



DIGITAL DISRUPTION – REVISITED

What FinTech VC Investments Tell us About a Changing Industry

Citi GPS: Global Perspectives & Solutions

January 2017



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What FinTech VC Investments Tells Us About a Changing Industry

2016 was the year when the Chinese FinTech dragons roared and some previously feted Western FinTech leaders wilted. In our first Digital Disruption GPS report, we argued that China was very important to the FinTech story (March 2016, link [here](#)). In this follow-on report, we follow the venture capital (VC) and corporate investments money trail to revisit the theme of the Chinese FinTech dragons as they roar at home and expand overseas.

Our conclusion: the rise of the Chinese dragons reflects a unique combination over the past decade of incredibly rapid digitization and the simultaneous rise of the Chinese mass middle class, along with poorly prepared incumbent financial institutions facing off against entrepreneurial e-commerce and social media ecosystems. It is no surprise to us that China accounted for over 50% of total FinTech investments globally in the first nine months of 2016 (9M 2016) and was the only major region where FinTech investments increased in 2016 — in fact doubling in China in the first nine months of 2016 versus the same period in 2015.

In this report we also take a look at how different the FinTech evolution has been in the West: (1) the U.S. pivoted to InsurTech in 2016; and (2) two of the largest U.S. FinTech VC funding rounds in 2016 were in the health insurance space. Big data, the Internet of Things (IoT), and wearable devices, among other trends, will help insurance companies use FinTech to be more creative and customized. So far the InsurTech focus is more about improving distribution efficiency and user experience, as with much B2C FinTech in general.

Lending hasn't gone away. Our VC contributors for this report remain enthusiastic about peer-to-peer lending as an opportunity, especially in China or emerging markets where it is about financial inclusion and accessing underserved clients. By contrast, in the U.S. it has often been a (sub-prime/near-prime) credit card debt consolidation play. Lending accounts for about 80% of 9M 2016 VC FinTech investments ex-U.S. — but if we exclude Asia from our data (basically China), then the share of lending drops to sub-30%.

Europe remains a laggard for start-ups/VC investing at about 10% of global FinTech VC investment in 2015-16. This is not a big surprise as Europe has a smaller VC market versus the U.S., it has none of the large technology/Internet companies that exist in the U.S. or China and its banking system (despite the sector's weak stock prices, earnings and capital challenges of the past decade) offers more of a full-service provision versus U.S. or Chinese peers.

European banks are among the top investors in VC-backed FinTech companies led by Spanish banks Banco Santander and BBVA (if we include Propel Ventures). European banks are increasingly interested in FinTech and with more bank investors and affiliates, we will see more of a shift to business-to-business (B2B). In 2017 we expect more focus on B2B FinTech topics, such as Artificial Intelligence, especially in London which is a hotspot with DeepMind and its concentration of universities; regulatory tech both in the U.K. and the U.S.; and cybersecurity primarily in the U.S. and Israel.

Back in the business-to-consumer (B2C) world, 2017 will also be the year when the Chinese dragons continue to make progress in expanding outside their home market, albeit this will not be the strategic "Blue Ocean" that China was a decade ago. The simple call for us to make is that Alipay will grow internationally as it follows the ongoing expansion of overseas Chinese tourism. The harder call is how many non-Chinese clients will Chinese companies like Ant Financial and WeChat gain in payments and associated products.

In the second half of this report, we switch from our analytical conclusions to highlights from our discussions in recent months with eight leading FinTech VC'S who are based across the world and in many of the key FinTech industry hotspots. We asked the eight VCs to nominate their favorite business models: (1) Payments, especially e-commerce payments, can reap large economy of scale (2) Lending is still popular especially among emerging markets (3) Shift in interest in B2B business models in developed markets (4) InsurTech is gaining momentum in the U.S.

