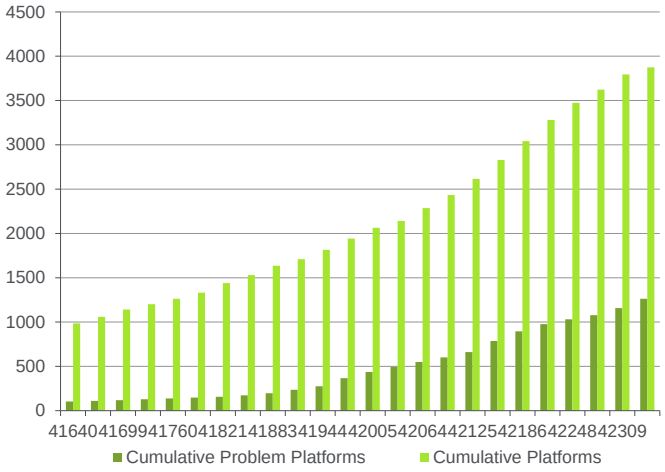
The booming of China's P2P lending is underscored by a state controlled banking system that directs credit towards State Owned Enterprises, a tightly regulated banking sector which created regulatory arbitrage, and savers searching for higher returns than bank deposits. Below we take a closer look at some of these drivers:

- **Under-Served Consumer & SME Customers** – China's banking system is dominated by the state owned banks, which have the tendency to lend to state owned enterprises. The SME sector, which accounts for ~60% of GDP, is massively underserved. According to China MSME Finance Report 2014 by Mintai Institute of Finance and Banking, almost 80% of SMEs were not served by the banks. The explosive growth in the P2P lending has met the needs of SMEs which cannot get formal financing. Equally, China's retail loan penetration is among the lowest in the world at ~20%. Part of the consumer credit demand is met by the P2P lending companies and also increasingly being met by payment companies such as Ant Financial through Ant Check Later.

- **Investors Search for Yield** – The financial markets in China are under developed and offer limited choices for retail investors. Traditionally, bank deposits and property investments are popular investment choices. As the yield on bank deposits has lagged inflation in recent years, some retail investors are searching for higher-yielding products offered by P2P platforms. The guaranteed return offered by some P2P platforms such as Lufax and my089.com are very attractive investment alternatives to bank deposits.

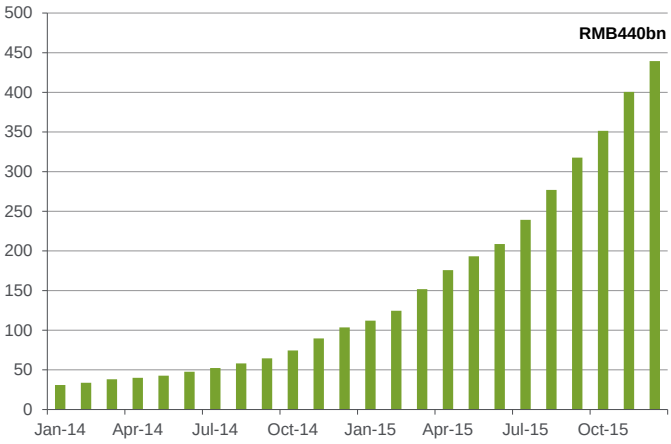
- **Tightly Regulated Banking Sector** – Chinese banks are under tight regulations such as reserve requirement, loan-to-deposit ratios (LDR), KYC, AML, and so on. There was however little regulations for the P2P lending sector. There is also no capital requirement. This reduces the entry barrier and has resulted in a proliferation of homogeneous P2P lending platforms in China (over 2,600), many of which lack a credible business model. The lack of regulation in the P2P space in China has also resulted in high failure rate and fraud rate. The failure rate of the platforms is about 3-5% every month (Figure 75). Recently a high profile P2P lender Ezubao (one of the larger P2P lenders in China), defaulted on its investors amounting ~$7.6 billion. The founders used the platform to create fictitious borrowers and sold the loans to investors (mainly retail individuals) seeking higher return. This incident has alarmed officials to increase the regulation in the P2P lending space.

Figure 75. Number of P2P Lending Platforms in China



Source: Wangdaizhijia

Figure 76. Cumulative P2P Lending in China (RMB Billion)



Source: Wangdaizhijia

- **Increased Regulatory Scrutiny** – There is increasing regulatory scrutiny on the P2P lending space in China as the sector grows. In December 2015, the State Council issued a consultation paper on P2P lending that tightened the regulatory control of the sector, requiring that: (1) platforms must be registered with the local finance authorities; (2) borrowers and investors must use real names; (3) platforms must use banks as custodians for customers funds; and (4) platforms be banned from taking deposits from the public, setting up asset pools, giving guarantees, selling wealth management products, financing stock purchases or engaging in equity/real asset crowdfunding. Furthermore, the paper encourages platforms to reduce concentration risk and issue mainly small loans and set single borrower limits. We believe increased regulation will be beneficial for the long-term healthy development of the sector.

- **Consolidation Expected** – Regulation creates higher barriers to entry and investors are more likely to be selective when choosing a platform in light of the high platform failure rate and fraud levels. Hence, we expect China's P2P lending platforms to consolidate in coming years. Platforms with sustainable business models, prudent lending practices and adequate risk management are likely to be the winners in the long term.

- **Unique O2O Model** – The P2P lending model in China is mostly a hybrid offline-online model, where investors are sourced online but loan acquisition is done offline either by partnering with non-bank financial institutions or by the platform's own agents or staff. Due to the lack of credit information, P2P lenders have to rely on offline traditional credit assessment methods. Many platforms actually don't have their own risk management system and rely on third-party loan originators to assess credit risks. This model, in our view, is prone to credit problems in a credit downturn. Eventually, we believe P2P lending will have to migrate to a purer online model in order to gain a sustainable competitive advantage over traditional banks and financial institutions. Lufax is an example of the hybrid model. Another important difference between the China model and the developed market model is that the O2O platforms are subject to credit risk. Most platforms in China guarantee investor returns and mitigate credit risk through third-party guarantees.

Figure 77. Lufax Business Model

Source: Company Website

Figure 78. P2P Business Model Compared - Online and O2O

	On line	Offline to Online (O2O)
Role	Facilitate matching of investors and borrowers	On-line for investors, off-line for borrowers
Capital Retention	No or little capital retention	Platform retain part of the credit risk (guaranteed investor returns) or through third-party guarantee
Strength	Fast processing time	Better risk control especially when lack of credit history
	No credit risk	Post-lending management
Weakness	Lack of credit data	Higher human cost
	More prone to fraud (fake identify/documents)	Time consuming
	Higher risk of money laundering	Geographic limitation

Source: Citi Research

- **Potential Markets Across Asia** – P2P lending is relatively new and small across Asia with the exception of China. In the rest of the region, startup P2P lenders are mostly in developed Asia where consumers are better banked and credit information is more readily available. Digital infrastructure is more mature in developed Asia and so it is easier to replicate the highly automated and online P2P lending models seen in the US and the UK. Some of the P2P lending marketplaces in the region include: Society One in Australia, Monexo in Hong Kong, Money Auction/Pop Funding in Korea, and Faircent in India. While most of these are focused on unsecured consumer lending, a handful of P2P lenders (such as MicroGraam in India and MEKAR in Indonesia) are also engaged in socially responsible lending to the unbanked, aimed at increasing financial inclusion.

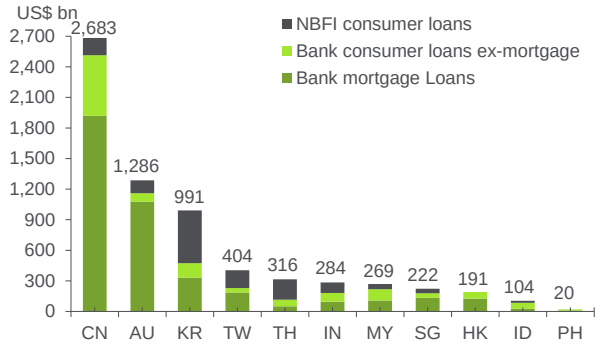
$6.8 trillion of consumer credit potentially up for grabs even before counting the underbanked segment

- **Outlook** - In the coming years, we believe P2P lending will disintermediate a portion of the existing consumer credit and small business lending in Asia. We estimate that there is $6.8 trillion of consumer credit in Asia ex Japan, which overall accounts for 38% of GDP and 32% of total loans in the banking system – not an insignificant size. Our consumer credit figure includes mortgage lending, consumer credit (e.g. credit cards, personal loans) and also lending by non-bank financial institutions.

Higher yielding lending is most susceptible, mortgages in HK and Singapore unattractive

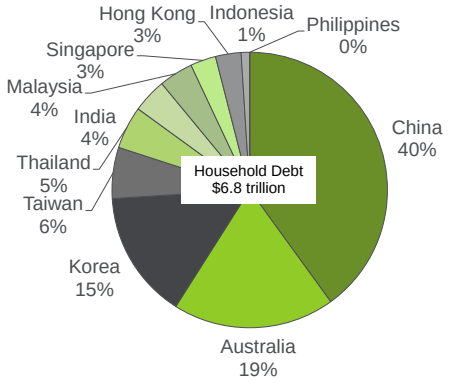
Not all types of consumer credit will be disintermediated – higher yielding unsecured consumer credit will be more susceptible in general whilst low-yielding mortgages in HK and Singapore will be unattractive for lenders. In underbanked countries, the potential addressable market could be significantly larger than our figures, which ignore future potential as banking penetration deepens. In China for example, a leading non-bank financial institutions estimates that the potential market for unsecured small business lending is around Rmb20trn, this is larger than the existing stock of consumer lending in the country of Rmb16 trillion ($2.5trn). We believe this potential is enormous in countries like the Philippines, India, and Indonesia where even the official penetration of consumer credit is very low at only just 10-15% of GDP.

Figure 79. Asia Household Debt in USD (2014)



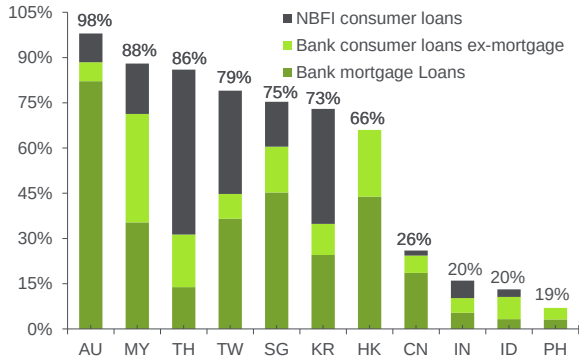
Source: Central Bank & Statistical Office Websites, CEIC, Citi Research

Figure 80. Asia Household Debt Mix by Country (2014)



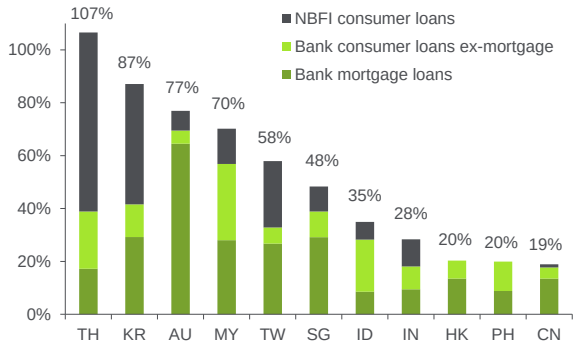
Source: Central Bank & Statistical Office Websites, CEIC, Citi Research

Figure 81. Asia Household Debt as Percent of GDP (2014)



Source: Central Bank & Statistical Office Websites, CEIC, Citi Research

Figure 82. Asia Household Debt as Percent of Banking Loans (2014)



Source: Central Bank & Statistical Office Websites, CEIC, Citi Research

Figure 83. Asian Household Debt

Figures in USD bn (2014)	Bank Mortgage Loans	Bank Consumer Loans ex-Mortgage	Non-Bank Consumer Loans	Total Household Debt	Total Household Debt as Percent of GDP
China	1,919	594	170	2,683	26%
Australia	1,078	83	125	1,286	98%
Korea	333	140	518	991	73%
Taiwan	187	42	175	404	79%
Thailand	51	64	201	316	86%
India	95	87	103	284	16%
Malaysia	108	110	51	269	88%
Singapore	134	45	44	222	75%
Hong Kong	127	64	n.a.	191	66%
Indonesia	26	59	20	104	13%
Philippines	9	11	n.a.	20	7%
Asia Pacific x-JP	4,065	1,299	1,406	6,771	38%

Note: NBFI consumer loans include: - in Korea: loans from non-bank depository corp., mutual credits, credit union, other financial corporations, and pensions funds, - in Taiwan: credit co-operatives, Chunghwa Post, insurance, and pension funds - in Thailand: personal loan companies, co-operatives, insurance and securities companies
Source: Central Bank & Statistical Office Websites, CEIC, Citi Research

Lufax (陆金所) Case Study

Lufax is Ping An Group's Internet finance platform and the largest online P2P or financial marketplace in China. Being a part of Ping An's financial ecosystem has helped Lufax develop rapidly, in particular Lufax leverages on Ping An's rich customer database of 89 million for risk control and the Ping An brand has enabled Lufax to quickly establish a safe and strong brand image. Lufax's goal is more ambitious than other P2P lenders in that it aims to be an open marketplace for loans and non-standard financial assets, for individuals, companies and institutions. Investors are sourced online while borrowers are sourced offline. As of December 2015, Lufax's total active users reached 3.6 million.

Lufax raised $1.2 billion in January 2016 from investors including Bank of China, Guotai Junan Securities and Minsheng Bank that would value the company around $19 billion according to FT (January 18, 2016). Lufax is also eyeing an IPO in Hong Kong in the second half of 2016 (Bloomberg, January 27, 2016)

Products – Lufax offers unsecured and secured consumer loans. Unsecured consumer loans are on average Rmb60-70k ($9-$11k) in size, 1-3 years in duration and guaranteed by a third-party guarantee company. Secured consumer loans are usually collateralized by real estate and are 3-12 months in duration. Investors in unsecured consumer loans typically receive 8.4% and 7-8% for secured consumer loans.

For Lufax's consumer business: investors are all individuals; borrowers are all individuals with insurers, AMCs and micro enterprises also providing assets on the platform.

For Lufax's corporate business: asset providers and investors mainly include banks, insurers, trust companies, asset management companies, securities and fund companies. Major assets placed on the platform include universal life insurance, mandated pension products, enterprise creditor rights and bank acceptance drafts.

Lufax charges borrowers and investors service fees and management fees. Lufax also receives an information service fee from guarantee companies. The cost of credit guarantee is borne by borrowers. Lufax also receives a fee for the transfer of loans/assets in the secondary market by investors. Bad debt ratio of unsecured P2P loans is 5-6% annualized; credit risk is borne by the guarantee companies and Lufax acts only as an information platform, i.e. it takes no credit or liquidity risks.

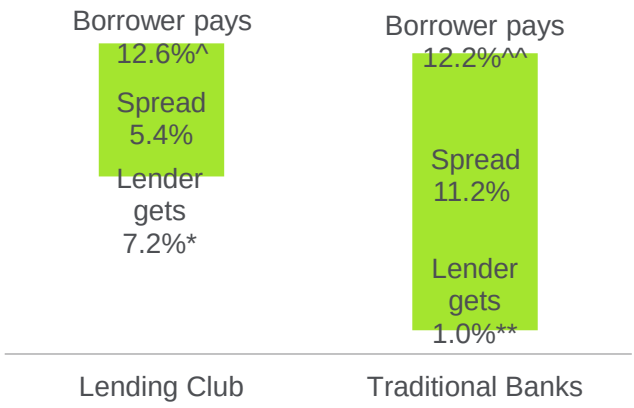
P2P Lending in the US and Europe

In developed markets, the driver of P2P lending is higher efficiency than traditional banks

In the developed markets, P2P lending is almost based entirely on an online business model. It offers a slightly different value proposition of higher efficiency than traditional banks.

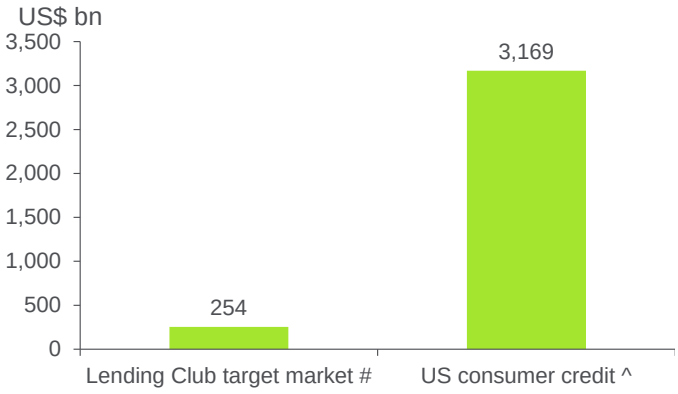
- **Value Proposition** – Apart from faster processing times and lower borrowing costs (due to branchless model), P2P lenders help service customer segments that are not ordinarily viable for banks. On the other hand, lenders enjoy higher returns vs other traditional bank products and have the opportunity to diversify their investments (as a single lender can choose to invest in multiple projects, thereby funding only a part of the whole project and diversifying his risk).

Figure 84. Interest Spreads at Traditional Banks vs. Lending Club



* Based on median return of investments over time horizon of 12-18m
^ Based on lastest average lending rate in 4Q15
** FDIC 12m return on Non-Jumbo Deposits (< $100,000) Dec 2015
^^ Commercial bank credit card rate Dec 2015
Source: Company Website, Fed, FDIC and Citi Research

Figure 85. US Consumer Credit vs. Lending Club Target Market



Based on Citi's estimate (in report Lending Club Corp.) after considering US revolving consumer credit ($882bn)and loans under made to small business ($298bn).
^ Consumer credit in US excluding mortgages
Source: Havers, Citi Research Estimates

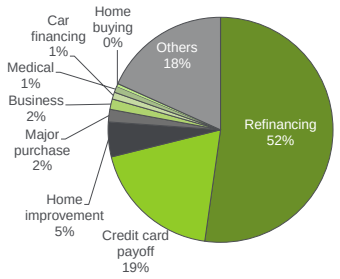
- **Market Size** – Prominent P2P platforms in the West are Lending Club and Prosper in the US and Zopa in the UK. They currently account for a miniscule share in the total credit pie (<1% of US and UK consumer lending), but they've been growing exponentially – Lending Club and Prosper originated loans of over $8 billion in 2015 alone.

  The addressable market for P2P lending potentially includes revolving credit card loans, student loans, and loans to small and medium businesses. We estimate in the US, this market totals $3.2 trillion, of which $1.3 trillion is held by commercial banks and the rest by non-bank financial institutions. Citi analyst Mark May estimates the target market for Lending Club's and its peers is about $254 billion – around 8% of total addressable US total consumer credit market (see Figure 85).

- **How it Works?** – Potential borrowers submit applications on the digital platform, similar to any traditional loan application. The platform staff then verifies borrower information (such as credit history, revenue sources) and assesses loan risk, before setting a grade and interest rate. Potential lenders review available applications and select borrowers they want to fund. Once confirmed, the website passes the money from the lender to the borrower. Subsequently the platform also facilitates repayments from the borrower to the lender. On Lending Club's

platform, nearly 80% of lending volumes now come from institutional investors like hedge funds and other businesses entities.

Figure 86. Lending Club Loan by Type (2014)



Source: Company Reports and Citi Research

- **Types of Loans** – Primarily unsecured consumer loans for refinancing, credit card payoffs, and home improvements with durations of 3-5 years. A few P2P lenders like Funding Circle in the UK specialize in lending to small businesses only.
- **Revenue Model** – P2P platforms generate revenue from origination fees charged to borrowers (usually 1-5% of loan granted) and service fees charged to lenders (usually 1% per year of principal borrowed).
- **Secondary Market** – Key players in the US and the UK offer secondary markets where lenders can liquidate current outstanding loans.
- **Counterparty Risks** – Unlike banks, P2P marketplaces do not undertake any risk in case of borrower default as they do not lend or borrow directly and also do not set aside any capital reserve. All risks are borne by the lender. However, a few P2P lenders, particularly in the UK, feature protection funds designed to compensate lenders exposed to loan defaults.

Figure 87. Key Players in US and UK P2P Lending Space

Company	Target customers	Economics	Transacted volume	Avg Loan Size	Avg Interest Rate	Avg Return to Lender	Historical Bad Debts
Lending Club (US)	Individuals and small institutions	Earns 1-5% as origination fee from the borrower depending on loan grade, tenure. Lenders pay a service fee of 1% for each repayment received from the borrower	Originated over US$16bn loans since 2007. Growth in recent years has been strong with loans originated in 2015 totaling US$8.4bn	US$14,000	12.6%	5.6 – 9.1%	5.53%
Prosper (US)	Individuals	Earns 1-5% as origination fee from the borrower depending on loan grade, tenure. Lenders pay a service fee of 1% p.a. for outstanding principal balance of loan	Originated over US$5bn loans after starting in 2006. Originations in LTM to 3Q15 exceeded US$3.1bn.	US$11,400	15.30%	9.33%	6.60%
Zopa (UK)	Individuals and business	Borrowers pay an origination fee of 1.2% - 4.4%, while lenders pay an annual fee of 1.0% on the amount they lend.	Lent more than GBP1.34bn to over 150,000+ UK borrowers since its founding in 2005.	GBP 7,300	8.00%	5.00%	1.79%
Funding Circle (UK) *also available in US	Small businesses	Borrowers pay 2-5% as origination fees. Lenders pay an annual 1% service fees on loan outstanding for each loan	GBP1.12bn lent to more than 40,000 British businesses	GBP15,000	10.90%	6.30%	1.50%

Source: Company Websites and Citi Research; Last update: Feb 2016

Risks to Marketplace Lending Platforms

Competition

With a large number of competitors in the space, success will increasingly be based on a company's marketing and branding

Given the growth and outlook for the online alternative lending sector, there are a large number of companies and significant venture capital invested in this space. While there are increasing institutional money seeking P2P as an alternative asset class, which provide valuable liquid funding for the platforms, the long term success of the companies would increasingly be based on the efficacy of a company's marketing and branding.