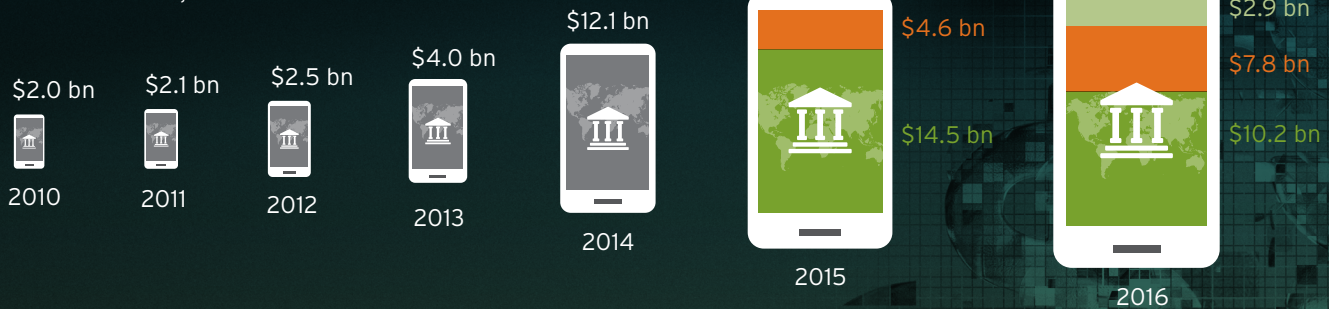
Chinese Dragons Roared in 2016 as West Continues to Evolve

ANNUAL PRIVATE INVESTMENT IN GLOBAL FINTECH COMPANIES CONTINUES TO GROW, HELPED BY SOME MEGADEALS IN CHINA

Annual Global Investments in Global FinTech Companies

Source: Citi Research and CB Insights

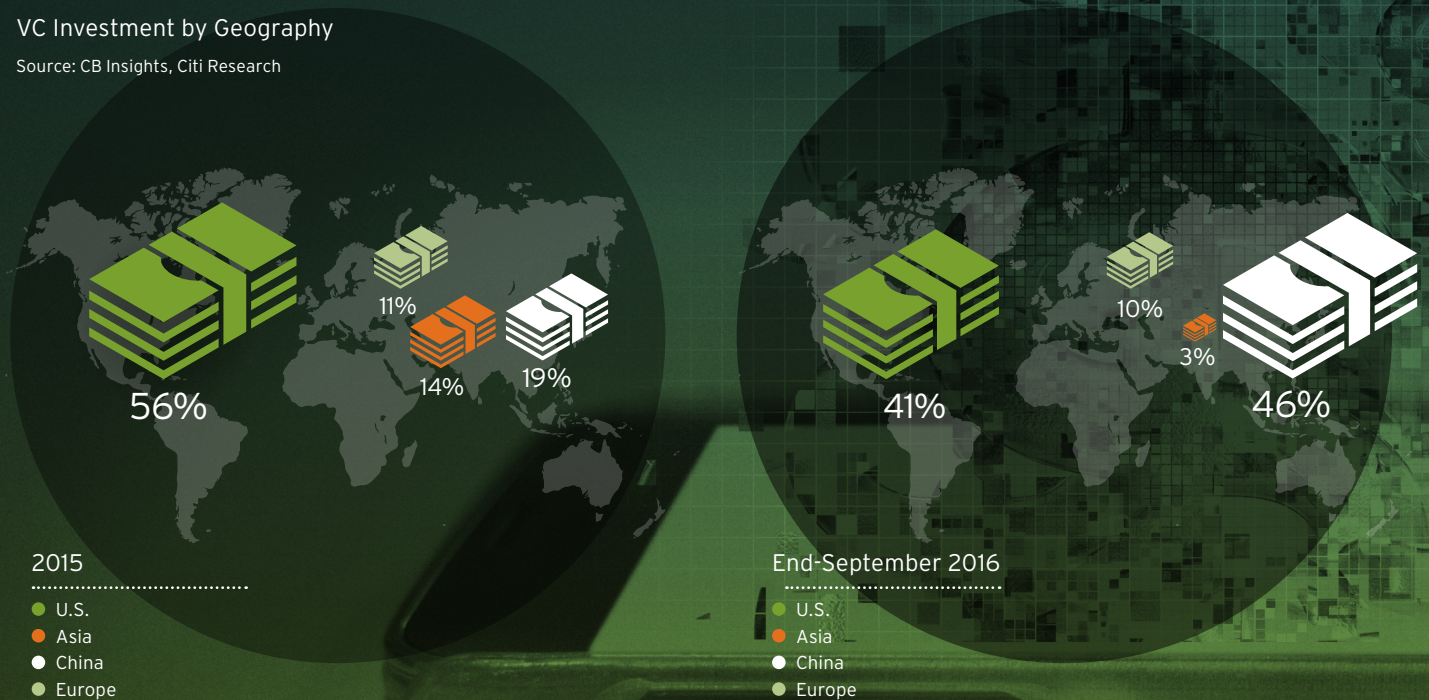
- Dollar Invested
- Venture Capital
- Other Investment
- Annualization Adjustment



CHINA'S SHARE OF THE GLOBAL FINTECH VENTURE CAPITAL INVESTMENTS HAS MORE THAN DOUBLED IN 2016

VC Investment by Geography

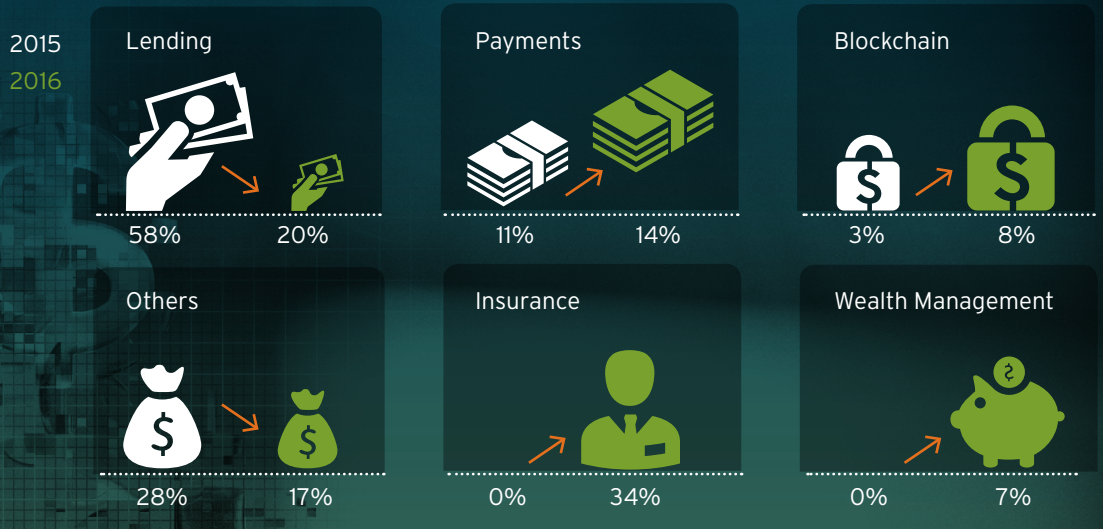
Source: CB Insights, Citi Research



IN THE U.S., VENTURE CAPITAL INVESTMENTS ARE MOVING AWAY FROM LENDING AND TOWARDS NEW AREAS SUCH AS INSURANCE AND WEALTH MANAGEMENT