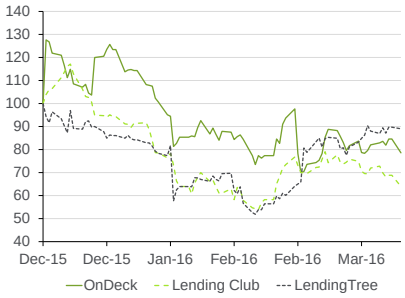
In addition, there is increased bank participation in the space to broaden its customer base (e.g. collaboration between JPM and OnDeck). In China, the number of P2P platforms backed by banks has increased from 3 in early 2014 to 14 at the end of 2015. In developing markets such as China, the bank backed P2P

companies have competitive advantages over privately owned P2P platforms as investors believe they have the 'implicit' government guarantee for investments through banks. Ping An backed Lufax is one of the largest P2P platform in China.

Other Internet companies such as Amazon, which have large user bases, may also want to monetize their user data to grow into the lending business. Many payment companies, as explained in the payment section, are growing consumer and SME lending.

Interest Rate and Credit Cycle

Figure 88. Share Price Change of US P2P Lenders



Source: Citi Research; Indexed to 100 at 1 Dec 2015

The marketplace lenders have only been around for a decade. They are currently benefitting from a record low interest rate environment that resulted in lenders/investors in search of yield and drawn them to its marketplace. The borrowers are also enjoying the lower debt servicing cost in a low rate environment. But the business model is yet to be tested against interest rates and credit cycles. There is concern that higher rates resulting from Fed tightening could negatively impact business models levered to consumer credit such as Lending Club. The Fed rate hike in December 2015 already resulted in a correction in the share price of US P2P lenders.

It is possible the market is over reacting to the Fed's rate decision. An examination of the historical performance of stocks levered to the consumer credit markets, namely the current card companies and as well as monolines such as MBNA, Providian, and Metris suggested that these stocks have tended to perform well both in a Fed tightening cycle and a loan growth cycle. Nevertheless, the business model of P2P lending is much less established than the traditional banks. The impact of credit and rate cycle is yet to be tested.

Regulatory Pressure

Increased regulatory pressure could be a burden if the asset class exhibits meaningful underperformance of sizeable defaults

As it stands currently, the alternative lending space has generally avoided falling subject to restrictive regulation that would impede alternative lending business models. That said, it is difficult to rule out increased regulatory burden for Lending Club and similar business models, especially if the asset class was to exhibit meaningful underperformance or sizeable defaults. We think likely impacts of increased legislation could include: (1) risk retention requirements, similar to those made of sponsors of asset-backed securities under Dodd-Frank; (2) minimum capital requirements to help alternative lending platforms withstand financial shocks, which are required in the UK; and (3) heightened disclosure and reporting requirements that could become more burdensome and expensive.

The UK has created a clear set of laws tailored to the P2P industry

While the US regulatory environment with respect to the alternative lending market remains unclear, with multiple governing bodies and numerous laws that are not fully applicable to these platforms, we note that the UK has created a clear set of laws tailored to the industry. Notable rules established by this legislation mandate minimum capital requirements to help alternative lending platforms withstand financial shocks, procedures to prevent commingling of client funds, arrangements for back-up loan servicing, requirements for useful and accurate disclosures that are not overly burdensome, and ongoing reporting procedures.

Relaxed regulation in P2P lending vs. the traditional banking was a driver of China's P2P platforms

Historically, China's tight regulation in the traditional banking sector and relaxed regulation in P2P lending have created regulatory arbitrage, which fostered the rapid growth of China's P2P platforms. The high level of platform default rate (3-5%) and the subsequent social hazard warrants increased regulation in China's P2P sector. In developing markets such as China, regulation can be a positive catalyst for the long term growth of the sector to instill trust in the system.

Banking's Uber Moment

Connectivity Replaces Physical Assets

Antony Jenkins, the former CEO of Barclays, in a Chatham House speech recently argued that banks were facing their Uber-moment: "*The incumbents risk becoming merely capital-providing utilities that operate in a highly regulated, less profitable environment, a situation unlikely to be tolerated by shareholders.*"

He added: "*In my view only a few [incumbent banks] will have the courage and decisiveness to win in this new field. We will see massive pressure on incumbent banks, which will struggle to implement new technologies at the same pace as their new rivals. That will make it increasingly challenging for them to deliver the returns and profitability that their shareholders demand. Ultimately, those forces will compel large banks to significantly automate their business. I predict that the number of branches and people employed in the financial services sector may decline by as much as 50% over the next 10 years, and even in a less harsh scenario I expect a decline of at least 20%*".

The shift to mobile means a disintermediation of bank branches rather than banks themselves

Banks' Uber moment will mean a disintermediation of bank branches rather than the banks themselves. Specifically, it will mean the shift to mobile distribution being the main channel of interaction between customers and the bank. The return of having a physical branch network is diminishing. The concept of retail banking profitability equaling outlet profitability will no longer be valid. Branches will be only one of the distribution channels. They will still play an important albeit diminishing role.

Shifting Customer Behavior

The adoption of smartphones and mobile devices has changed the way customers interact with their banks today

The adoption of smartphones and other mobile devices have fundamentally changed the way consumers interact with their banks today. According to the Accenture Banking Customer Survey 2015 (Figure 89), a customer interacts with their main bank about 17 times a month on average across multiple-channels. Non-human contact such as Internet and mobile banking, ATM, and social media accounts for 15 of those interactions.

We believe an omni-channel strategy is the winning solution for incumbent banks over the next decade

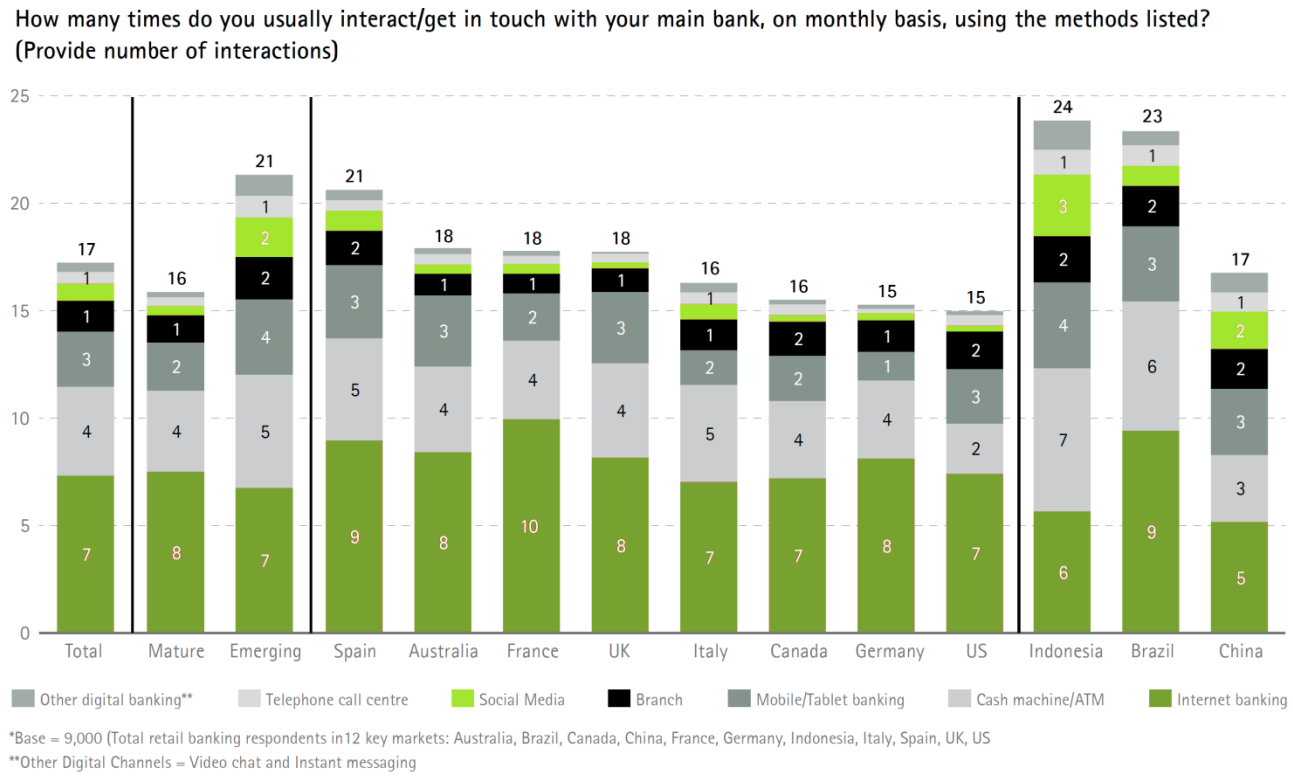
This shift in customer behavior is making banks rethink their channel strategy. In our view, an omni-channel strategy is the winning solution for incumbent banks over the next decade because customer interact with their main bank via multiple channels rather than a single channel. The omni-channel strategy should be built around a competitive digital banking offering, a reduced and modernized branch network and lastly, a targeted channel strategy for different segments of customers.

The role of branches is changing from transactional to advisory and banks are resizing, repositioning and re-energizing branches to meet customer needs

Banks will follow consumer behavior and close branches as they see their consumers shift away from branches to digital. The shift is happening at a faster pace in Europe than in the US. Digital adoption (and most importantly, digital-only banking) varies by country along a maturity curve. The role of the branches is also changing from transactional to advisory. Rather than closing branches outright, banks are resizing, repositioning, and re-energizing branches to meet changing customer needs.

Customers may largely stop visiting branches for transaction-related services, but still prefer human contact for handling complicated issues or life changing events (e.g. their first mortgage loan). In the UK, some banks are installing self-service machines in the branches to handle transaction related services but at the same time banks such as Virgin Money are transforming their branches into "lounges", a place where customers can meet, relax, and even have a cup of coffee.

Figure 89. Number of Interactions with Main Bank Every Month By Channels



Source: Accenture, Banking Customer 2020, Rising Expectations Point to the Everyday Bank, 2015

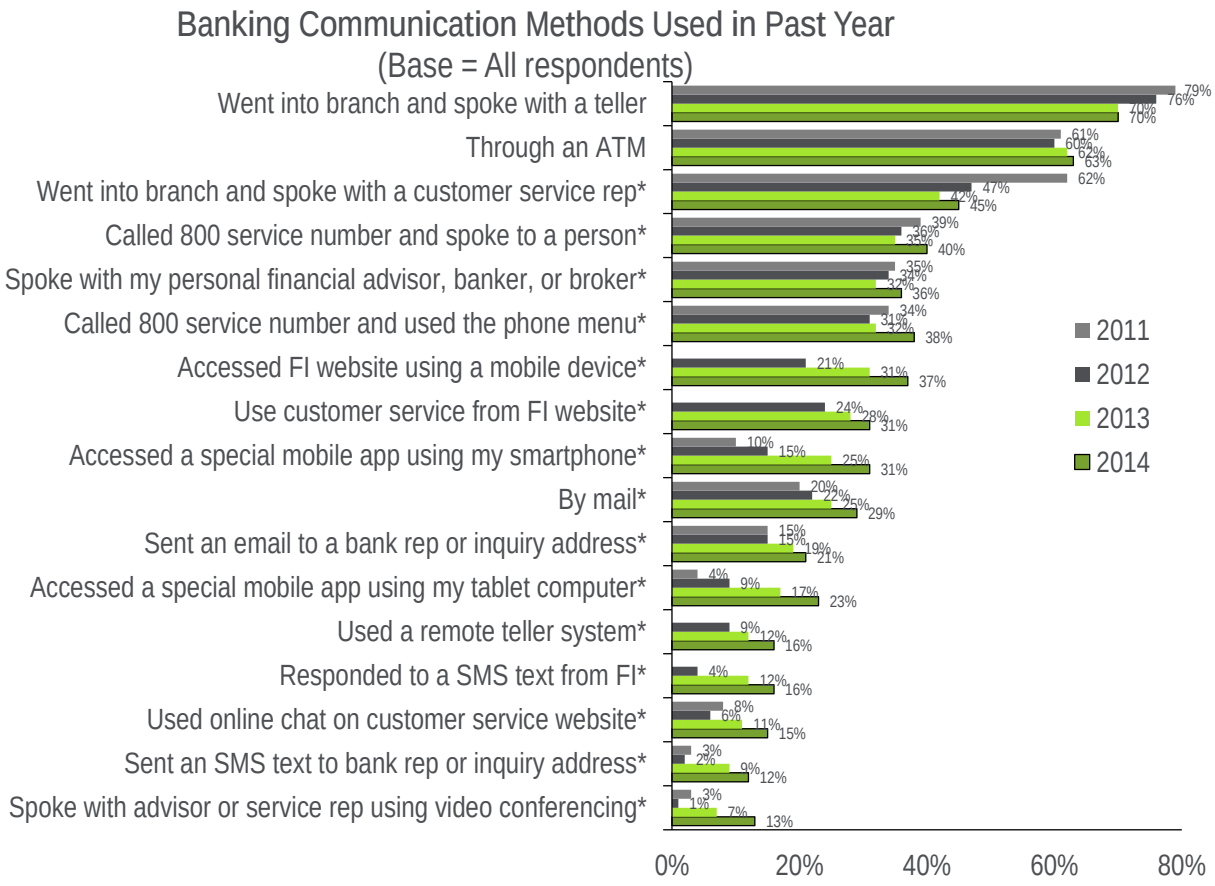
As not every customer has the same level of digital competency, it is important to incorporate an omni-channel strategy

The diverse nature of a banks' customer base underlines the importance of an omni-channel strategy. Not every bank customer has the same level of digital competency. Take the US market for example, in 2014, according to Mercator Advisory Group customer survey, 70% of customers still visited a branch. Branches remain the most important communication channel to the US customers. Other channels serve as complements to branches rather than substitutions. We think a successful channel strategy should cater for the differentiated customer segments. Banks could promote digital awareness among their branch visiting customers and offer alternative channels of interaction.

Given customer behavioral change happens gradually, traditional banks have time to adapt

The positive news for banks is that customer behavioral change happens gradually, which allows the traditional banks time to adapt and develop a digital channel strategy to meet new customer needs. Furthermore, in many developed markets, where retail banking is well penetrated, the incumbents have leading digital channel offerings. Many 'digital only' challenger banks have a high entry barrier and struggle to differentiate in these markets (e.g. Scandi, UK).

Figure 90. Banking Communication Channels of Importance to US Banking Customers



Note: * Statistically significant difference 2013-2014 at the 95% level
Source: Mercator Advisory Group Customer Monitor Survey Series, Banking and Channels, 2011– 2014, Question 10

Branches Halved Already in the Nordics

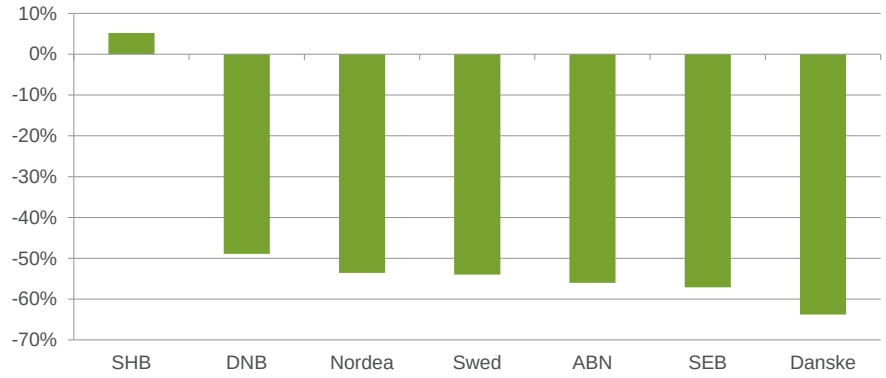
Branch strategy will vary by region, with the US and European markets seeing reduction but emerging markets could see branches continue to grow

We agree with Antony Jenkins' comment that the number of branches could well halve over the next decade – however, while we believe that this will be the case in some European markets, it would be overly simplistic to assume a reduction of branches globally at the same rate because of regional differences in customer digital acceptance and demographic mix. In an emerging market where retail banking penetration is low, branches will continue to grow – for example, in India. In developed markets, branch numbers will likely shrink. But in certain areas, such as wealthy cities such as New York, or rapidly growing suburbs, branch numbers could continue to increase.

The Nordic region has already halved the number of branches since their peak in 2008-09

The Nordic region remains one of the leading laboratories for change in retail banking distribution. The number of branches has already halved in major Nordic banks since their peak in 2008-2009 (Figure 91). And this Nordic trend is expected to continue. DNB announced on its investor day on November 25, 2015 that they will halve the number of retail branches in 2016, driven by the digitization of retail banking and shift in customer behavior. Of course the Nordic banks are ahead of other developed countries in branch reduction but interestingly for them efficiency begets further efficiency gains.

Figure 91. Nordic and Benelux Banks Number of Branch Reduction from Peak (3Q15)



Source: Company Reports and Citi Research; ABN based on reduction since 2009 to 1H15.

Figure 92. Commercial Bank Branches Per 100k Adults By Country and Region

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Chg 14 vs 04
Euro area	33.6	31.9	33.9	37.3	36.6	35.4	34.2	35.5	32.0	29.6	28.0	-17%
United States	32.5	33.1	33.7	34.6	35.0	35.7	35.3	35.0	34.8	33.6	32.4	0%
East Asia & Pacific	13.9	12.5	11.4	10.7	10.4	10.6	10.5	10.0	9.7	9.9	10.8	-22%
LatAM & Caribbean	12.5	12.6	13.2	13.3	14.4	13.7	14.2	14.2	15.1	15.0	15.7	26%
Nordics	25.0	25.1	25.8	26.0	25.5	23.7	22.5	21.6	19.9	18.2	17.4	-30%
Netherlands	33.7	28.1	27.7	28.6	27.6	25.2	23.0	21.3	19.7	17.4	14.8	-56%
Denmark	50.1	50.2	50.5	51.8	50.4	45.8	40.9	38.7	34.1	30.1	27.9	-44%
Ireland	35.9	34.6	33.9	33.1	33.7	34.4	28.2	27.2	24.6	22.9	21.4	-40%
Qatar	23.6	21.9	20.3	19.3	19.0	18.6	18.4	13.3	13.2	12.5	14.4	-39%
Norway	13.1	12.1	12.0	12.3	11.6	10.9	11.0	10.7	9.9	9.0	8.6	-35%
United Arab Emirates	17.3	15.0	14.0	13.1	12.9	12.2	11.9	11.8	11.9	12.4	11.9	-32%
Spain	97.7	99.5	102.0	104.4	104.0	99.3	96.1	88.5	84.1	74.0	70.2	-28%
Malaysia	13.9	12.5	11.6	11.4	11.2	11.1	10.9	11.2	11.1	10.9	10.9	-22%
Portugal	66.6	68.3	70.8	61.5	64.2	65.8	66.0	64.1	61.3	58.3	53.6	-19%
Greece	33.6	34.7	37.5	39.5	41.9	41.7	40.9	39.4	37.4	32.3	28.0	-17%
United Kingdom	29.0	28.3	26.4	26.4	26.0	25.4	24.7	24.1	22.1	25.2	25.2	-13%
Sweden	23.6	23.6	23.7	23.6	24.0	23.0	22.5	21.7	21.8	21.6	21.1	-10%
Finland	13.2	14.4	16.9	16.1	16.1	15.0	15.5	15.1	13.6	12.2	12.1	-8%
Italy	64.1	64.8	66.3	67.8	71.6	68.8	67.8	67.5	65.9	62.7	59.6	-7%
Australia	30.7	30.6	31.2	31.7	31.5	31.2	30.7	30.3	30.9	30.2	29.2	-5%
Israel	19.8	19.6	19.4	19.4	19.8	19.6	19.4	20.1	20.1	19.6	19.1	-2%
Canada	-	-	24.6	24.7	24.6	24.2	24.1	24.2	24.3	24.2	24.0	-2%
Japan	34.6	34.4	34.1	33.9	33.8	33.8	33.8	33.9	33.9	33.9	33.9	-2%
Argentina	13.5	13.2	13.2	13.2	13.1	13.0	13.0	13.2	13.3	13.3	13.3	-1%
Philippines	8.3	8.0	7.9	7.6	7.7	7.6	7.7	7.9	8.1	8.4	8.8	7%
Brazil	-	-	-	40.9	43.1	43.9	44.0	45.4	46.5	47.0	47.3	16%
Saudi Arabia	7.9	7.6	7.7	7.9	8.0	8.4	8.5	8.6	8.6	8.8	9.2	16%
Nigeria	4.7	4.1	3.7	5.2	6.2	6.4	6.5	6.4	5.8	5.9	5.6	19%
Egypt, Arab Rep.	3.9	3.9	4.1	4.4	4.6	4.8	4.8	4.8	4.8	4.8	4.8	23%
Poland	26.6	26.5	27.6	29.6	32.7	32.8	32.1	32.5	33.9	33.0	33.0	24%
Kuwait	12.7	13.5	14.4	15.3	15.5	16.0	16.1	16.6	15.7	16.7	16.9	33%
Chile	12.5	13.1	13.8	14.9	15.3	16.9	17.3	17.2	17.1	17.0	16.8	34%
Russian Federation	26.7	28.4	30.4	33.7	35.6	34.7	35.2	36.8	38.3	38.5	37.0	39%
Mexico	10.6	10.7	11.1	12.2	13.1	13.7	14.2	14.2	15.1	15.0	14.9	40%
India	9.0	9.0	9.0	9.1	9.4	9.7	10.1	10.6	11.3	12.0	13.0	44%
Turkey	-	13.0	14.1	15.3	17.1	17.3	17.9	18.3	18.7	19.8	19.8	53%
Thailand	7.8	8.4	9.2	9.8	10.4	10.9	11.2	11.5	11.8	12.2	12.7	62%
France	21.6	22.0	45.9	44.9	44.5	41.9	41.5	41.3	38.9	38.6	38.0	76%
Kenya	2.7	2.6	2.7	3.5	4.1	4.4	4.7	5.0	5.3	5.4	5.8	115%
China	-	-	-	-	-	-	-	-	7.7	7.8	8.1	-

Source: WorldBank; Citi Research

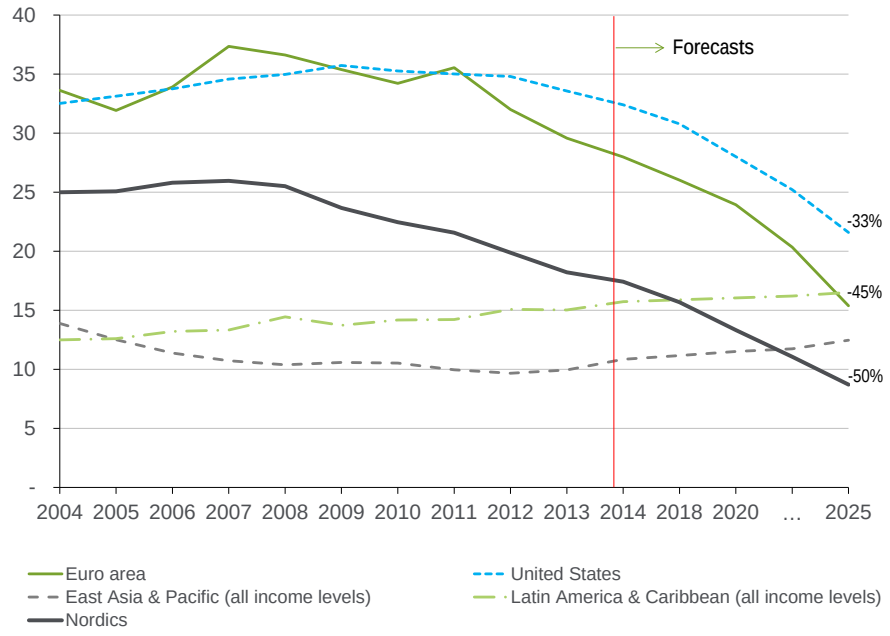
Digitization to Drive Cost Efficiency

We expect the gap in branch density to narrow between developed and emerging markets as developed markets close branches and emerging markets maintain or open branches

Over the next decade, we expect the gap in branch density between developed markets and emerging markets to narrow as developed market banks close branches and emerging market banks maintain or open more branches. We believe the consumer banks in the US and Europe are at a tipping point in terms of branch distribution. Northern Europe has already done a lot. Nordic and Dutch banks have cut total branch levels by ~50% from recent peak levels. We believe that from 2013 levels (last reported branch/population penetration data from the World Bank), developed market banks could cut branch numbers by another 30-50%. DNB, already operating in the developed market with the lowest branch penetration/population ratio, announced in late 2015 that they will further halve their branch network in 2016.