U.S. VC Investment into FinTech

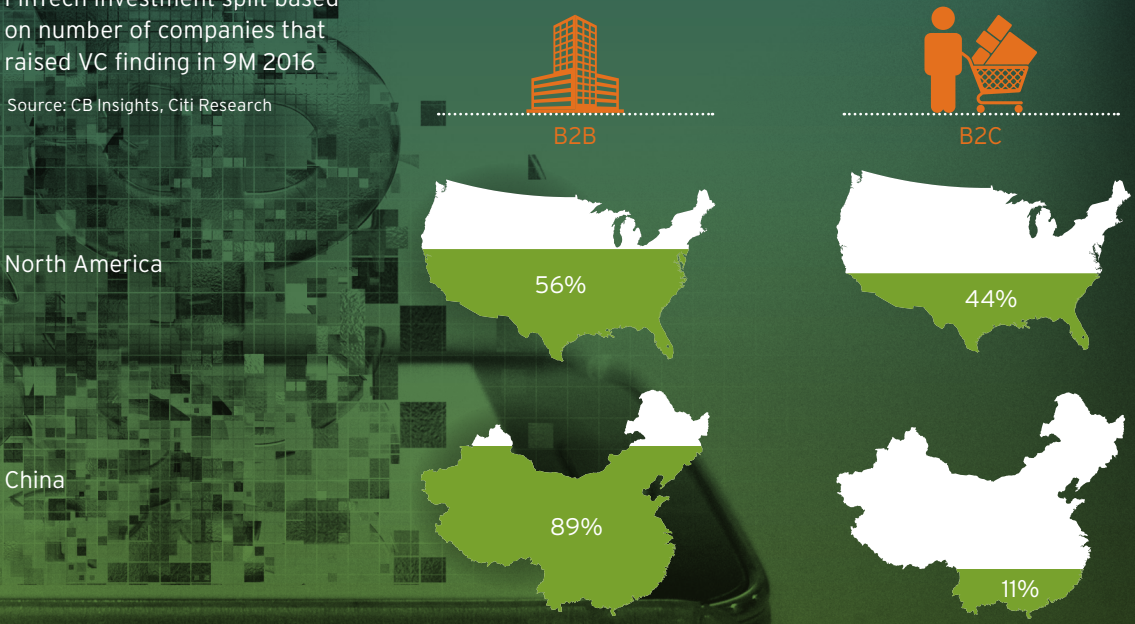
Source: CB Insights, Citi Research



INVESTMENT IS SHIFTING TOWARDS BUSINESS-TO-BUSINESS (B2B) IN THE U.S. WHILE CHINA CONTINUES TO FOCUS ON BUSINESS-TO-CONSUMER (B2C) BASED BUSINESS MODELS AS THE VAST OPPORTUNITIES IN CONSUMER FINANCE REMAIN UNTAPPED BY BANK INCUMBENTS.

FinTech investment split based on number of companies that raised VC funding in 9M 2016

Source: CB Insights, Citi Research



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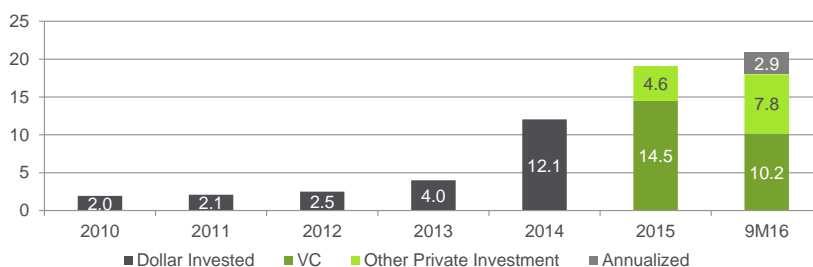
Digital Disruption - Revisited

FinTech Flows

2016 was a year when the Chinese dragons roared and some previously feted FinTech leaders wilted. Global FinTech investments reached \$18 billion in the first nine months of the year, close to the \$19 billion dollars invested in 2015, benefitting from some mega deals such as Ant Financial's \$4.5 billion private fund raising in the second quarter of 2016 (part of the \$7.8 billion non-VC private investments in FinTech during 9M 2016) and a few large VC investments in Chinese FinTech in the first quarter of 2016.

Total VC-only funding for FinTech slowed in 2016 versus 2015 (Figure 1). This reflected the more cautious stance of VC investors in light of a volatile public stock market in the first half of 2016, especially for U.S.-quoted FinTech lenders, concerns around a flood of capital inflow into the sector and some questionable valuations. Overall full year 2016 FinTech VC funding is likely to be down year-over-year. Adding non-VC private investments, we estimate there was a small increase in total global FinTech investments for the year.