The US banks have up to now lagged their Nordic and European peers on branch reductions. But with the increased ubiquity of the mobile Internet, increasing FinTech competition and a sluggish revenue and profitability environment, we expect US banks to follow their European peers on cutting branches. The US banks on average appear to be about 5 years behind European banks who are in turn about a decade behind the Nordic banks.

Figure 93. Commercial Bank Branches Per 100k Adults By Region



Source: WorldBank, Citi Research

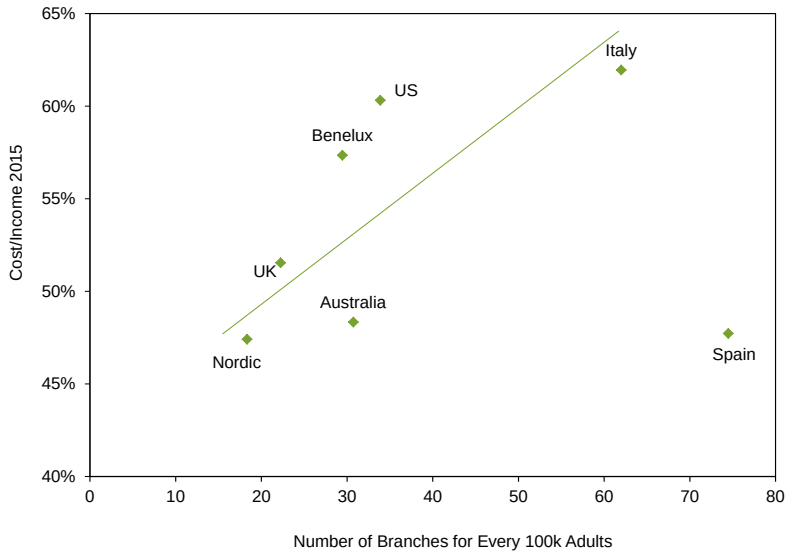
Nordic banks are ahead of other regions in branch reduction and cost efficiency driven by digitalization. The average cost-to-income ratio of Nordic banks is around 45% and the best in class Nordic banks such as DNB and Swedbank's cost to income ratio is close to 40% and improving.

If banking systems in the US, Europe and Japan operated at the same operating levels as the Nordic region it would remove $175 billion from their 21016 cost base and add 39% to 2016 pre-tax profit

If the cost-to-income ratio of global banks under Citi Research's coverage reaches the level of Nordic banks (assuming constant income), that will result in about a 10% reduction in the cost base. The developed market banks in Japan, the US, and Europe have the most upside from cost reduction. If the banking system in Europe, Japan, and the US operated with the same cost/income ratio as the Nordic region it would remove $175 billion from their cost base (or 23% of 2016 costs) and add 39%

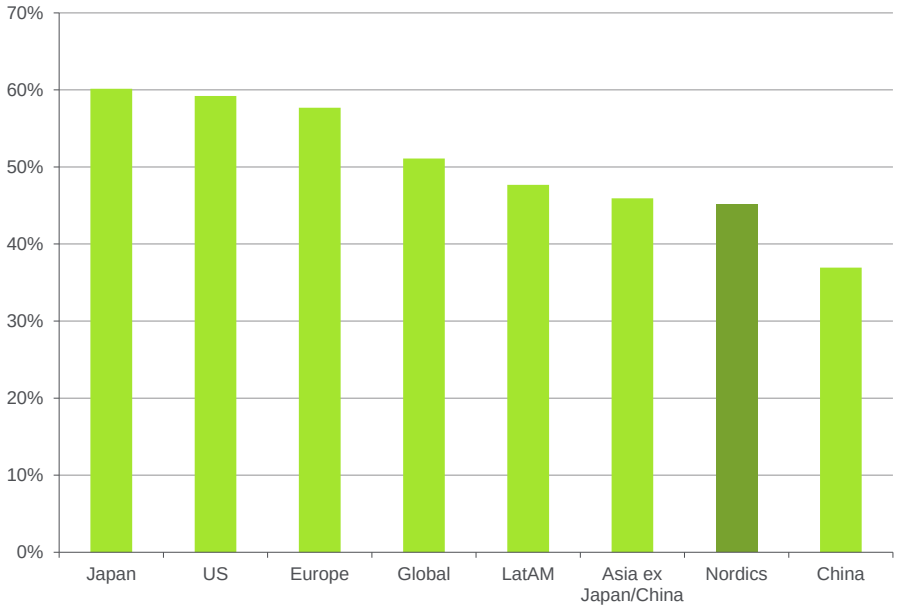
to the 2016 pre-tax profit of the banks. Of course, this is a hypothetical simplification but illustrates the upside from better use of technology, efficient operations and an oligopoly market structure that the Nordic banks benefit from.

Figure 94. Developed Market Banks: Lower Branch Density, Better Cost Efficiency



Source: Company reports, Citi Research; Spain is an outlier as it has a lot of small branches

Figure 95. Global Banks Cost to Income Ratio 2016E



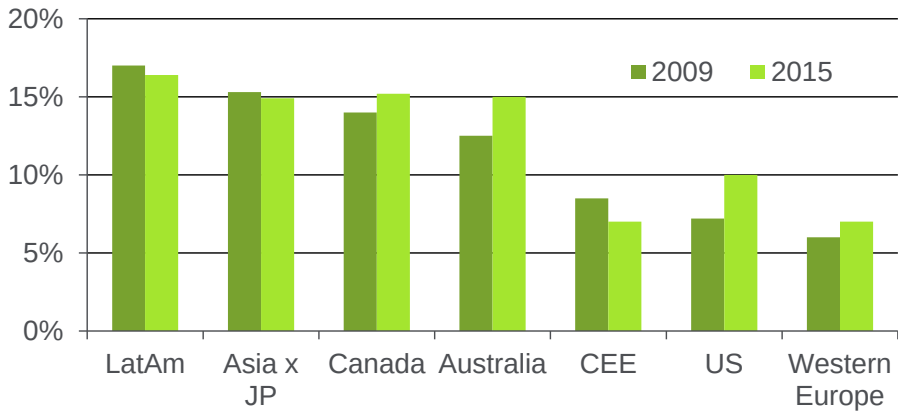
Source: Citi Research Estimates

Europe has done a better job of lowering their branch density vs. the US

In a world of low growth, low rates, and low profitability, cutting costs is an obvious response. European and US banks had similar branch density pre-global financial crisis but the number of branches in the Euro Area is down 20% from the peak level

in 2007, while branch density in US is largely flat during the same period. This could be due to European banks' greater cost cutting efforts to improve lower profitability. European banks' 2015 return on equity (RoE) of 7% is at the bottom of the pack among global peers. More sticky US branch numbers could also reflect demographic and economic variety – branches are being opened in the faster growing parts of the US.

Figure 96. Global Banks' ROE by Region (2009 vs 2015)

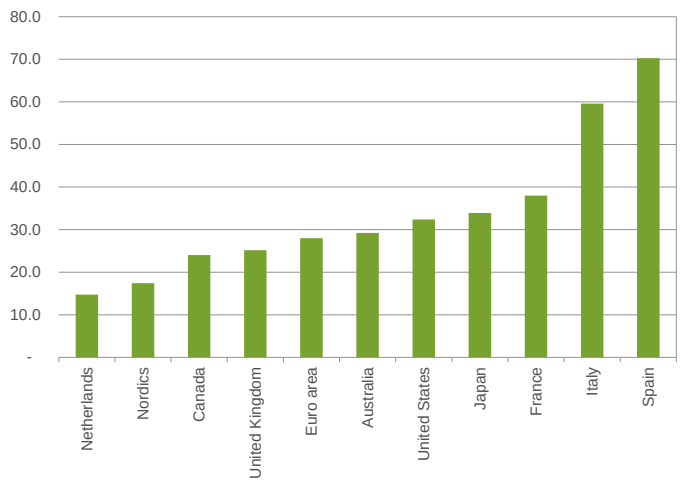


Source: Citi Research Estimates

As more customer shift to digital only, we expect banks to gradually reduce their branch footprint

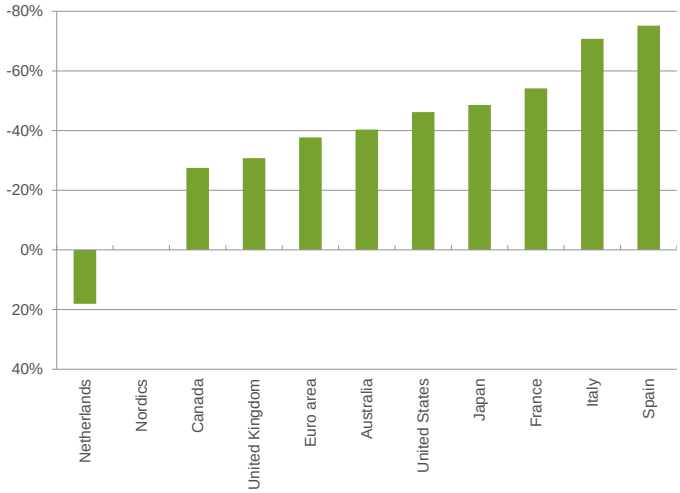
As more and more customers move to a digital only channel, we expect banks to gradually reduce their branch footprint. Of the developed banking markets, the Dutch and Nordics have the lowest branch density. The Spanish, Italian, and French banks have much higher branch density. The shift in customer behavior in these markets could result in significant cost take out opportunities. The Spanish and Italian banks need to cut 70% of the current branch network to reach the same density as the Nordic banks. Banks in France and the US would have to halve their branch numbers to reach Nordic density levels.

Figure 97. Number of Branches Per 100k Adults in DM (2014)



Source: World Bank; Citi Research

Figure 98. Branch Reduction Potential to Reach Nordic Density (2014)



Source: World Bank; Citi Research

Branch of the Future:

Q+A with Jonathan Larsen

Jonathan Larsen runs Citi's Global Retail and Mortgage business, including the US, which spans 19 countries. Previously, he was the Global Head of Retail Banking and Head of Consumer Banking in Asia Pacific.

I can't remember the last time I visited a branch. Why is the branch an important part of banks' distribution channel when most client interactions can be performed online?

Fifteen years ago, there were confident predictions that the bank branch will disappear altogether. That didn't happen. Instead, we see a consolidation of existing branch networks. Today, with the ever increasing adoption of mobile banking, we have incremental additional channels rather than the replacement of the branch channel. People are living their lives on mobile today. Mobile banking is the fastest growing channel in retail banking.

However, as of today, mobile banking penetration remains low. Less than 50% of developed market customers are using mobile. Even in the US, the mobile penetration is less than half. But the growth is phenomenal.

Banks have been slow in creating the user experiences to completely eradicate the branch channel. There are functions that as of today can't be done through mobile channels. Things like password reset, high value payments, change of address, and so on.

Lastly, the concept of physical presence still has resonance among mass market consumers today. Many customers still value the consultative experience when getting a mortgage product or receiving investment advice. The human interaction component won't go away. The branches may not look like what we see today. Instead, there will be premises and hubs where customers can meet advisors. That's why we still have branches around as of today.

What does the Branch of the Future look like?

The future of the branches is about advisory and consultation rather than transactions. Many banks have done a good job in automating transactions in branches. Here are some photos of Citi's new generation of branches.

Figure 99. Moscow, Avia Park

Source: Citi

Figure 100. New York, Fifth Avenue

Source: Citi

My take is that, first of all, banks need to rethink their distribution channel strategies. The concept of retail bank profitability equals outlet profitability is no longer valid. A branch is only one of the distribution channels. It's playing an important but diminishing role.

Secondly, segmentation of customers is extremely important. Mass market customers generally have lower profitability relative to affluent and emerging affluent customer segments and are more efficiently served through channels such as digital and mobile. Moreover, clients' profitability increases as they increase the number of products held with the institution. There should be increased focus on client depth.

Lastly, clients over time will move almost entirely to mobile channels. Banks will look like Uber.

It is a very interesting comparison of Banks to Uber. What are the similarities? Do you mean banks won't have a balance sheet going forward?

Uber has nothing to do with cars. It created an entirely new user experience. It tracks all your transaction histories, expenses, drivers' ratings and so on. It created needs you never had. What it means to banks is first and foremost the centrality of mobile as the main channel of interaction between customers and the bank. More importantly, there is a diminishing return on physical assets – especially the branch network. I won't say that banks won't have a balance sheet in the future, but the way customers interface with the bank will be revamped.

As the branch footfall declines, it's only natural to see a reduction in number of branches. But the US banks seems to be behind European peers when it comes to branch reduction. Why is that? Could we expect an acceleration in US branch closures?

It's right that some US banks are very slow when it comes to closing branches. The number of branches is often associated with deposit market share. Some banks have been very aggressive in building branch networks until as recently as one year ago. Over the past one year, US banks have started to cut back, as they have realized that interest rates are unlikely to increase any time soon. Banks need to be more efficient to sustain and grow profitability. Even if rates do increase, banks will be on a more efficient model than today. In my view, some banks in the US will more than halve their branches over the next 5 years. For that to happen, banks need to have a high conviction of delivering a new mobile/digital driven user experience.

How much of the cost base of a typical retail bank comes from the branch network? What is the percentage of staff cost and non-staff cost tied up with physical distribution in a retail bank?

Branch and associated staff costs make up 60-65% of a total cost base for a bank with an extensive branch distribution network. The inefficient processes associated with manual processing add to the cost of running a physical network. It is more error prone and there is a long process of human decisions involved.

In a typical developed world retail bank what percentage of staff today work in client vs non-client facing functions? How much can the latter be automated?

Roughly 60-70% of retail banking employees are doing manual processing-driven jobs. If all the current manual processing can be replaced by automation, these jobs can disappear or evolve. Headcount reduction can happen quite fast for digital

leaders and might never happen for some banks. It's all about transactional efficiency. Those that can deliver transactions quickly and efficiently are set to win.

What is the future of the FinTech companies in your view?

There are three main categories of FinTech challengers out there. The first are the robo-advisors (.e.g.: Betterment) targeting the wealth space. At the moment, the new startups are finding it hard to find customers. It's not easy to build a brand, trust, relationship and the advisory capabilities.

The second category is the lenders, which have a good business model. The main limitation is funding capacity, even with institutional money participation. These firms need banks to extend balance sheet. Hence, we see increasing collaboration between banks and P2P or Marketplace lenders.

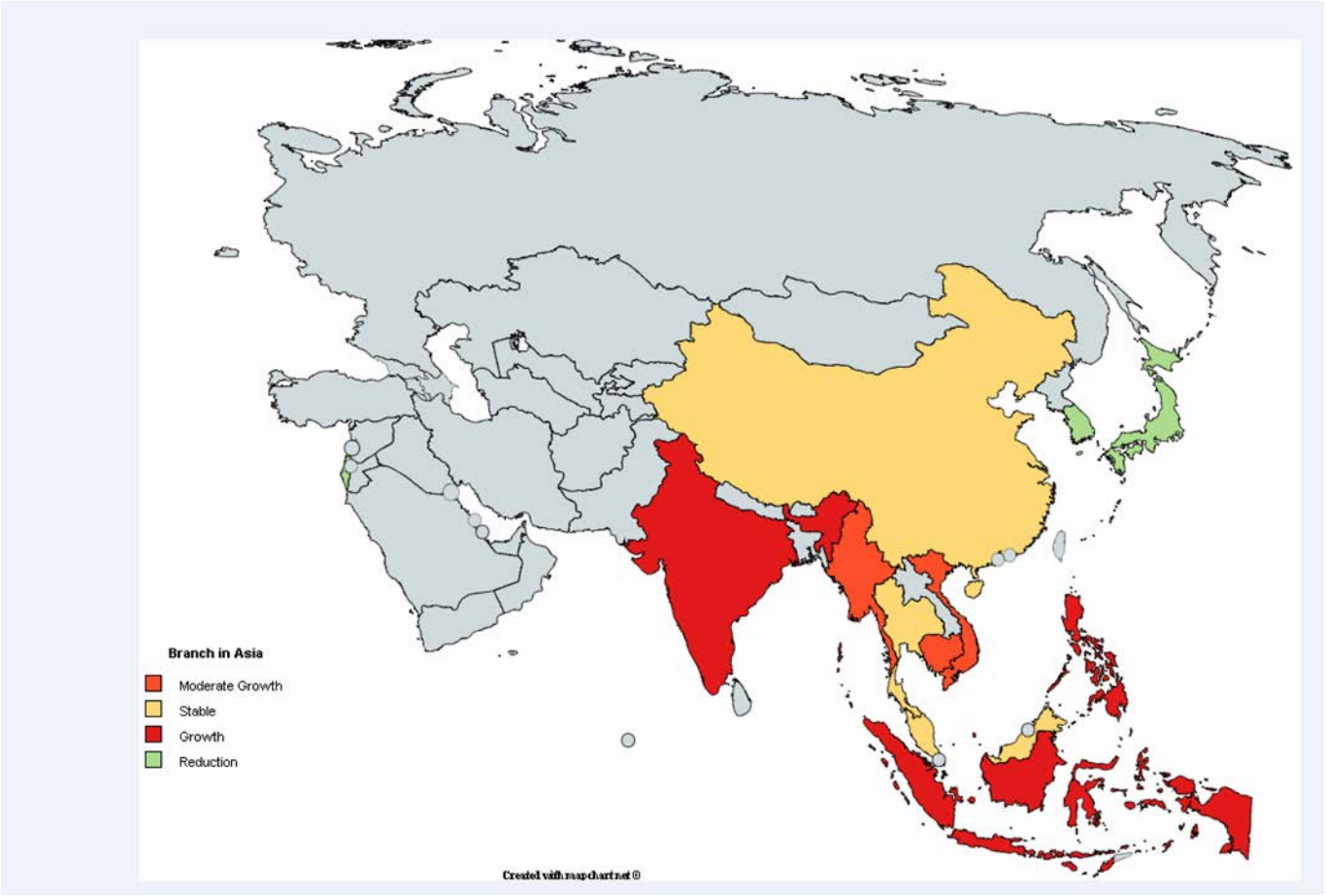
Lastly, we see really interesting developments in the payment space. In developed markets, FinTech in the payment space is focused around e-commerce. It's a small part of banks' profit pool. To banks, it's an opportunity lost rather than loss to existing profit pool.

In South and South East Asia, More Branches

Branch density is increasing in developing countries due to the need for financial inclusion and uneven smartphone penetration

In contrast to developed countries such as the Netherlands, Denmark, and Norway where branch density is down 40-50% over the last decade, branch density is increasing in many developing countries due to the need for higher financial inclusion and uneven smartphone/technology penetration.

Figure 101. Branches are Increasing in A Large Part of Asia



Source: Citi Research

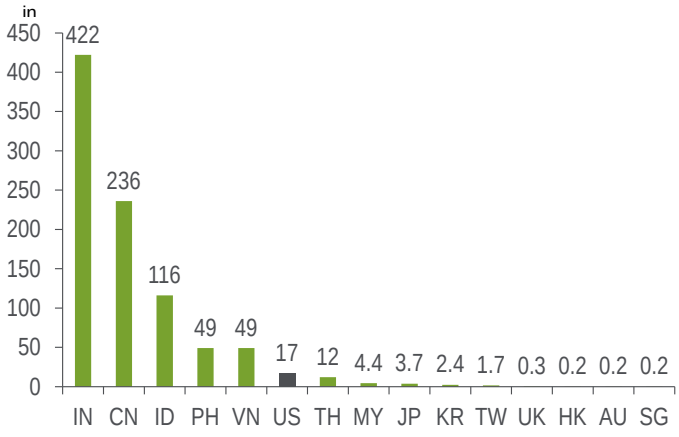
The main branch growth is expected to come from Asia over the next decade

We expect the main branch growth over the next decade to come from Asia, as a result of the high level of unbanked population. Asia is estimated to have ~850 million unbanked population (35% of adults), mainly in India, China, and Indonesia. The number of branches in India, Indonesia, and Philippines are likely to grow 5-15% compound annual growth from current levels in the medium term. In developed Asian markets such as Korea and Japan, there will likely be a decline in the total number of branches, a trend similar to other developed markets in Europe and the Americas.