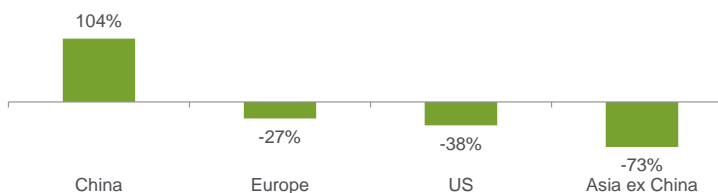
Figure 1. Annual Private Investments in Global FinTech Companies 2010-2016 (\$bn)



Note: Other private investments include funding by angel investors, private equity mutual and hedge funds and corporates. Annualized 2016 total FinTech investments assume 4Q16 investments equal 3Q16. Source: Citi and CIB Insights

Within the global picture of slowing FinTech growth, 2016 was characterized by some dramatic geographic shifts. Asia has overtaken North America as the number one FinTech investment destination driven by the Chinese dragons. We estimate VC investments doubled in China in 2016 versus 2015 while they declined 38% in the U.S. and 27% in Europe. Asia ex-China experienced almost a three-quarters decline in VC FinTech investing due to slower funding activity to India (a big driver for 2015).

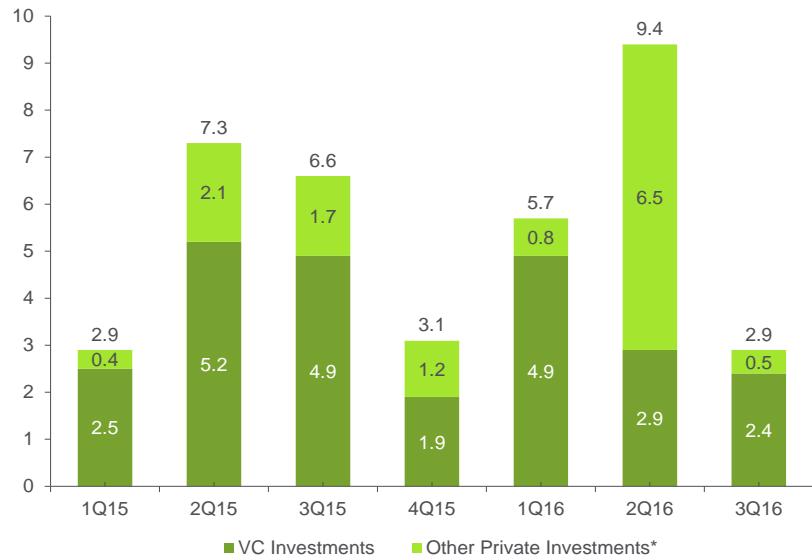
Figure 2. Change in Global VC Funding into FinTech by Geography (2016E vs. 2015)



Note: 2016 total VC funding is estimated based on 9-month 2016 actual funding plus an estimate for 4Q16 which is assumed to be the same as 3Q16. Source: Citi and CB Insights

Furthermore, the funding mix is changing beyond VCs as the sole large funding source. "Other private" funding including private equity, mutual funds, hedge funds and corporates are increasingly important. Ant Financial's \$4.5 billion funding round in the second quarter of 2016 was the largest private sector technology funding round ever. The funding didn't come from VC investors but from existing shareholders, including some of China's biggest insurance companies, China Post Group, private equity firm Primavera Capital Group and China Development Bank Capital, according to the Wall Street Journal ([link here](#)).

Figure 3. Quarterly Investments in Global FinTech Companies 1Q 2011-3Q 2016

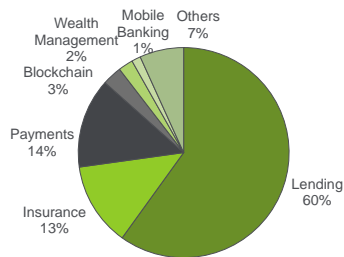


* Other private investments include funding by angel investors, private equity, mutual and hedge funds, and corporates.