The wide adoption of mobile money doesn't preclude the opening of more bank branches

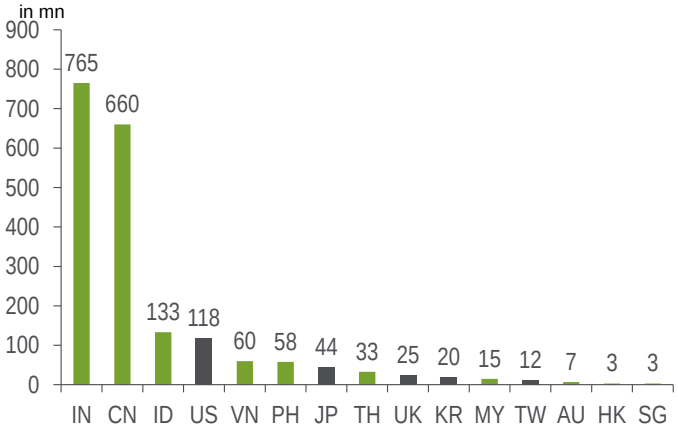
Admittedly, technologies such as mobile money dramatically help to improve banking accessibility. However, we note that the wide adoption of mobile money doesn't preclude the opening of more branches. For example, the branch density in Kenya has doubled over the past decade, albeit from a low level, despite being a global pioneer in mobile money (M-PESA). On balance, we still expect more branches opening in developing markets albeit at a gradual pace.

Figure 102. Asia — Est. Adult Population (Millions): No Bank Accounts



Source: World Bank Global Findex Database 2014, Citi Research estimates

Figure 103. Asia — Estimated Adult Population (Millions): No Formal Savings



Source: World Bank Global Findex Database 2014, Citi Research estimates

India has the highest unbanked population in Asia and Indian banks are expected to expand branches at around 10-15% per year

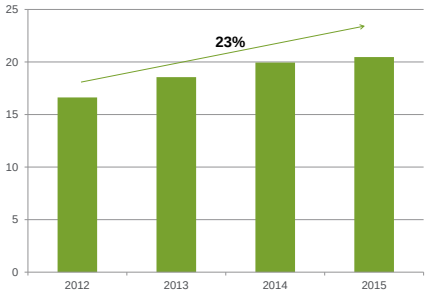
India has the highest total unbanked population in Asia of around 400 million (2014). Low branch density is a key factor that hinders banking penetration. There are about 120 branches for every one million people in India. As Prime Minister Modi makes financial inclusion his top commitment, banks are opening more branches with at least 25% of the newly opened branches located in unbanked rural regions. The Indian banks will in coming years continue to expand branches at around 10-15% per year (Figure 104). The number of unbanked population in India almost halved to 233 million in 2015.

Figure 104. Indian Banks – Branch Opening Plans

Bank name	Existing branches (end-2015)	Plans	Comments
Axis Bank	2,743	Opened 154 branches in 1HFY16, will open 250-300 branches in FY16. Will continue growing branches at 10-12%	Believe have under-invested in branches, will increase branch expansion in FY16. Operate with much smaller branches now (3 people instead of 8)
ICICI Bank	4,054	Will do 300-400 branches every year for the next couple of years i.e. ~10% growth per year. Opened only 4 branches in 1H16	
HDFC Bank	4,227	Opened 213 branches in 1H16	300-400 branches per year. Had done 600 branches in FY15
Kotak Mahindra Bank	1,298	Target 1400 branches by CY17	Recently acquired ING-Vysya Bank, so limited need for branches
Indusind Bank	905	Target is to get to 1200 branches by FY17	
Yes Bank	700	Targeting 15-20% branch growth. Target 100-150 branches in FY16. Already done 70 so far in 1H16	

Source: Company Reports and Citi Research Estimates

Figure 105. Number of Branches in Indonesia (in 000)



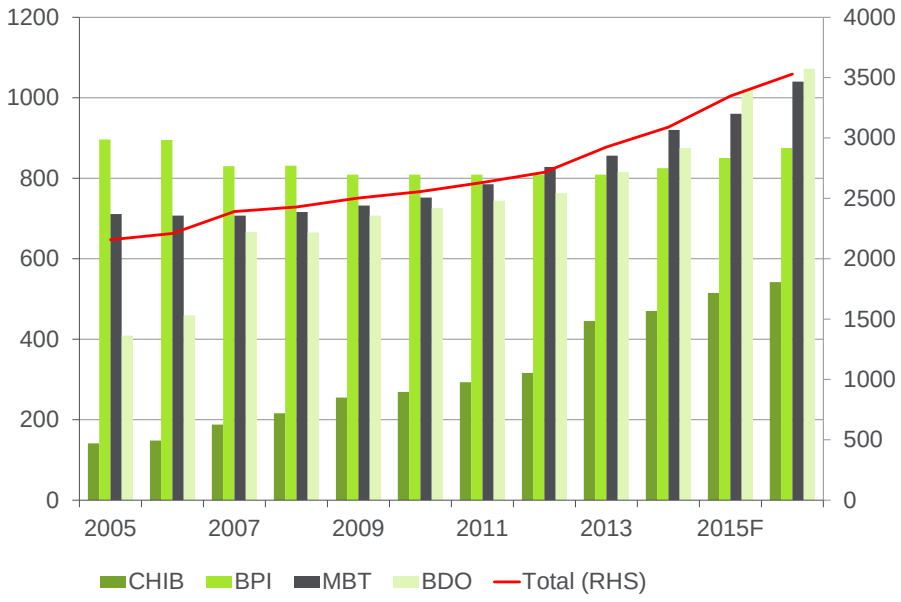
Source: Company Reports, Citi Research

In Indonesia, a "branchless banking" program was launched in March 2015 to reach out to the unbanked. The aim is financial inclusion as currently only an estimated 20% of population has access to banking. New regulations allow the appointment of third-party agents (for the banks) equipped with new technology to spread banking services. The local telcos with their large network and some other FinTech companies (Payment Gateways) are also offering limited financial services (transfers/remittances). But the incumbent banks in Indonesia are also expanding in the traditional way: since 2012, the number of branches in Indonesia grew by ~20%.

The Philippines has one of the lowest banking penetration in Asia, with over 70% of adults (aged 15+ years) unbanked. Central bank survey data suggests that outside Metro Manila, the unbanked is 80%+. BPI Globe BanKO Inc. is the first mobile-based, microfinance-focused savings bank in the Philippines. BanKO has a network of over 4,000 partner outlets equipped with information and communication technologies from BPI and Globe, and also taps on Globe's "GCash" mobile money (1.9m active users, 15,000 partner outlets). This enables BanKO to provide cash-in/cash-out transactions for its customers and conduct customer identification (KYC) for savings or loan applications.

The banks in Philippines are expanding their branch network with increased focus in Metro Manila to generate more current account & savings account (CASA) deposits as well as to tap the SME and retail market. Numbers of branches of the largest four banks are up c40% in the last decade. We expect the branches to grow at around 5% CAGR in coming years.

Figure 106. Philippines – Banks Are Opening More Branches



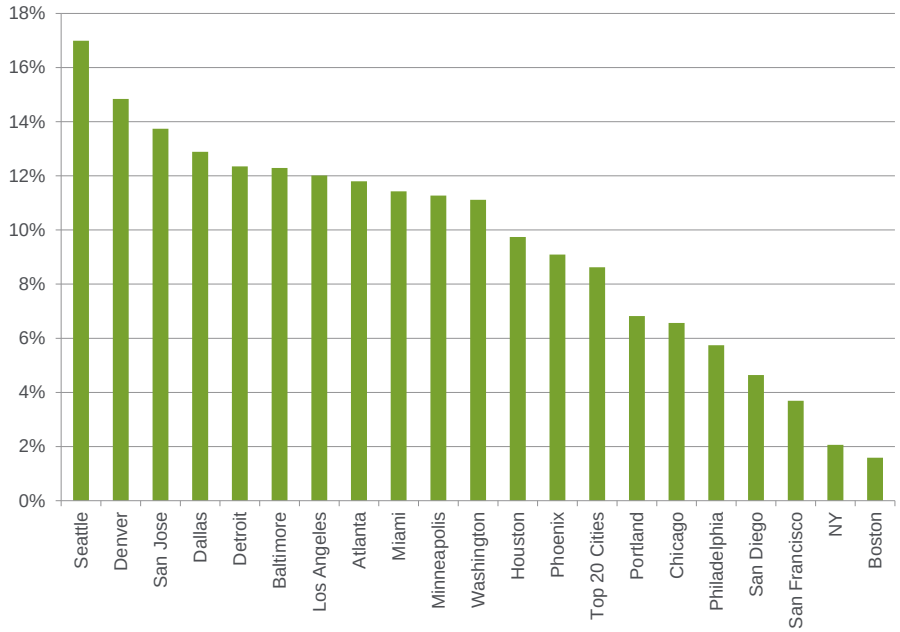
Source: Company Reports and Citi Research Estimate; Total is a sum of the large four banks in Philippines

Why Are Branches Blossoming in US Cities?

Branch openings in top US cities has increased between 2% and 17% in the past 5 years

The other area of branch openings has been large cities in the US. Over the past five years, the number of branches in the top 20 US cities increased between 2% and 17% (Figure 107).The fastest growing branch numbers in the US top cities are also in locations that are economically dynamic.

Figure 107. US Top 20 Cities Change in Number of Branches Last 5Ys (2011-2015)



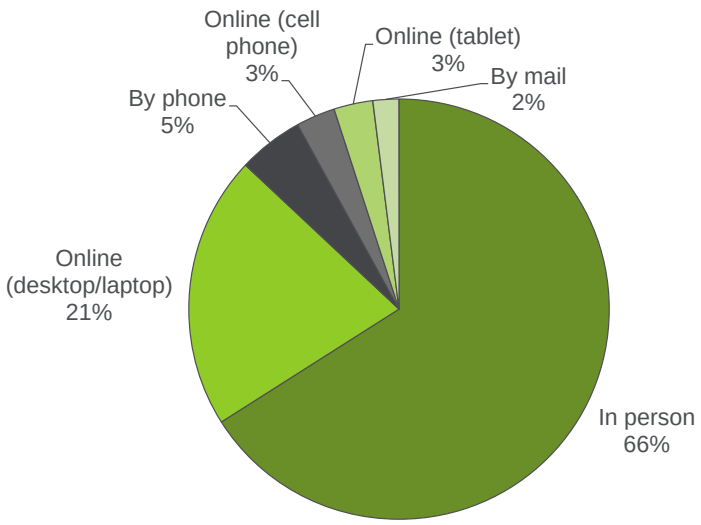
Source: SNL, Citi Research; Top 20 based on 2014 GDP

Client Acquisition

A key function of physical branch presence is client acquisition

A key function of physical branch presence is client acquisition. Many traditional banks as well as Internet only banks have digital onboarding, which allows you to open an account online. But often, many banks still require a physical visit to the branch for identity verification due to regulations such as KYC and AML. A survey conducted by Forrester showed that in the United States, two-thirds of the consumers open an account in person. Branches remain the most important channel for client acquisition. That's precisely why challenger banks (such as Metro Bank in London) are opening up branches to increase market share to reach critical mass.

Figure 108. Two-Thirds of Consumers Opened their Checking Account In Person



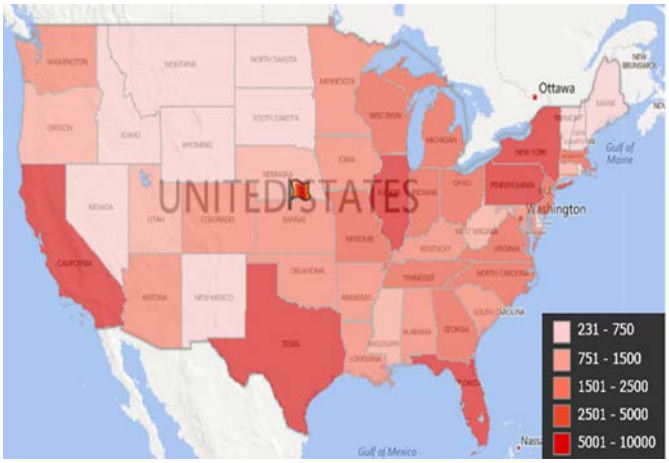
Source: "How US Consumers Research And Buy Checking Accounts", Forrester Research, Inc., November 30, 2015

Deposit Acquisition

States with higher GDP output also have higher branch density

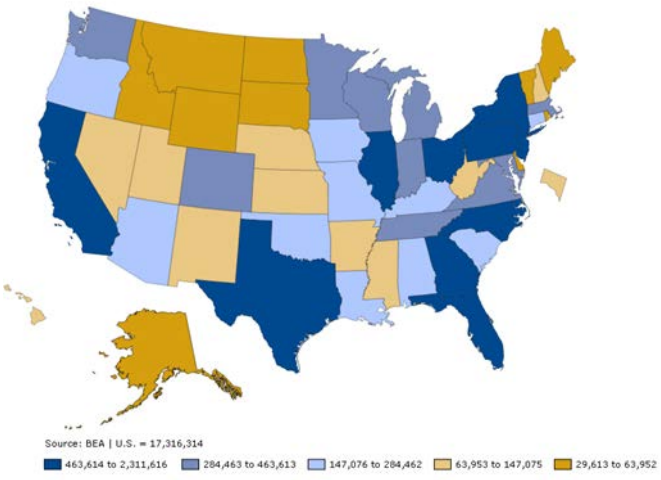
Another interesting observation is that, where the money goes, the branches follow. In the United States, the states with higher GDP output also have higher branch density. Branches are used to capture both corporate and retail deposits from these wealthy states. The benefits of operating branches in these locations such as brand recognition and easy of customer access far exceed the costs.

Figure 109. United States Branch Density By State



Source: SNL, Citi Research

Figure 110. US GDP by State – All Industry Total, 2014 ($millions)



Source: Bureau of Economic Analysis; Citi Research

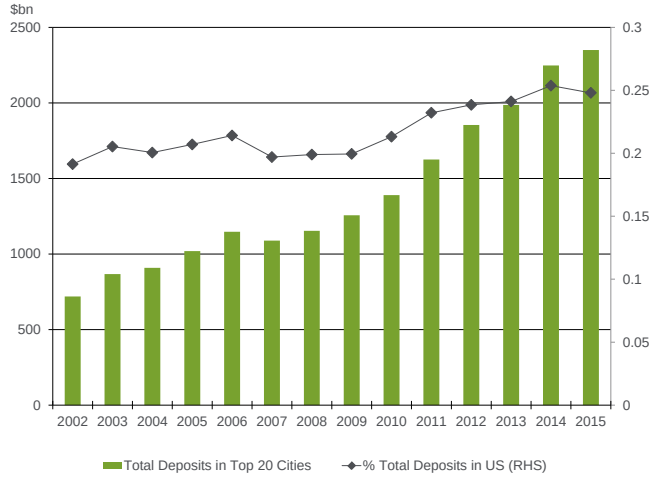
With wealth concentrated in the top cities in the US, a strong branch presence in these cities allows banks to capture wealth

In the United States, wealth is concentrated in the top cities. Having a strong branch presence in these cities allows banks to capture the wealth. The top 20 cities (ranked by 2014 GDP) host a quarter of total deposits in the United States with less than 7% of the total branches (Figure 111 - Figure 112). There should be no surprise that the number of branches in these cities are up more than 50% from less than 4000 at the turn of the millennium to 6000 by 2015 and continue to increase.

Figure 111. Branches Share in Top 20 US Cities are Increasing

Source: SNL, Citi Research; The 20 cities used is shown in Figure 113

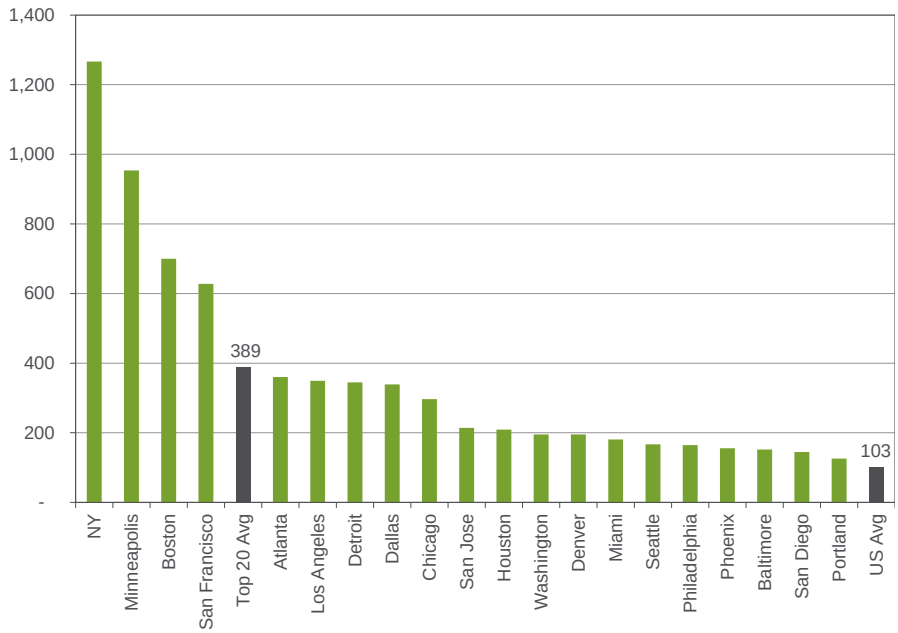
Figure 112. Top 20 US Cities Contribute to 25% of Total US Deposits ($bn)



Source: SNL, Citi Research; The 20 cities used is shown in Figure 113

The average deposits per branch in the top 20 cities are close to $400 million, almost four times the national average. New York City alone is 9% of national deposit market share with around $1.3 billion deposits per branch (Figure 113).

Figure 113. Top 20 US Cities Have Much Higher Deposits Per Branch Than National Average



Source: SNL, Citi Research; Top 20 based on 2014 GDP

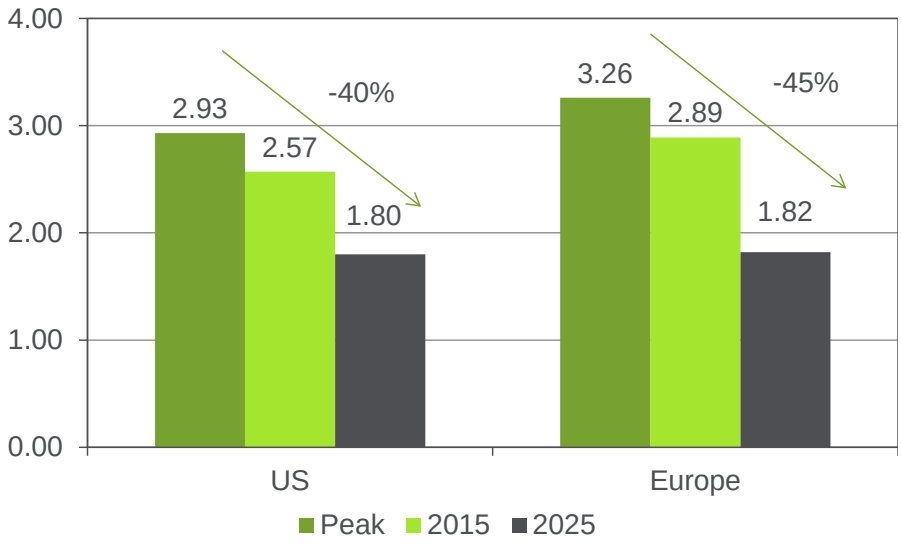
People: Automation Tipping Point

We see another ~30% reduction in staff during 2015-2025 with a 3% decline per year (up from the current 2% decline), resulting in a 40-45% decline from peak staffing levels pre-crisis

The future of the branch is about advisory and consultation rather than transaction. The return on having a physical network is diminishing. Branches and associated staff costs make up about 65% of the total retail cost base of a larger bank and a lot of these costs can be removed via automation. The pace of staff reduction so far has been gradual (~2% per year or ~11-13% from peak levels per-crisis). We believe that there could be another ~30% reduction in staff during 2015-2025, shifting from the recent 2% per year decline to 3% per year, mainly from retail banking automation. From peak staffing levels pre-crisis, this would result in a 40-45% decline, not far off from Antony Jenkins' forecast.

For countries that have gone through more severe financial crisis and consolidation such as Greece, Ireland, and Denmark, recent full time employee (FTE) reduction ranges between 3%-5% per year. Low interest rates and increased automation are catalysts for faster full-time employee (FTE) reduction.

Figure 114. At the Tipping Point of FTE Reduction (millions)

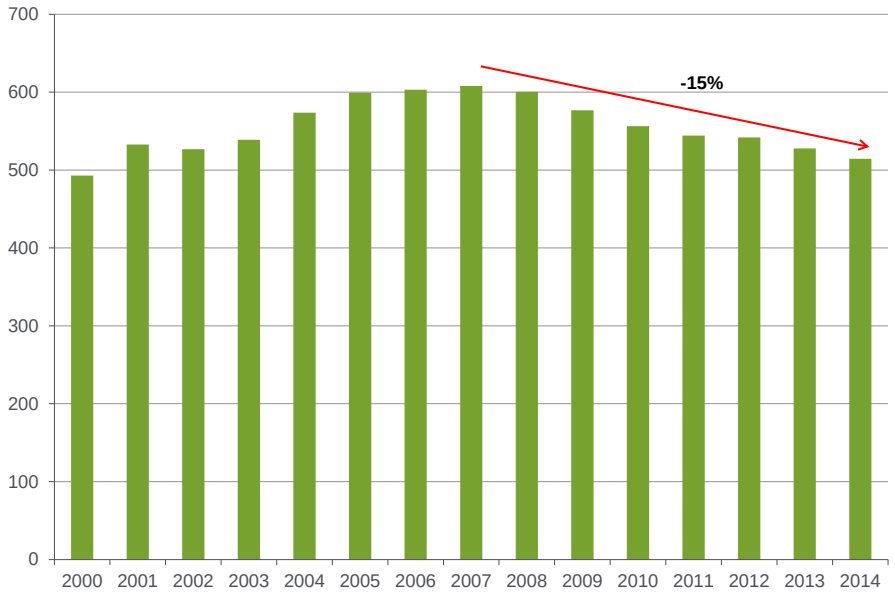


Source: ECB, United States Bureau of Labor Statistics, Citi Research estimates

As banks reduce the number of branches, the number of transaction-based employees will decline

We are at an inflection point for retail banking driven by automation and digitalization. As banks reduce the number of branches, naturally the number of transaction based employees such as branch tellers will decline. In the US, the number of bank tellers is already down 15% from the peak in 2007. As we noted in the Branch of the Future section (see page 71) in a branch heavy retail bank around 65% of banks' staff are doing processing work that could be automated in the long term. In the coming years, the recent trend of branch teller staff reduction should accelerate (e.g. in the US go up from the 2 percentage point reduction per year since 2007).

Figure 115. US Number of Bank Tellers Declined by 15% From Peak in 2007

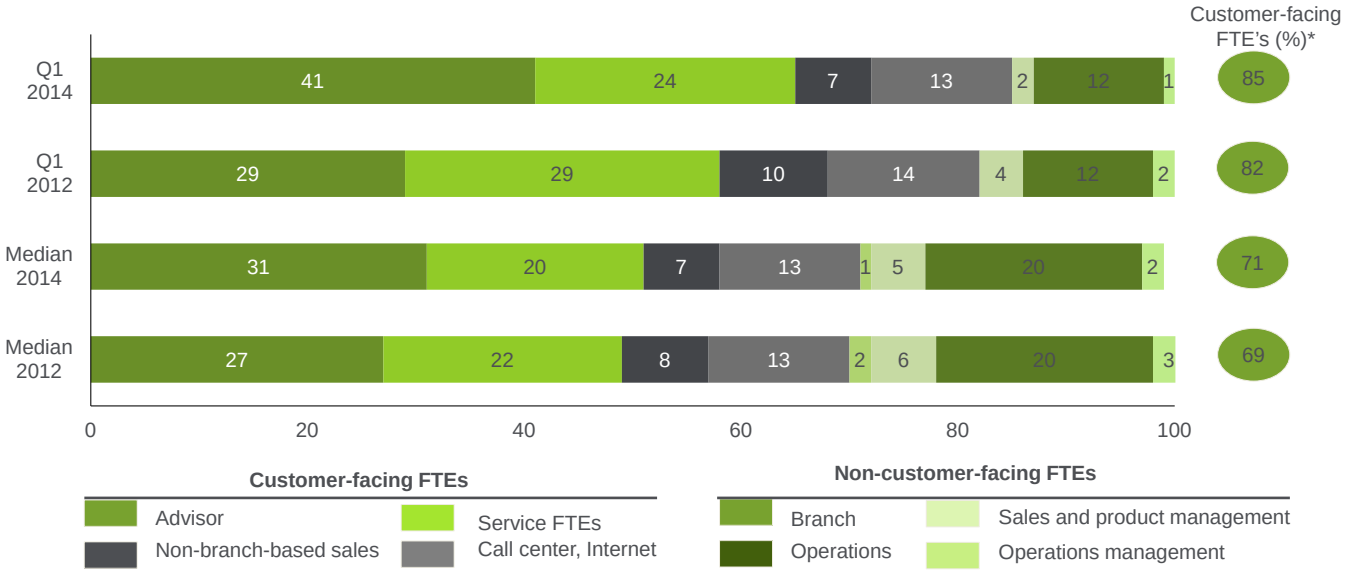


Source: Bureau of Labor Statistics; Citi Research

We see a rebalancing of staff from transaction-based roles to advisory-based roles

As more transactions are automated and done on a mobile phone, we believe there will be a rebalancing of staff from transaction-based roles to advisory-based roles. The higher the percentage of customer-facing employees, the higher the retail bank's operating efficiency according to BCG retail banking operational excellence benchmarking. The banks in the top quantile have on average 85% of customer facing FTEs (including advisor, service, non-branch based sales and call center staff) in 2014, relative to the median of 71%.

Figure 116. The Share of Customer-Facing FTEs Continues to Rise

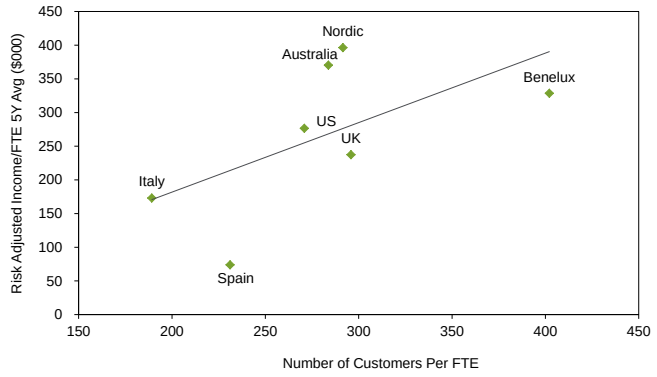


Source: BCG, Operational Excellence in Retail Banking 2015, Four Trending Practices of the Leading Banks; Q1 = top quartile

There is a strong positive correlation between employee productivity and the banks' profitability

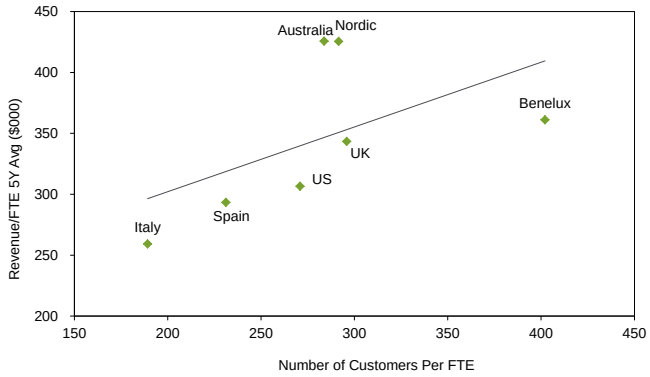
Improving employee productivity is a key determinant of bank profitability. In our sample of developed market banks, there is a strong positive correlation between employee productivity (measured by number of customers per FTE) and the banks' profitability (measured by Revenue per FTE, gross operating profit per FTE, risk-adjusted income per FTE or pre-tax profit per FTE) (Figure 117 - Figure 120). Nordic, Australian and Benelux banks are ahead of the Spanish and Italian banks in per FTE profitability. We believe the higher unit labor cost in the Nordic and Benelux countries forced the banks to adopt a higher level of automation and digitalization – a strategy other developing market banks should follow.

Figure 117. The Higher Number of Customers Per FTE, the More Profitable A Retail Bank (Measured By Risk Adjusted Income/FTE)



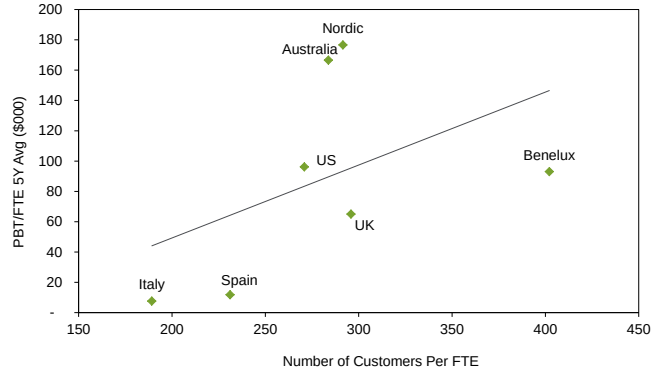
Source: Company Reports, SNL, Citi Research; Based on companies under Citi's coverage; Risk adjusted income is calculated as total income minus loan loss provisions.

Figure 118. The Higher Number of Customers Per FTE, the More Profitable A Retail Bank (Measured By Revenue/FTE)



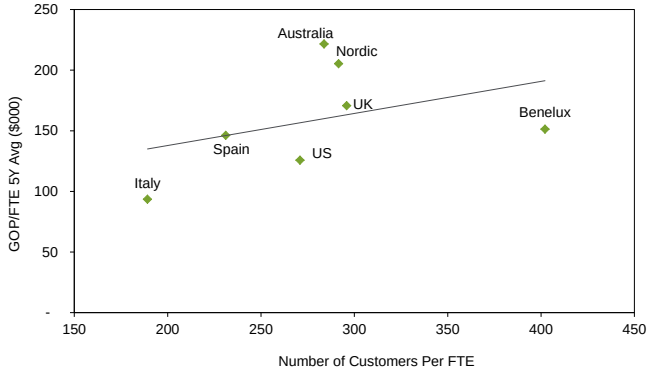
Source: Company Reports, SNL, Citi Research; Based on companies under Citi's coverage

Figure 119. The Higher Number of Customers Per FTE, the More Profitable A Retail Bank (Measured By PBT/FTE)



Source: Company Reports, SNL, Citi Research; Based on companies under Citi's coverage

Figure 120. The Higher Number of Customers Per FTE, the More Profitable A Retail Bank (Measured By GOP/FTE)



Source: Company Reports, SNL, Citi Research; Based on companies under Citi's coverage; GOP stands for Gross Operating Income and is calculated as Total Income minus Total Expenses.

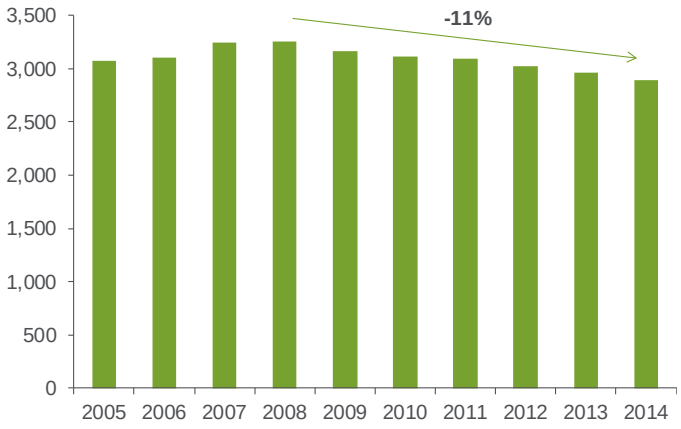
Early Stage of Headcount Reduction

Headcount reduction in the US has been stickier than in Europe while in Asia and Latin America, headcount is increasing

At a system level, cost and the number of employees have proven to be stickier: the number of people employed by banks is down 11% in Europe or 13% in US from the peak. In the US, most of the FTE reduction happened between 2006 and 2009 and since then the number of US bank FTEs has been relatively stable. In Europe, the number of FTEs peaked in 2008 and since then there has been a gradual and slow paced reduction over the past six years. In Asia and Latin America, the number

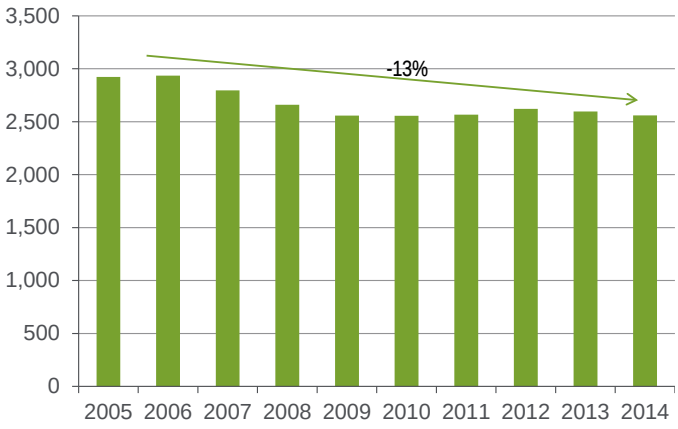
of bank employees is still understandably growing as the banking system expands together with the economy.

Figure 121. Number of FTE – European Banks (in '000s)



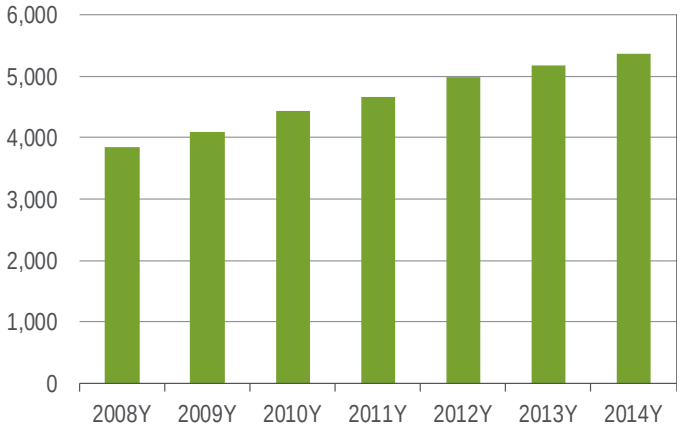
Source: ECB, Citi Research; Based on the total FTEs of 28 EU member state

Figure 122. Number of FTE – US Banks (in '000s)



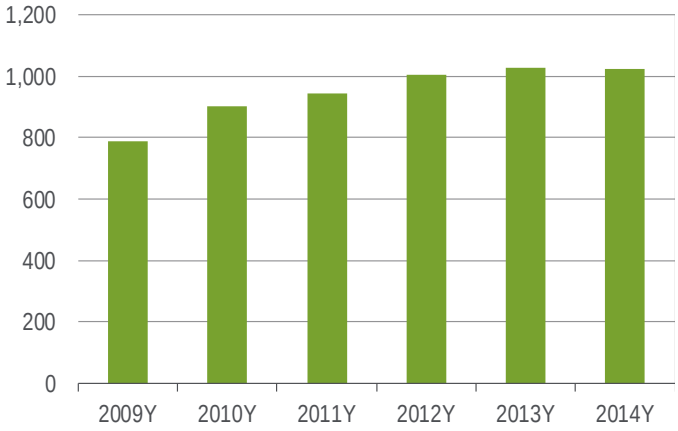
Source: United States Bureau of Labor Statistics, Citi Research; Total employment by Credit intermediation and related activities (NAICS 522)

Figure 123. Number of FTE – Asia Pacific Banks (in '000s)



Source: SNL; Based on sum of FTEs for the banks covered by SNL financials for banks headquartered in the region

Figure 124. Number of FTE – Latin American Banks (in '000s)



Source: Source: SNL; Based on sum of FTEs for the banks covered by SNL financials for banks headquartered in the region

At an aggregate level, the annual FTE reduction seems small in developed markets (~2% per year), but some European countries are shrinking at a much faster pace. These markets have either experienced more severe financial crisis (Greece, Ireland, and Spain) or went through consolidation in the banking system (UK, Denmark, and Benelux). Since 2008, countries like Denmark, Greece, Ireland or Spain have experienced almost 30% headcount reductions (see Figure 125).

For markets that didn't go through structural shifts in their banking industries, the reduction of staff is slower

For the markets that didn't go through such structural shifts, the FTE reduction is much slower. The number of bank employees in Germany is down only 8% over the past decade while that in France is only down 3% from the peak. There remains a considerable opportunity to reduce headcount via increased digitization and use of automation. The push factor or catalyst for further headcount cuts could come from the need to increase profitability as interest rates and growth stay lower for longer. It could also come from competitive pressures from FinTech entrants.

Figure 125. Number of Bank Employees in EU By Country

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2014 vs 08	2014 vs 05
Greece (GR)	61,295	62,171	64,720	66,165	65,682	63,408	59,958	57,006	51,242	45,654	-31%	-26%
United Kingdom (GB)	534,437	521,423	503,235	491,262	471,129	455,594	453,971	439,873	421,508	402,561	-18%	-25%
Ireland	37,702	39,154	41,865	40,507	38,178	36,438	35,612	31,773	29,832	28,871	-29%	-23%
Denmark	47,579	46,394	49,644	52,830	50,101	47,739	47,224	44,900	36,367	37,201	-30%	-22%
Netherlands	120,165	116,500	114,424	116,000	110,000	108,000	105,408	103,447	96,423	94,000	-19%	-22%
Spain	252,831	261,890	275,506	276,497	267,383	261,389	245,956	234,292	215,953	201,643	-27%	-20%
Belgium	69,481	67,957	67,080	65,985	63,723	61,861	61,197	60,068	58,237	56,611	-14%	-19%
Italy	335,726	339,091	340,443	338,035	323,407	321,081	316,360	309,478	306,607	299,684	-11%	-11%
Latvia	10,477	11,656	12,826	13,905	12,365	11,534	11,188	10,565	10,029	9,374	-33%	-11%
Slovenia	11,726	11,838	12,051	12,284	12,188	11,995	11,813	11,498	11,218	10,682	-13%	-9%
Germany	705,000	692,500	691,300	685,550	673,500	667,900	663,800	659,100	655,600	647,300	-6%	-8%
Finland	23,644	24,769	25,025	25,699	24,879	23,353	23,188	22,510	22,402	22,019	-14%	-7%
Slovakia	19,773	19,633	19,779	20,598	18,750	18,234	18,452	18,655	18,540	18,656	-9%	-6%
Estonia	5,029	5,681	6,319	6,144	5,693	5,497	5,516	5,563	4,861	4,860	-21%	-3%
Austria	75,303	76,323	77,731	78,754	77,246	78,098	78,085	77,424	75,980	74,110	-6%	-2%
Portugal	54,035	58,213	60,979	62,377	61,593	61,504	59,911	57,348	55,820	53,888	-14%	0%
Cyprus	10,799	10,845	11,286	12,554	12,513	12,643	12,825	12,853	11,142	10,956	-13%	1%
Hungary	37,527	39,302	41,905	43,620	42,609	41,526	41,305	41,103	40,642	39,456	-10%	5%
France	387,118	411,172	424,732	424,536	416,772	412,933	426,336	421,037	416,262	411,012	-3%	6%
Czech Republic	37,943	37,825	40,037	39,882	38,394	38,359	39,461	40,147	39,742	40,334	1%	6%
Sweden	37,448	39,132	39,698	40,929	40,193	40,792	40,002	39,284	39,816	40,609	-1%	8%
Romania	52,452	58,536	66,039	71,622	67,898	66,753	65,772	61,769	58,612	57,732	-19%	10%
Luxembourg	23,224	24,752	26,139	27,208	26,416	26,255	26,696	26,534	26,237	25,816	-5%	11%
Poland	158,130	162,125	173,955	188,969	183,064	184,858	186,331	181,991	179,385	175,972	-7%	11%
Lithuania	7,637	8,624	10,303	11,080	10,902	9,993	8,707	8,671	8,392	8,952	-19%	17%
Malta	3,383	3,450	3,670	3,872	3,836	3,914	4,026	4,007	4,197	4,427	14%	31%
Bulgaria	23,636	25,633	30,953	33,258	34,290	34,133	33,897	33,527	32,756	31,715	-5%	34%
EU 28 (fixed composition)	3,074,907	3,100,357	3,240,403	3,259,308	3,161,767	3,114,791	3,092,779	3,027,325	2,963,284	2,889,320	-11%	-6%

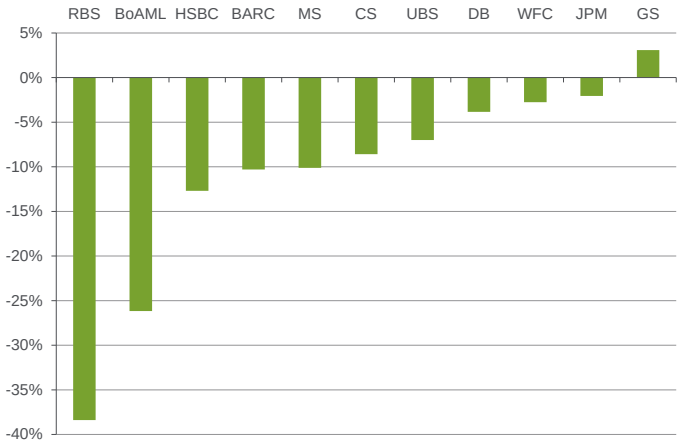
Source: ECB, Sweden Banker's Association (2005 Sweden FTE pro-forma for SEB IT and Enskilda Securities consolidation with parent); Citi Research

Investment Bank Headcount Reduction: Talk High

Investment banks are also reducing headcount

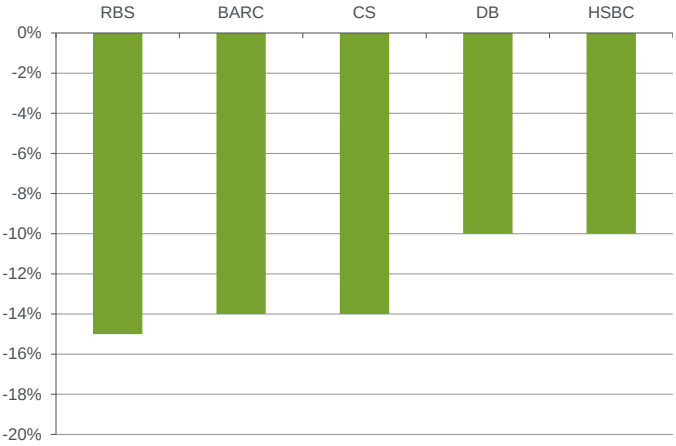
Of course, another major source of headcount reduction remains the need for banks to recover profitability damaged by the aftershocks of the recent financial crisis and the new regulatory regime that has been ushered in. Ever since the 2008 financial crisis, newspapers have been full of headlines on job cuts by the world's major banks. The Financial Times reported that the big banks in the US and Europe announced almost 100,000 job cuts in 2015 alone, or about 10% of the total workforce (FT, December 2015). This is in addition to the cuts already made since 2007-08. The latest round of FTE reduction targets came after leadership changes of several European banks in 2015, including Standard Chartered, Deutsche Bank, Credit Suisse and Barclays.

Figure 126. Major Global Banks FTE Reduction Since 2010



Source: Company Reports and Citi Research

Figure 127. FTE Reduction Targets Over Next Few Years



Source: Company Reports and Citi Research

Not Easy to Be a Tech Company

Banks also employ a lot of technology employees

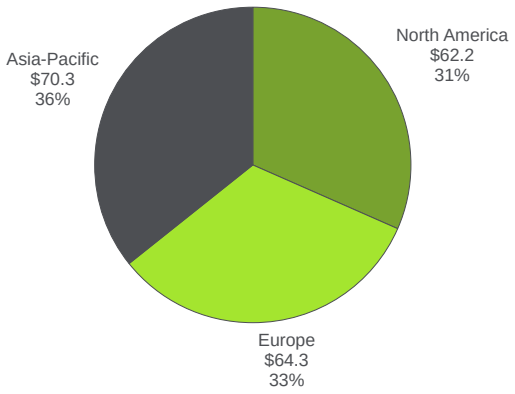
Goldman Sachs' CEO Lloyd Blankfein said "we are a tech company". According to Business Insider (April 2015), 9,000 or close to 30% of Goldman's 33,000 employees are engineers and programmers, a level similar to Facebook's total employee base and larger than the entire payroll of Twitter or LinkedIn. Goldman is not alone in this. Banks' executives have long realized the importance of technology and have invested heavily in IT. More than a decade ago, the Chairman of Swedbank, the largest retail bank in Sweden, told analysts that Swedbank was an IT company.