Source: Citi and CB Insights

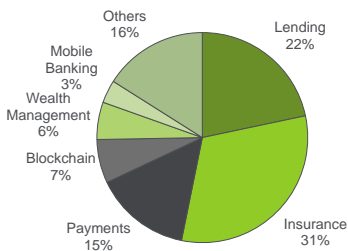
Just as the geographic focus on FinTech investing shifted in 2016 from the U.S. to China, with momentum and overall funds invested putting the latter in pole position, the product focus of the fund flows changed as well. The 2016 product picture was split between lending, which dominated Chinese VC funding, and insurance, a key sector for U.S. VC funding. Lending dominated VC investing with two-thirds of global VC funds invested but if we add the second quarter 2016 private funding round of Ant Financial, payments would account for about 50% of the 9M 2016 global FinTech investments.

Figure 4. Global FinTech VC Investments by Product, 9M 2016



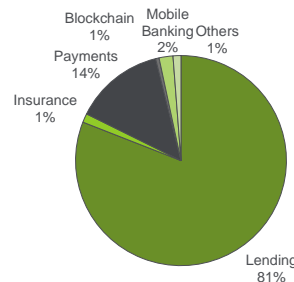
Based on 68 largest FinTech VC funding rounds in 2016
Source: CB Insights, Citi Research

Figure 5. Global ex-Asia FinTech VC Investments by Product, 9M 2016



Based on 50 largest FinTech VC funding rounds in 2016
Source: CB Insights, Citi Research

Figure 6. Global ex-North America FinTech VC Investments by Product, 9M 2016



Based on 27 largest FinTech VC funding rounds in 2016
Source: CB Insights, Citi Research

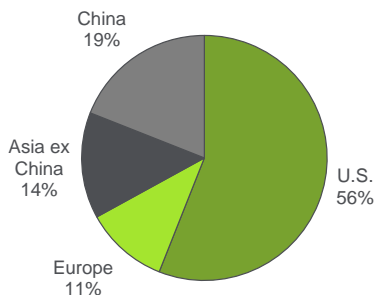
If we look at trends outside Asia, InsurTech was the big new development of the year, making up 41% of global ex-Asia VC investments in the first nine months of the year. Interestingly, lending was only 28% of total VC funding outside of Asia, no doubt impacted by a few well-publicized U.S. challenges. This is a change. In 2015, lending was the largest product destination for global FinTech funding (almost half the total) driven by the U.S. Insurance was not material in 2015 U.S. funding, albeit it featured in the rest of the world. These rapidly changing trends are a good reminder that FinTech investing is still at an early stage.

Chinese Dragons

In our first FinTech GPS report we argued that China was very important to the FinTech story ([link to GPS](#)). It is the home of consumer FinTech adoption as measured by client numbers. Tencent's WeChat has over 800 million monthly active users and Alibaba's Alipay has over 400 million. The number of mobile wallet users in China exceeds or rivals retail customer numbers of the largest Chinese banks.

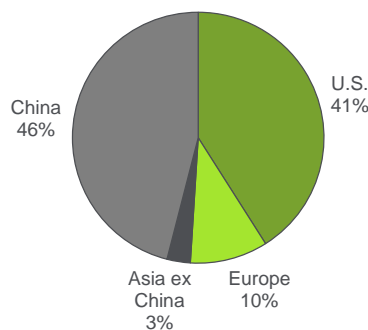
The leadership role of China in FinTech is reflected in the 2016 investment flows data which shows China's share of global FinTech VC investments up to 46% in 9M 2016 from just 19% in 2015. China accounted for over 50% of total FinTech investments in 9M 2016 if we include non-VC 'other private' investments (corporate, private equity etc.).