There is no doubt that banks need to invest in IT to become more efficient through automation and digitalization, therefore there will be over the long term a reduction in staff expenses and an increase in IT expenses. However, in the near term, there is often a double running of operating expenses from an increase in new development expenses and double running of legacy systems/processes, resulting in a near term higher cost level for banks.

IT expenses of global banks was close to $200 billion in 2015

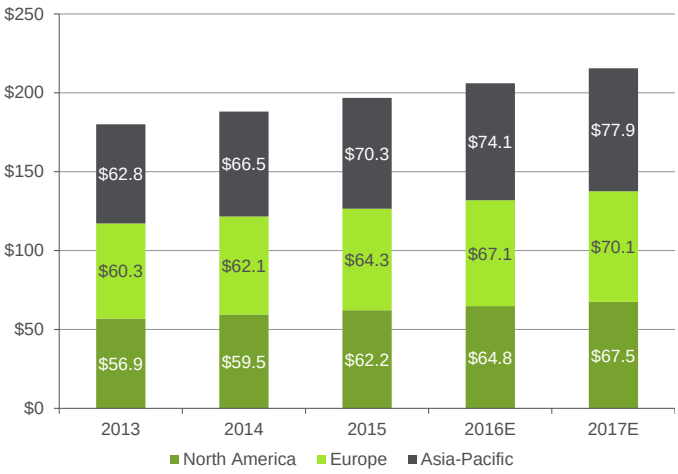
Celent estimates the IT expenses of global banks in 2015 is close to $200 billion and is expected to grow by ~5% per year to reach over $215 billion by 2017. IT is a large portion of banks' total expenses, accounting for 10-15% of a bank's total expenses and increasing. The high level of IT investments in the sector creates entry barriers for new entrants. The annual IT expenses of the financial industry is almost 10x the total capital deployed into FinTech industry in 2015.

Figure 128. Estimated Bank IT Expenses 2015 (in $bn)



Source: Celent

Figure 129. IT Expenses of Global Banks (in Billion)

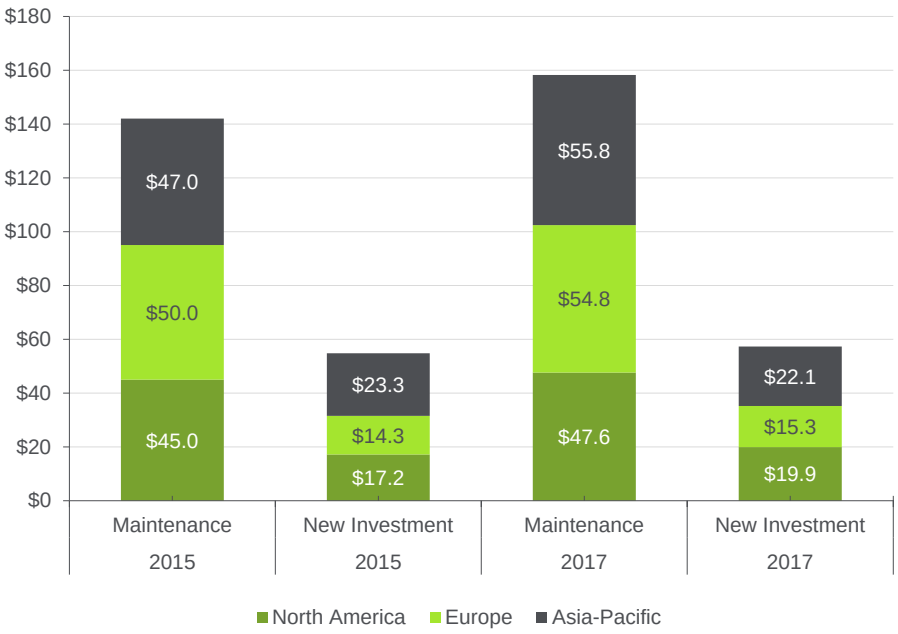


Source: Celent

Over 70% of IT expenses at existing banks are maintenance related to support existing legacy systems

The problem for the existing banks is that they are not very good in running large IT projects. Over 70% of the IT expenses are maintenance related to support the running of existing legacy system. Only around $50 billion invested in 2015 globally was for new developments — that's only 2.5x the level of total FinTech investments in the same year. The FinTech companies are much more agile in developing new products based on new technology plus FinTech companies also do not have the concerns of integrating with legacy systems.

Figure 130. Global Banks Spend More on Maintenance than New Investments



Source: Celent

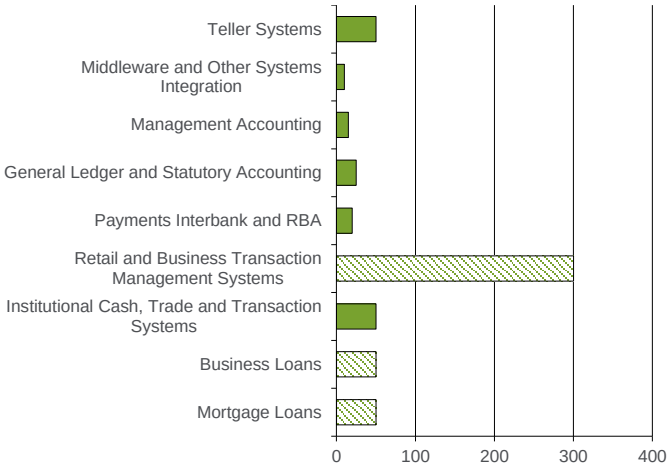
Legacy IT System Costs: Australian Banks Study

Australian banks, some of which are perceived to be leaders in the use of IT, give us some insight on the age and cost of replacing these legacy systems. This topic has been well analyzed by our Australian bank analyst colleagues, led by Craig Williams.

Many of the very oldest legacy IT systems in Australian banks date from the 1970s and 1980s – the era of the first round of digital transformation. In 1984 the main systems digitization was centered around teller entry of deposit and lending transactions, and preparation of customer and general ledgers. We show at Figure 132 our estimate of the original costs of these systems shown in 2014 dollars. The largest and most expensive of these systems, and those which handled by far the largest volume of transactions, were the deposit, basic lending and transaction systems. These comprised about 60% of the total installed costs of all systems then in place. It is these large legacy systems that banks are referring to when they talk about "core banking system" replacement.

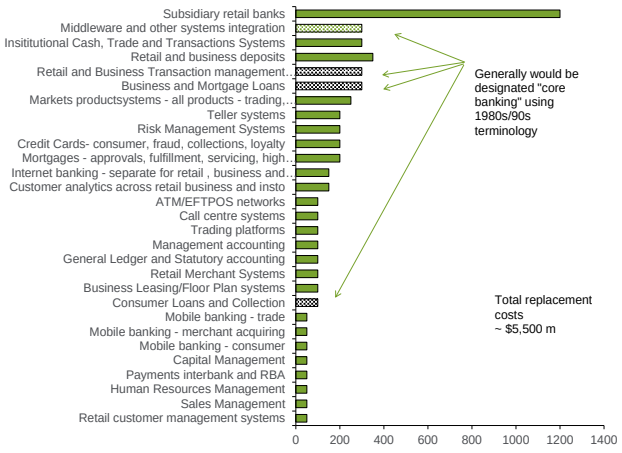
By comparison, the total replacement costs of installed software in one of the major banks is now likely to be at least A$5 billion, versus the perhaps A$600 million in today's dollars to replace their systems in 1984. Not only are there vastly more mission critical systems (Figure 131 - Figure 132), and their individual functionality much richer than the 1980s models, but the costs of integrating these many more systems into a stable "ecosystem" have increased exponentially. We estimate that the replacement costs of the original legacy critical systems is now only 20% to 25% of the total replacement costs of all systems now installed.

Figure 131. Bank IT Systems in 1984 at 2014 Replacement Costs, A$m



Source: Citi Research Estimates (shaded boxes show 1984 systems generally considered as "core banking"

Figure 132. Bank IT Systems in 2014, Replacement Costs, A$m



Source: Citi Research

When Commonwealth Bank of Australia (CBA) announced the replacement of its core IT system in 2008, it was estimated that the cost of the replacement was A$580 million over 4 years. The key driver was replacing a 40-year old system that ran on a language which very few people in the industry was familiar with and therefore could operate. By adopting a new system, CBA has generated some competitive advantages including real time processing, superior customer experience, reductions in branch staff errors, and speed to market with new products. There have been some areas that haven't been as successful. The

mortgage loan book has not been migrated over to the new system due to cost and complexity. Australian mortgages are a customized product that wouldn't naturally fit a vanilla global banking platform.

National Australia Bank (NAB) attempted a similar core IT system replacement with Oracle, rather than SAP. This project has been hampered by serious issues with both the vendor system and the NAB IT infrastructure supporting the system. NAB ended up delaying the migration of existing customer files to the new system due to cost and complexity. New customers are entered into the new Oracle system, while existing customer remain on the existing 40-year old system. The costs of this IT project are also expected to be multiples of the original estimate and the timeframe has moved from a 5 year project to a 15 year project.

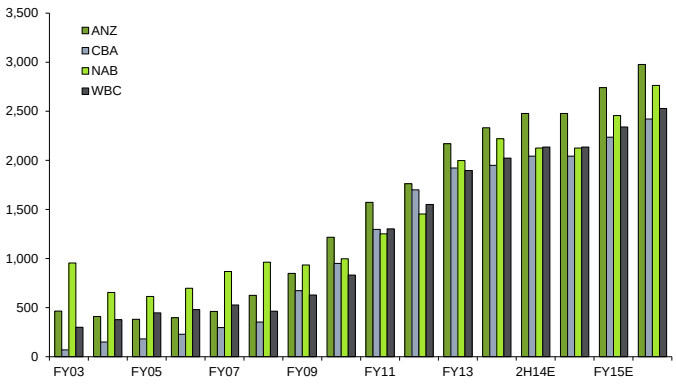
There are valuable lessons to learn from the forerunner Australian banks:

- Check the proven ability of the purchased system. NAB was the first customer globally to purchase Oracle's Banking Platform and it suffered considerable teething problems.
- The complexity and strength of the underlying IT infrastructure. This is important for the cost of getting the information into the new system from both a migration perspective as well as an on-going business usage perspective.

IT Expense Capitalization – Below the Cost Line

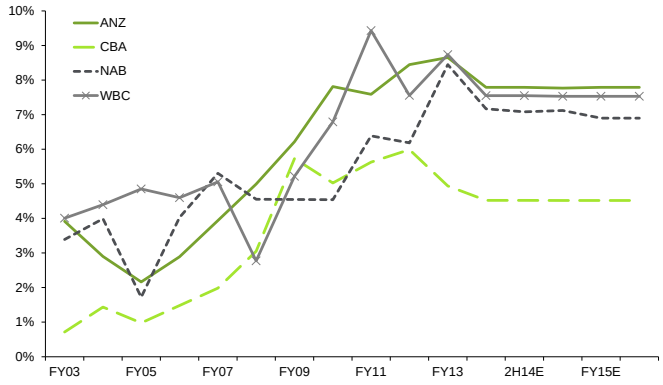
The actual IT expenses of these projects could also be higher than the company reports due to capitalization. At Australia and New Zealand Bank (ANZ), National Australia Bank (NAB), and Westpac Banking (WBC) the amount of software being capitalized (net of software amortization expenses) has been running at around 8% of operating expenses in the last few years (Figure 133 - Figure 134). By contrast at CBA the amount peaked at 6% with the completion of the SAP banking project and has since fallen back to 5%. The ongoing high levels of software capitalization at all of the Australian banks vs historical levels reflects the complexity and number of IT systems now installed.

Figure 133. Capitalized Software Balances at the Major Banks, A$m



Source: Company Reports, Citi Research

Figure 134. Amount Capitalized Less Amount Amortized per Year as % of Operating Expense



Source: Company Reports

Blockchain: The Next Big Thing?

A lot of innovation has been focused on the "last mile"…

Looking to the long term, the new generation of technology could generate cost savings as well as extra investment spend. So far a lot of payments innovation has been focused on the “last mile”, i.e., the user experience at the point of sale. The existing payment infrastructure remains the backbone. But Blockchain technology could be different. It could replace the current payment rail of centralised clearing with a distributed ledger for many aspects of financial services, especially in the B2B world.

Blockchain positives are based around its characteristics, including decentralization, programmability, and immutability. It could also be a catalyst for the transformation of many existing legacy systems that operate with a high degree of robustness but may not be the most cost or capital efficient way of doing business. However, there are also considerable negatives associated with the technology, not least that it is currently still "bleeding edge" and lacks the robustness of existing payment systems such as Visa or SWIFT. But even if Blockchain does not end up replacing the core current financial infrastructure, it may be a catalyst to rethink and re-engineer legacy systems that could work more efficiently.

Figure 135. Blockchain Positives and Negatives

Positives (+)	Negatives (-)
• **Decentralization:** Direct transfer of digital assets based on a distributed ledger. Allows counterparties to transact without the need of (multiple) intermediaries. • **Programmability:** Enables pre-programmed contracts to be executed once agreed conditions are met (e.g. smart contracts in insurance/hedging) • **Immutability:** Maintain an audit trail. that tracks the ownership of the asset from origination (e.g. property rights). • **Cost/Capital Efficiency:** Could be a catalyst to drive a transformation in existing processes that would ultimately result in lower cost and higher capital efficiency from new business models.	• **Lack of Scale:** High marginal cost relatively to existing systems (e.g. Visa or SWIFT) because of a lack of scale and network effects at the moment. • **Bleeding Edge:** The technology is not mature relative to the current financial infrastructure. Robustness for large volume transactions is yet to be developed. • **Inherently More Costly:** A distributed ledger system is more costly to operate than a centralized system (higher computation power required). • **Consensus:** Without an intermediary, a super majority is required to reach consensus. The design of the consensus mechanism affects transaction speed

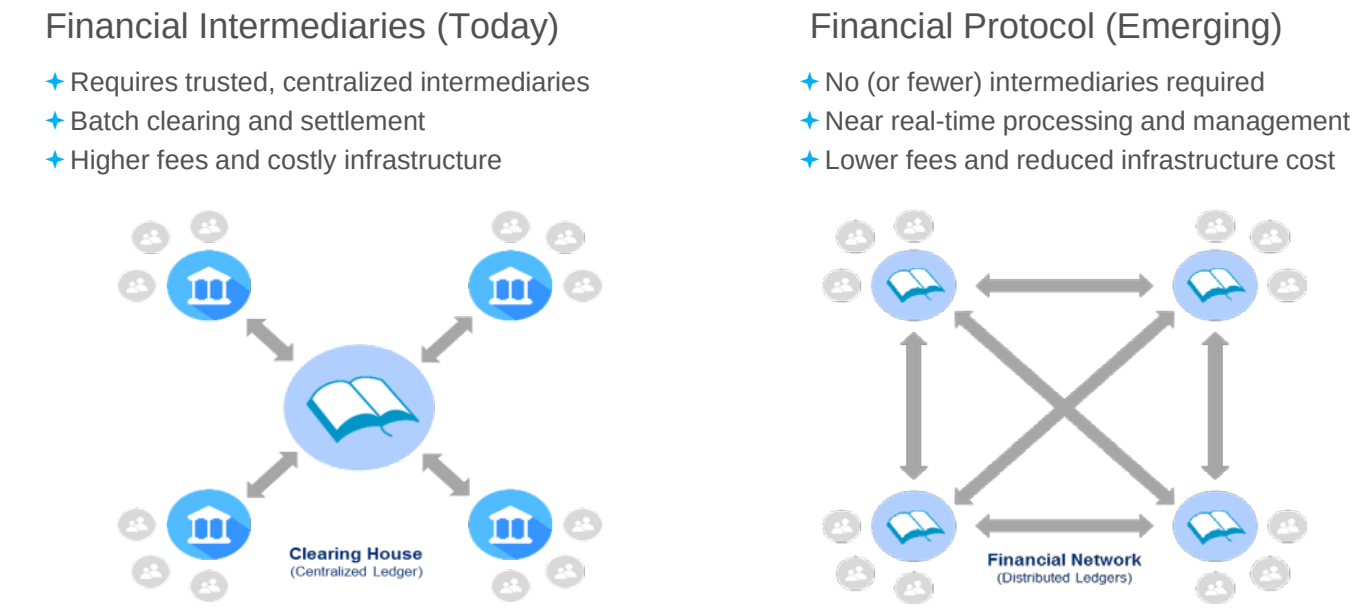
Source: Citi Research

…. and blockchain technology in the longer term

What Is Blockchain?

Blockchain is a distributed ledger database that uses a cryptographic network to provide a single source of truth. Blockchain allows untrusting parties with common interests to co-create a permanent, unchangeable, and transparent record of exchange and processing without relying on a central authority. In contrast to traditional payment model where a central clearing is required to transfer money between the sender and the recipient, Blockchain relies on a distributed ledger and consensus of the network of processors, i.e. a super majority is required by the servers for a transfer to take place.

Figure 136. Blockchain's Distributed Ledger Model has Potential to Take Steps, Time and Cost out of Financial Flows



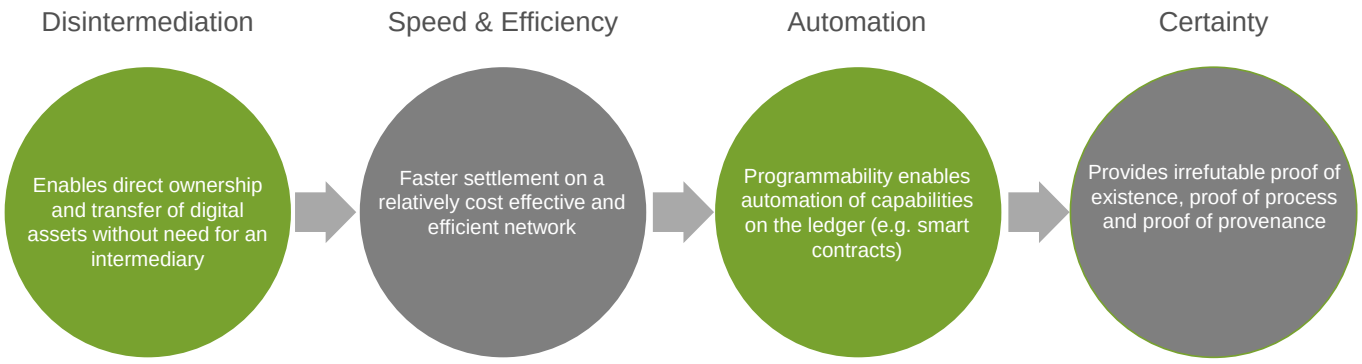
Source: Citi Research

Advantages of Blockchain

Blockchain disintermediates the middle man

If the Internet is a disruptive platform designed to facilitate the dissemination of information, then Blockchain technology is a disruptive platform designed to facilitate the exchange of value. Blockchain has a few clear advantages relative to the current system. First of all, it disintermediates the middle man. It enables direct transfer of digital assets without the need for an intermediary. Moreover, since no middle man is required, a Blockchain system has the likely benefit of fast and low cost settlement. Blockchain. Another promising innovation that leverages the Blockchain is smart contracts and tokenization. Smart contracts automate and execute pre-agreed conditions once they are met. And lastly, Blockchain provides irrefutable proof of existence, an important feature to maintain an audit trail that tracks the ownership of the valuable asset being transferred – this is crucial from a business and a regulatory perspective.

Figure 137. Attractions of Blockchain Offering

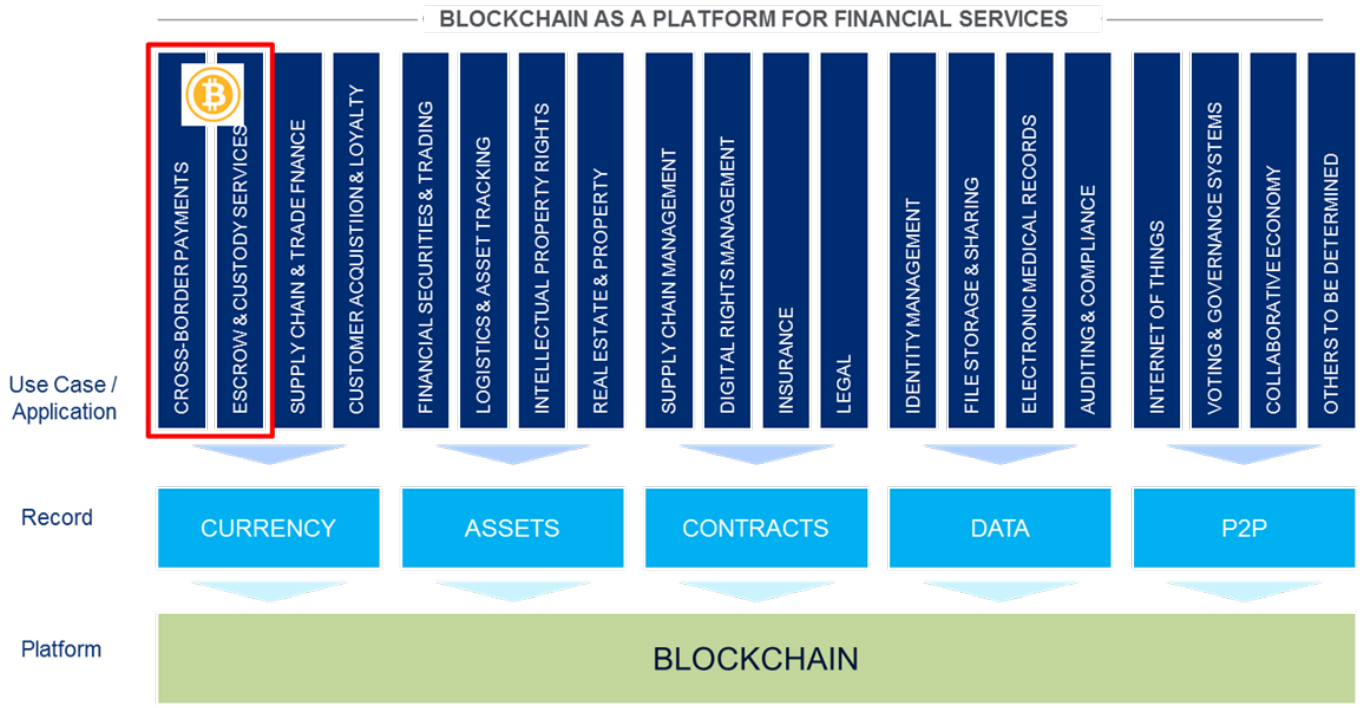


Source: Citi

Blockchain Use Cases

Blockchain technology could be applied more broadly than crypto-currencies. In the currency space, the Bitcoin rail could be used to facilitate cross border payments or supply chain and trade finance. Because virtually any type of information can be digitized and placed onto Blockchain, theoretically any information of value could be transferred in the Blockchain world. The programmability of Blockchain makes it suitable for smart contracts: a contract that executes once pre-agreed conditions are met. Blockchain could also be used for data management such as identity management. Determining the optimal Blockchain use case is often the most challenging part of Blockchain adoption, especially as an ecosystem needs to be developed for the adoption of the new system. The technology is not industrial grade yet in the view of many in the banking industry.

Figure 138. Blockchain Is Bigger than Bitcoin



Source: Citi Research

In the financial world, Blockchain can be used in a wide range of applications including payments and trade as seen in Figure 139, even though for many of these use cases, it could take decades to reach industrial scale.

Cross border payments and remittances can be very successfully adopted in the near to medium term. Bitcoin is only one crypto-currency. Other well-known ones include Ripple and Ethereum. These Blockchain rails can also be used for foreign exchange and cross boarder payments.

Blockchain for markets and securities could take a long time to reach industrial scale. There is no common protocol that participants agree on. Even when a common protocol is established, investment and time will be required to build the Blockchain network to industrial scale. The power of Blockchain comes from wide adoption, hence banks have formed consortiums to collectively research and develop use cases in the financial industry.

The application of Blockchain in trade could take even longer time than markets and securities, not least because the current legacy system works, but also because 'trust' is often required for a trade to occur. The dealing parties could prefer a trusted intermediary. Banks will continue to play a key role in this trade process.

Figure 139. Blockchain Financial Use Cases

Source: Citi Research

Blockchain Use Cases: Abra Case Study

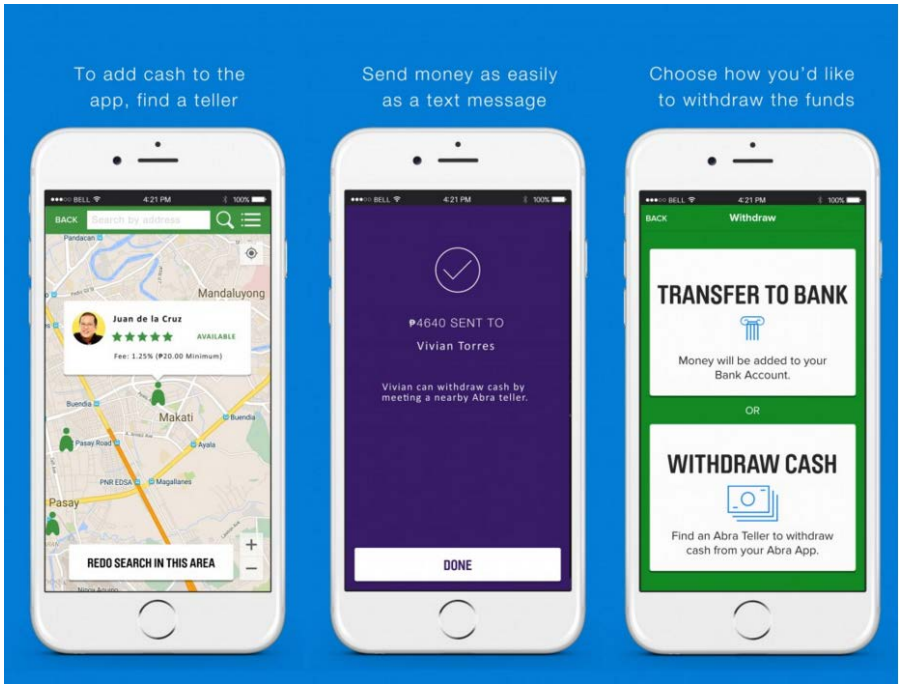
The international remittances market could be revolutionized using the BitCoin technology. There were $580 billion of cross border C2C remittances sent in 2014 and that is expected to grow to $700 billion by 2020 according to World Bank. The existing cross border payment system is slow (takes a few days to settle), costly, and often requires a bank account between the transaction parties.

Abra was founded in 2014 with the aim to digitalize cash and enable P2P money transfer through Abra's network, which is essentially a Bitcoin network. With Abra, one can convert physical money to 'digital' money (essentially Bitcoin but pegged to the US dollar for three days guaranteed by Abra) and send to other people anywhere in the world with the recipients' phone number. The transaction is secure and instant with no transfer fees. The recipient can withdraw 'physical' cash through Abra Tellers. The Abra tellers then charge a spread for converting the 'digital cash' ($ value) to local currency.

American Express is a key investor in Abra. Harshul Sanghi, Managing Partner, American Express Ventures explains the rationale behind the investment: "*As people and businesses transact more globally, there's a need for more convenient and affordable ways to move money, and we think the Blockchain could play an important role in the evolution of money transfer and commerce, especially in emerging markets.*"[1]

[1] Forbes "American Express Invests in Bitcoin Venture, Abra, Which announces U.S., Philippines Launch", October 22, 2015.

Figure 140. How Abra Works



Source: Company Website

Blockchain Use Cases: Securities Trading and Settlement

Blockchain has garnered attention because of its potential to replace multiple ledgers that exist today into a single distributed ledger

Banks' current trading systems comprise of a few completely separate systems in charge of trading, settlement, and order management. Back office is needed to resolve any exceptions, which is complex and inefficient. Consequently, Blockchain has garnered attention because of its potential to replace the multiple ledgers that exist today with a single distributed ledger that clearly displays ownership of securities. While the near/intermediate term impact seems to be more hype than substance, we do identify some interesting business use cases to watch.

- Syndicated loans are one area where we see Blockchain having an impact. We also anticipate syndicated loans benefiting from the technology, especially since there is mounting regulatory pressure to reduce settlement times. Settlement times are long due to certain manual processes related to legal procedures and due diligence. While we do not believe that Blockchain can eliminate these issues entirely, we do see its potential to reduce the friction and costs associated with manual labor and capital held during the settlement period.

- Commodities trading are another area. Difficult to move assets like gold could also benefit. Tokenizing physical assets like gold and placing them on the Blockchain may increase liquidity by facilitating and speeding up the settlement of these assets.

- Cash Settlement could benefit significantly from significantly lower costs ("cheaper"), real time settlement ("faster"), and potentially freeing up liquidity/capital thanks to lower settlement risk ("better"). Cash products could include equities, fixed income, and repo. These products are currently cleared and settled through a central clearinghouse (also known as a central counterparty or CCP). The process is already highly automated with over 90% of

the trades happening on a “straight-through processing”. But the complex system means back and middle offices exists to handle “exceptions".

- Derivatives Trading could enhance liquidity. Shorter settlement times have the potential to reduce liquidity risk, as well as the cost of liquidity, which could have a positive impact on the size of banks’ balance sheets. Blockchain also be used to automate manual processes associated with ledger reconciliation, which could reduce costs. Today derivatives rely on some manual intervention, both when it comes to writing up the contract, as well as monitoring the positions. On payment dates, both counterparties must reconcile their ledgers and agree on the amounts owed.

Winners and Losers of Blockchain

The main benefit of Blockchain is in reducing friction in the financial market

Blockchain’s main benefit is reducing friction in the financial market. Currently there are many third-party services that “sell efficiency”, and we believe that these businesses are the most at risk if Blockchain takes off and removes the friction that these companies profit from.

Clearing House Revenue May Modestly Suffer

Clearing house revenue may modestly suffer from the technology allowing banks to settle trades between themselves, subject to regulatory approval. Blockchain provides a common ledger that is visible and trusted by all network participants. This characteristic of the Blockchain competes with the clearinghouse function of providing a trusted record of security ownership. It is possible that Blockchain will allow two counterparties to settle trades with each other directly, bypassing the need for a clearinghouse, with the counterparties simply notifying the central securities depository to move the securities between clearing member accounts. However, we believe that although this is technologically feasible, it will require a network of counterparties to belong to the same Blockchain. Additionally, regulators will need to be involved to monitor these types of trades. Regulators like the CCP model because it allows them to view flows and keep track of risk in one central location. Furthermore, these bilateral trades may decrease some of the benefits of netting provided by the CCPs, specifically with respect to liquidity. Instant settlement would require instant payment in full, which may make liquidity management more complex.

Custody Banks Will Endure

The custody bank handles the receipt and delivery of cash and securities. Custody banks add another layer of cost to the transaction by charging for book entry, wire transfers, principal paydowns, and surcharges for manual instructions. The custody bank interfaces with the clearinghouse on behalf of the broker and manages securities and cash for a fee. The custodian must then transmit all the information back to the broker so that the broker can reconcile its records. Custody banks also handle corporate actions. For example, an issuer will allocate a lump sum to the DTCC for dividends, which must then be allocated to the different custodians of the stock. Each custodian must then repeat this process, and the chain continues until the beneficial owner of the security is identified. The DTCC uses a system called Omgeo to synchronize the brokers and custodians so that they can be ready to exchange securities and payment, and update their accounts.

We believe custodian banks can benefit from operational efficiencies. Custody banks are proactively working to experiment with Blockchain. Northern Trust has announced that it is on the verge of formalizing a proof of concept agreement with a third-party, while BNY Mellon and State Street are also looking to internally

experiment with the technology. Custody banks benefit from a history of reliability when it comes to handling and safekeeping assets, as well as providing a certain degree of comfort to regulators. We believe regulators will require progress to move slowly in order to ensure the transition to a new infrastructure is smooth. There will therefore likely be a role for custodians.

In our view, custody banks will initially benefit from the efficiencies brought about by Blockchain, which could contribute to a reduction in operational costs. Their systems are already prepared for faster settlement times, and the market is expected to adjust to the shorter clearing cycle. Custodians will have the ability to expediently reclaim securities that have been lent out. However, in the much longer term, custody banks could see a reduced role as custody and back-office services are rendered obsolete by the technology.

Investment Banks Could Be a Key Beneficiary from Cost Take Outs

Blockchain is primarily a cost play for financial institutions in the long run

We view Blockchain as primarily a cost play for financial institutions in the long run. Lower costs would come from removing intermediaries in the trading process, who charge fees and contribute to a more complex infrastructure. A secondary benefit is faster settlement times, which could shrink the size of the balance sheet (we estimate for the large bank it could be in the tens of billions of dollars) and modestly free up capital for banks constrained by the supplementary leverage ratio.

- **Potential for Lower Costs** - Blockchain could conceptually enable banks to settle a transaction without having to go through exchanges or CCPs. We consequently see potential for some brokerage, clearance and exchange fees (BC&E) expense reduction, similar to the cost savings banks get from internalization, whereby a broker fills an order from its own inventory, which results in lower transaction costs.

- **Lower Capital** - Blockchain could be utilized to shorten the settlement cycle and subsequently can potentially free up capital by reducing the size of the balance sheet. We believe that the capital release is beneficial but not game changing. We do see some small benefit from reduced operational risk thanks to fewer trade fails and reduced counterparty risk from shorter exposure. The shortened settlement cycle is expected to reduce counterparty risk, decrease clearing capital requirements, reduce pro-cyclical margin and liquidity demands, and increase global settlement harmonization.

  – Faster settlement would reduce required liquidity buffers – Shorter settlement times would reduce the amount of liquidity banks need to hold, which would shrink the size of the balance sheet.

  – Capital related to settlement risk is relatively small due to trade date accounting. As long as the trade is expected to settle within a few days, we believe the capital requirements are relatively low. Because most securities settle on T+3, the capital freed up from faster settlement is fairly limited. However, we do again see a benefit from a smaller balance sheet driven by a reduction in the total amount of receivables and payables, benefitting SLR-constrained banks.

  – There is potential for Blockchain to enable less capital to be held with financial market utilities – Clearing members must contribute to default funds for central counterparties by posting collateral. The amount of collateral is determined by market price volatility using a 99% confidence level over a three-day risk horizon. If the amount of time to settle is reduced, then less collateral will be needed for the default fund.

Robo-Advisors: Complementary, not Substitutional

Robo-advisors leverage the Internet to offer customized investment portfolios to clients by employing algorithms

Robo-advisors refers to the digital breed of investment managers that leverage the Internet to offer customized investment portfolios to clients by employing algorithms. The rise of robo-advisors provides individual investors more choices around getting financial and investment advice at a fraction of the costs associated with traditional portfolio managers and financial advisors.

- **How it Works** – Investors fill in an online questionnaire detailing their investment amount, risk tolerance and expected returns. The platform then uses algorithms to place investment into various buckets (usually low-cost ETFs). In return, the platform charges a management fee plus fund expenses. The platform also helps routinely rebalance the portfolio in-line with set allocations and can also offer other additional services – such as automatic tax loss harvesting.

Earn management fees of 0.25-0.50%

- **Revenue Model** – In the US the platform earns management fees of 0.25-0.50% per year which varies based on the value invested on the platform. Investors also pay ETF expense fees in cases where applicable which range from 0-0.15%. European robo offerings (so far) tend to charge higher fees.

- **Limited Service Offering** – Currently, robo-advisor offerings are restricted to basic planning and investment (primarily investing in ETFs). We think it will appeal to individuals with less to invest.

(i) lower costs and ease of use,

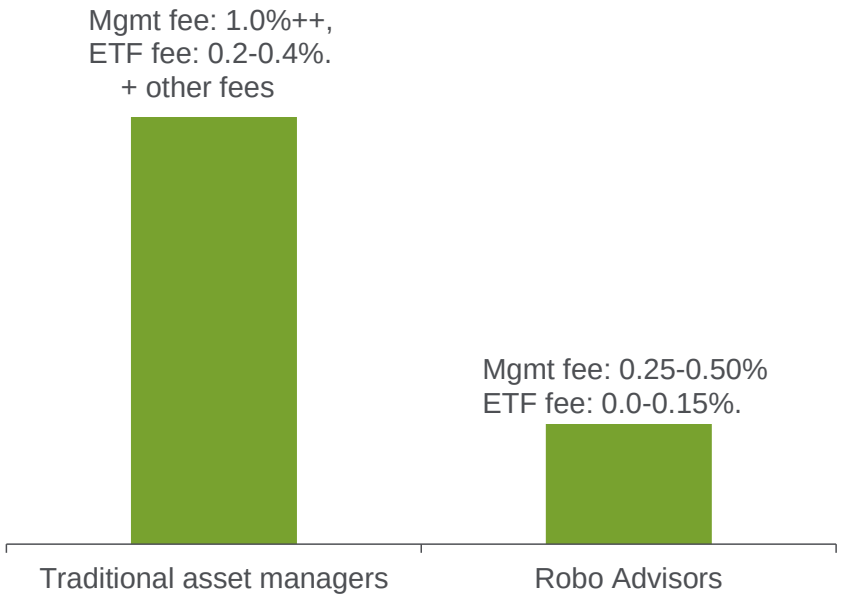
(ii) portfolio diversification & rebalancing,

(iii) tax harvesting

(iv) widens potential investor base.

- **Value Proposition** – Robo-advisors offer a unique proposition to investors with low account minimums, low fees and investments mostly in ETFs. Aside from lower costs and ease of use owing to automation, they also help – (1) diversify and efficiently rebalance portfolios in-line with desired allocations on a regular basis – ideal for conservative investors who have little market experience; (2) incorporate tax-harvesting strategies that were previously offered only to high net worth investors; and (3) widen the potential investor base by including lower net worth investors in the portfolio management market.

Figure 141. Cost of Investing with Traditional Asset Managers vs. Robo Advisors

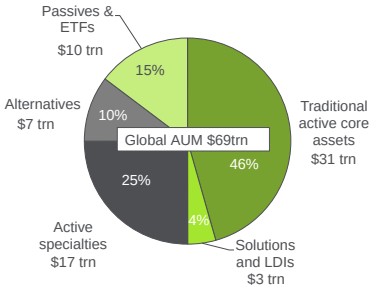


Source: Citi Research

- **Market Size** – The global asset management industry is sizeable with assets under management (AUM) of over $69 trillion spread across different asset classes (see Figure 142). Of the total pie, active and passively managed investments account for the bulk $41 trillion, and include equities, fixed income, commodities, and forex. However, since robo-advisors only primarily tend to invest in managed funds, we believe a like-for-like comparison would be to look at the mutual fund and ETF industry which measures $30.4 trillion and $2.6 trillion respectively. Geographically, ETF assets are predominant in the US with AUM of $1.9 trillion (73% of total) (see Figure 143).

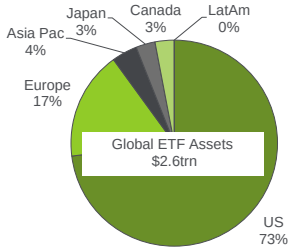
  In contrast, robo-advisors presently own a fraction of the market, estimated at $20 billion (see Figure 144). The larger independent US robo-advisors include Schwab Intelligent Portfolios (manages around $4bn); Betterment (reached $3bn in Nov 2015) and Wealthfront (which manages an AUM of $2.6bn). While robo-advisors service a niche presently, their growing prominence amongst younger millennial and Gen X investors is certain to continue for the foreseeable future as they get richer. With the fast pace of new sign-ups, Schwab estimates robo-advisors US market potential to be worth $400 billion in the coming years.

Figure 142. Global AUMs by Products (2014)



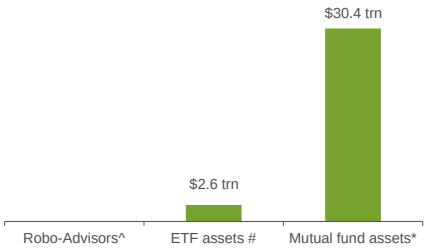
Based on BCG Global Asset Management 2014
Source: BCG Perspectives, Citi Research

Figure 143. ETF Assets by Region (2014)



Source: ETFGI, Citi Research

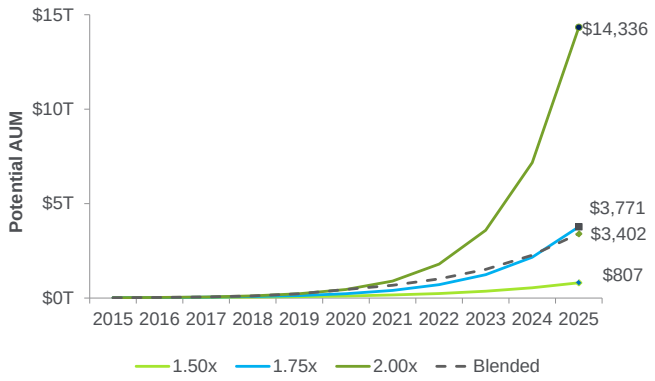
Figure 144. Global AuMs of Robo-Advisors vs ETF and Mutual Fund Industry



^ Based on estimate by The Economist
# ETF industry size from ETFGI
* Mutual fund assets sourced from ICI
Source: ETFGI, ICI, Citi Research

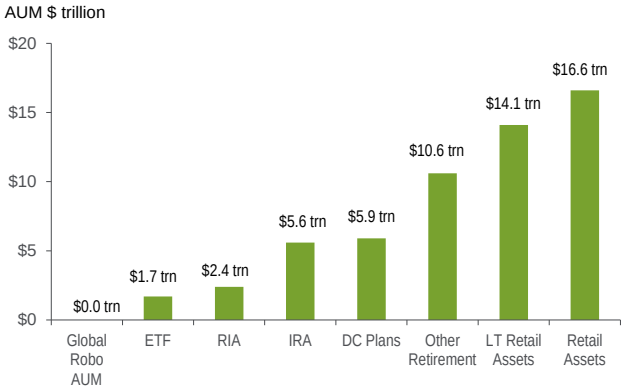
- Global: $13.5 trillion total addressable market. In a June 2015 report, McKinsey estimated the potential value of personal financial assets that could be served by virtual advice at $13.5 trillion, split into $6.4 trillion in North America, $3.4 trillion Asia, $3.3 trillion Europe, $0.4 trillion Australia and $0.1 trillion Latin America. This assumes that 25% of affluent households ($100k to $1 million in financial assets) and 10% of high net worth households ($1to $30 million) are prime candidates for virtual advice. Once again, this is a figure for all virtual advice, not just robo-advice.

Figure 145. Potential Growth of US Robo AUM, Starting at $14B end-2014



Source: Citi Research

Figure 146. US AUM by Product



Source: CFA Institute Magazine (March/April 2015), Cerulli, ICI Fact Book 2014, Strategic Insight Simfund, Citi Research

Figure 147. Robo Advisors – SWOT Analysis

Strengths	Weaknesses
■ Low cost, highly scalable, solid margins	■ Subject to glitches/cyber attacks
■ Can be a tool used by a Financial Adviser or do-it-yourself investor	■ Challenges around tactical allocations
■ Easy to use, understand	■ Uncertainty around cash sweep/economics
■ Better returns (supposedly) vs. passive/index	■ Not yet tested 'through the cycle'
Opportunities	**Threats**
■ Huge AUM target addressable market	■ Can be copied and replicated without additional fees
■ Essentially a lower fee TDF/Asset Allocation Fund	■ Unless offering a continued service (rebalancing)
■ Millenials want online products	■ Pushback from tenured Financial Advisors
■ Rising affluence in younger generations	■ Fiduciary responsibility?

Source: Citi Research

Complementary Not Substitutional

Traditional players join forces with digital disruptors

We see the advent of robo-advice as an example of automation improving the productivity of traditional investment advisers, and not a situation where there is significant risk of job substitution. We note that in the US Personal Financial Advisors jobs doubled between the year 2000 to 2010, however they are expected to increase by only 27% between 2012-2022. Financial Analysts grew by 38% between 2000 and 2010, but are only expected to increase by 16% between 2012 and 2022.

Always a place for human interaction

Higher net worth or more sophisticated investors will, in our view, always demand face-to-face advice. However, we believe the services offered by advisors have the potential to be augmented by virtual and robo-advice tools, increasing individual adviser productivity, and ability to service more clients, or in more user-friendly and/or sophisticated ways.

Technology as a client acquisition tool

For the mass-market, or investors whose wealth levels preclude them from seeking more costly high-touch investment advice, we see technology, in the form of “Robo-Advice” offering a useful solution. For many advice firms, the provision of a robo-advice offering could be a useful “loss-leader” tool for future client acquisition: allowing them to provide a service to younger/less affluent customers, many of whom are likely to see their wealth expand such that they need a full personalized advice service in the future.

US Case Study

First mover advantage for robo-advisors such as Wealthfront and Betterment has seen them quickly gather significant AUM, of around $2.5 billion each. But bigger industry incumbents have moved swiftly to head off this perceived threat, either acquiring the technology for themselves, or offering alternative low cost alternatives.

In the US, incumbents are responding to the threat of new technology and adapting it for themselves

Recent examples include: BlackRock announced the acquisition of FutureAdvisor in August 2015, taking the robo-advisor’s platform, with plans to offer this to banks, brokerages and other clients of BlackRock Solutions. In May 2015, Vanguard launched a hybrid service, offering clients access to robo-services and human advisors for just 30bp, a very similar pricing level to ‘pure’ robo-advisors. Schwab Intelligent Portfolios (launched March 2015) offers an automated investment advisory service at no charge (no advisory fees, account fees or commissions) – the fee revenue to Schwab comes from management fees and/or cash feature charges on client funds allocated to Schwab ETFs.

In response to this, the robo-advisors' are building the hybrid model themselves e.g. Financial Engines recently announced its acquisition of The Mutual Fund Store, a RIA with ~$10bn AUM, 125 retail locations and 300-plus advisers. Betterment offers its digital investment technology to advisors through its Betterment Institutional arm.

Figure 148. Selection of US Robo-Advisors and Competing Offerings from Incumbent Financial Institutions

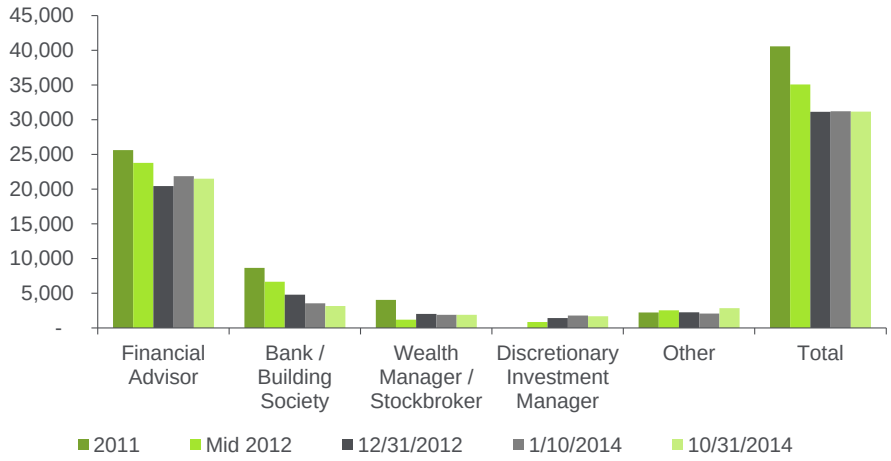
Robo Advisor	AUM	Founded	Platform Fee	Investment Types	Description
wealthfront	$2.6bn	Dec-11	0% up to $10k 0.25% above $10k	ETFs tracking 11 major asset classes	Similar offerings. Both claim to be the "largest automated investment service" offering diversified, continually rebalanced portfolios of ETFs, automated tax loss harvesting, and both IRA and non retirement accounts. Wealthfront ($5k account minimum) manages $2.6bn AUM, Betterment (no minimum account size) cites over 143,000 customers with more than $3bn AUM.
Betterment	$3.0bn	2008	0.35% up to $10k 0.25% above $10k 0.15% above $100k	ETFs tracking 12 asset classes	
PERSONAL CAPITAL	$1.9bn	Sep-11	0.89% up to $1m For investors with more than $1m: 0.79% first $3m, 0.69% next $2m, 0.59% next $5m, 0.49% over $10m	Combination of single stocks and fixed income / alts ETFs	900,000 registered users, $200bn tracked assets, $1.9bn AUM. Offers free online financial tools, coupled with a phone / virtual meeting-based financial advice service. $100,000 account minimum
SIGFIG	$70mn	2011	0% up to $10k 0.25% above $10k	5-6 ETFs available on each of its partner brokerage platforms (TD Ameritrade, Fidelity and Schwab)	Proposes optimal portfolios based on risk questionnaire. Allocates across 6 key asset classes. Automatic rebalancing. $2,000 account minimum.
Hedgeable	$35mn	2009	0.75% up to $50k. Lower fees for larger accounts. 0.30% above $1m	Mixture of single stocks, ETFs and alternatives (private equity, bitcoin, real estate, commodities)	Automated, low cost risk managed investing, no account minimum.
Vanguard Personal Advisor Services	$4.2bn	Apr-15	0.30% up to $5m 0.20% above $5m 0.10% above $10m 0.10% above $25m	Vanguard ETFs	Build portfolio using low cost funds, rebalance, minimise taxes. Minimum $50k investment with a team of advisers. More than $500k to have a dedicated advisor. Not automated
charles SCHWAB INTELLIGENT PORTFOLIOS	$4.1bn	Feb-15	None	54 ETFs, 14 Schwab, 8 OneSource, the rest third party	$5,000 investment minimum. Offers risk-based investment strategies, with automatic rebalancing, tax loss harvesting (minimum $50,000 balance)

Source: Citi Research

UK Case Study

In the UK, the Financial Advice market underwent significant upheaval following the implementation of the key proposals of the FCA's (Financial Conduct Authority) Retail Distribution Review (RDR). These included more onerous qualification requirements, and a change in the economic model for many advisers (a move from upfront commissions / share of the front-end load on funds, to directly charging retail investors for advice services). The chart below shows how the number of advisers in the UK changed over this period.

Figure 149. Estimated Numbers of Retail Investment Advisers in the UK, Pre- and Post- RDR



Source: FCA. RDR = Retail Distribution Review. Key proposals arising out of the RDR were implemented end 2012

In the UK, technology should act as an agent for industry recovery and change

We see Technology and Automation helping the financial advice industry recover, and become more productive, following the upheaval caused by the RDR. However, so far, the success of "pure" robo-advice offerings has been very limited.

We believe regulatory action could be a trigger for change. The FCA's "Financial Advice Market Review", launched in August 2015 and recently closed (22 Dec 2015, findings expected in Spring 2016), is examining how financial advice could work better for consumers, including looking at whether there is an advice gap for those people who think they cannot afford to get financial advice. Amongst other aims, the review intends to come forward with a package of reforms to:

- Empower and equip all UK consumers to make effective decisions about their finances;
- Facilitate the establishment of a broad based market for the provision of financial advice to all consumers; and
- Create a regulatory environment which gives firms the clarity they need to compete and innovate to fill the advice gap.

We believe this industry review could act as a trigger for greater growth in lower cost "robo" advice, or hybrid advice offerings in the UK. Proposals are expected ahead of Budget 2016 (Spring 2016).

Figure 150. Selection of UK Robo-Advisors and Competing Offerings from Incumbent Financial Institutions

Robo Advisor	AUM	Founded	Platform Fee	Investment Types	Description
nutmeg		2011	1.00% above £1k 0.90% above £25k 0.75% above £50k 0.60% above £100k 0.50% above £250k 0.30% above £500k	53 ETF's tracking 9 asset classes	£1,000 investment minimum. Offers 10 risk-based portfolios having bonds, equities and other asset class ETF's.
Wealth Horizon		2014	Initial fee of 0.25% plus annual fee of 0.75%	Range of funds from Legal& General, Threadneedle, Vanguard, Ignis etc.	£1,000 investment minimum. Risk assesment based on number of questions. Offers risk-based portfolios having mix of equities, bonds, property and cash.
Money on toast		2012	1% annual fee (min £3) plus 0.49% underlying fund charges. Additional charges on pensions	25 funds (Collective funds, active and passive funds)	£1,000 investment minimum. Offers 6 risk-based portfolios managed by CPN Investment Management (parent).
HL Portfolio+			Annual fee of 0.45% above £1k 0.25% above £250k 0.10% above £1m 0% above £2m	HL Multi-manager funds , 1.50% TER	£1,000 investment minimum. Offers 6 risk-based portfolios managed by Hargreaves Lansdown investing in shares, bonds and other assets.

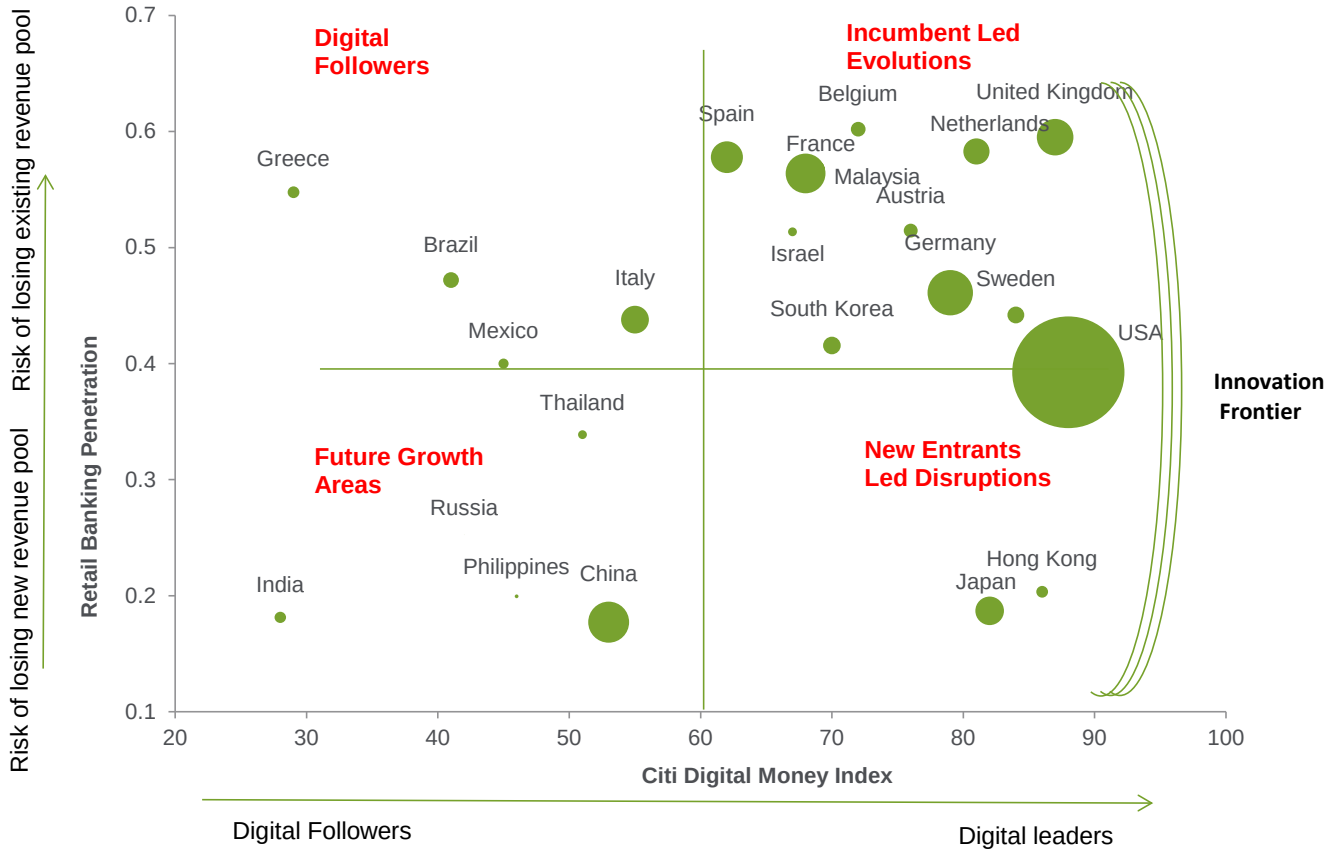
Source: Citi Research

Appendix: Citi's Digital Money Index

One measure of digital leadership is the Citi Digital Money Index, an index that measures a countries' propensity to adopt digital money (See Appendix for more details on Digital Money Index). The US and UK stand out on the innovation frontier. Sweden, Netherlands and Hong Kong are also among the digital leaders. Countries in the top right hand quadrant of the chart below are likely to be characterized by incumbent bank led evolution rather than get disrupted by new entrants as they already have banks that are heavily geared to consumer banking. New entrants in these markets are likely to focus in profitable niches that they can mine (eg cross-border retail payments in the UK).

By contrast, many EM countries such as India, Philippines, Russia, Thailand – or even China as noted previously – have banks with relatively small consumer operations. These EM banks usually are not consumer experts. And while the digital infrastructure of their countries is often under-developed (as measured by the Citi Digital Money index) they have an army of smart-phone wielding consumers that are open for FinTech challengers to capture before the banks can.

Figure 151. Map the Risk of Digital Disruption



Source: Company Reports and Citi Research; Retail bank penetration is measured as retail loans% total loans. Size of the bubble is retail bank loans, the larger the bubble, the higher the retail bank loans

Measuring Digital Money Readiness

Citi's Digital Money readiness index measures how ready a given country is to adopt digital money. We believe the readiness is supported by four key pillars including institutional environment, enabling infrastructure, solution provisioning and propensity to adopt.

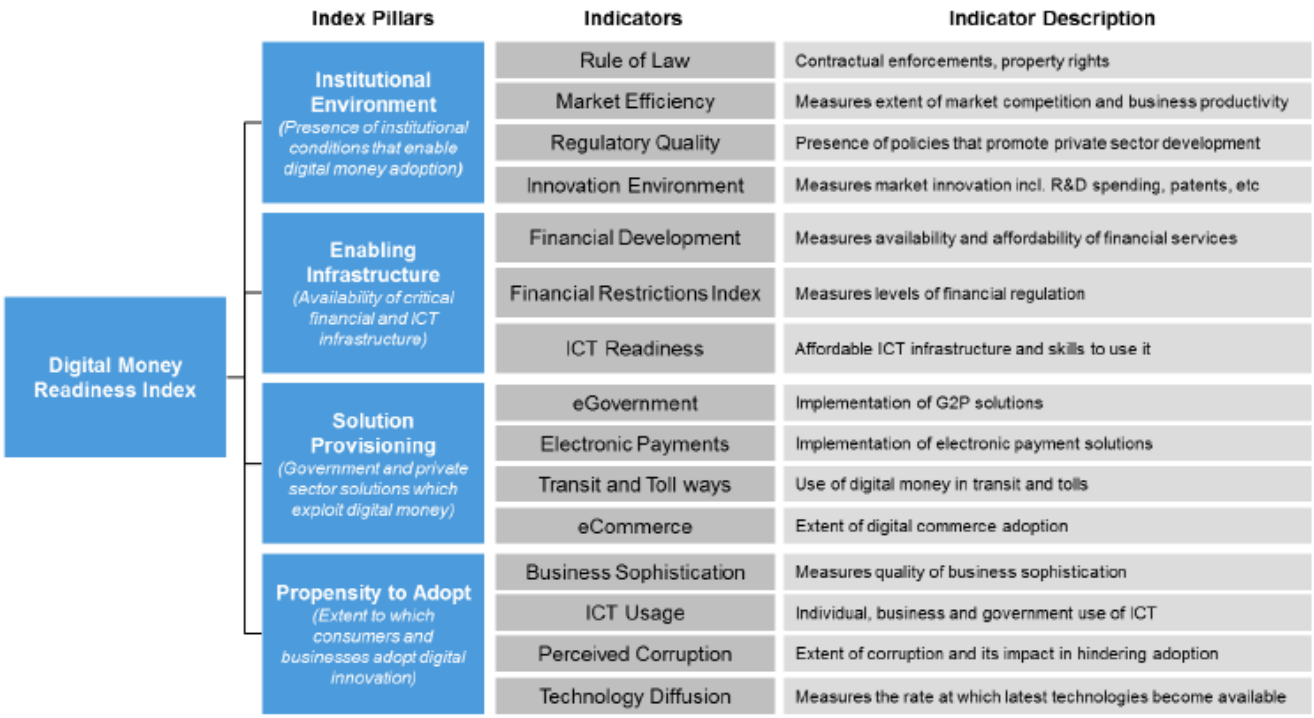
Citi's Digital Money Readiness Index segments the 90 countries we survey into four quartiles

- Institutional environment: This pillar considers the national institutional characteristics within which digital money needs to operate – this includes factors such as property rights and the government's support for innovation.
- Enabling infrastructure: This pillar considers technological and financial infrastructure which underpins the deployment and operation of digital money. Both regulatory and operational aspects are considered.
- Solution provisioning: This pillar consists of industries and functions that drive the provision of digital money solutions (and the most frequent use cases).
- Propensity to adopt: This pillar captures the rate at which consumers and corporates adopt new innovation.

To measure the digital money readiness, we created a composite score consisting of four pillars that drive readiness and measured these with data collected across 15 indicators illustrated in Figure 150.

A specific index score as well as detailed breakdown is available for each of the 90 countries studies. Click here for the Digital Money Index rankings of 90 Countries.

Figure 152. Framework to Measure Digital Money Readiness



Source: Citi Digital Money Report 2014

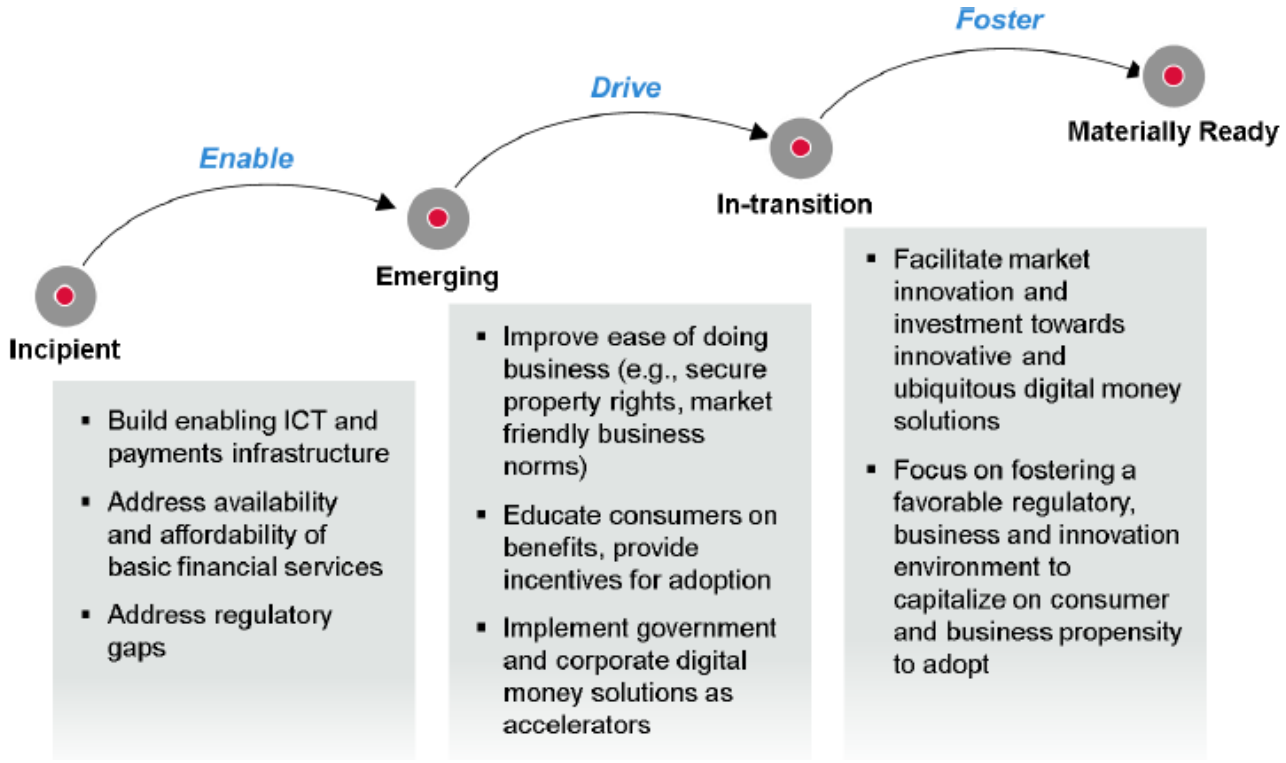
Understanding Digital Money Readiness

Citi's analysis of the readiness scores yielded four distinct clusters measuring stages of readiness based on aforementioned pillars and indicators. The four stages are: incipient, emerging, in-transition and materially ready.

- Incipient: Countries in this stage are characterized by a lack of affordable (and basic) infrastructure and expensive / limited financial services. Countries in this stage include Vietnam, Greece, Kenya, Mexico and so on.
- Emerging: There is basic regulation and infrastructure exists in these countries, but they often have a large informal economy underpinned and perpetuated by people's love of cash.
- In-Transition: Digital money is starting to make its presence felt in these countries, often in the form of government disbursements. But In-Transition countries still require significant investment in e-commerce initiatives, or the relaxation of regulations to encourage private enterprise.
- Materially Ready: People in this group of countries are familiar with digital solutions, and live in a regulatory environment that encourages digital innovation.

Citi Money Index not only ranks the countries in its financial readiness, it also identifies the bottlenecks that affect each countries readiness score, with a view to provide a roadmap to becoming digitally ready over time. Figure 153 shows how each country could move from one stage to the next.

Figure 153. Improving Digital Money Readiness



Source: Citi Digital Money Report 2014

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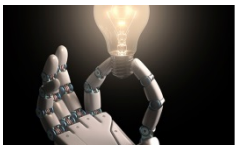

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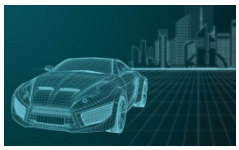

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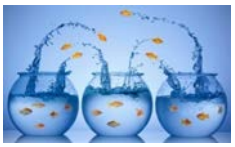

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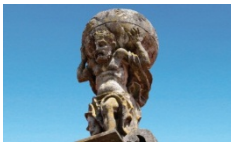

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FinTech investments have grown exponentially in recent years, growing by two-thirds year-over-year in 2015 to $19 billion. / New digital business models are expected to grow from just 1% of North American consumer banking revenues to almost 17% by 2023 pushing the region close to a disruption tipping point.

INNOVATION

The majority of FinTech spend has been in the personal and SME business segments with focus on the user experience at the point of sale, competing directly with banks in their highly profitable consumer segment. / FinTech investment in Blockchain technology could be revolutionary as it replaces the core financial infrastructure and allow banks to rethink and re-engineer legacy systems that could work more efficiently and yield cost savings.

SOCIAL CHANGE

Globally, a customer interacts with their main bank on average about 17 times a month across multiple channels. Non-human contact — Internet or mobile banking, ATMs, and social media — accounts for 15 for those interactions. / The shift in consumer behavior is making banks rethink their channel strategy and banks will close branches as they see their consumers shift away from branches to digital.