Figure 7. VC Investments by Geography, 2015



Source: CB Insights, Citi Research

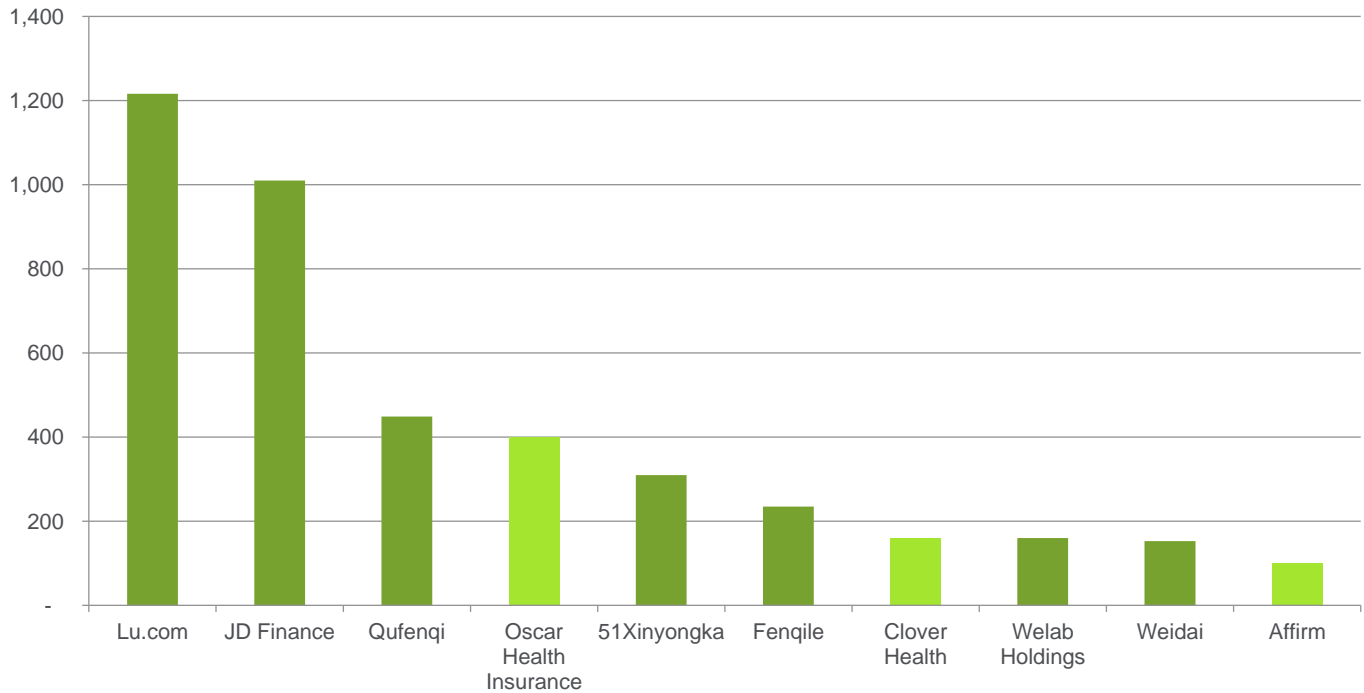
Figure 8. VC Investments by Geography, 9M 2016



Source: CB Insights, Citi Research

Calling the leading Chinese companies “dragons” isn’t just colorful. It is also a very good reflection of their large size – both in terms of funding rounds and implied total valuations. China FinTech investments are big per deal. Seven of the top 10 FinTech VC rounds in 9M 2016 were Chinese (Figure 9-Figure 10). Three Chinese FinTech companies — Lu.com, JD Finance and Qufenqi — are at the top of the global league table with VC funding rounds that raised \$1.2 billion, \$1.0 billion and \$0.45 billion respectively. And that is before we count the giant non-VC private funding round at Ant Financial at \$4.5 billion.

Figure 9. Top 10 FinTech VC Rounds, 9M 2016 (\$m)



Source: CB Insights and Citi Research. Dark green represents the company is based in Asia and light green means the company is based in North America.

Figure 10. Top 10 FinTech VC Rounds, 9M 2016 (\$m)

	Company	Product	Description	Country	Deal Size (\$m)	Funding rounds
1Q16	Lu.com	Lending	Lu.com is an online marketplace for wealth management, P2P lending, insurance, and other financial offerings. It is backed by the Ping An Group. Through the platform, investors have access to a broad range of investment products. Asset owners can use Lu.com to structure, price, and place complex assets to investors in a credible and transparent manner.	China	1,216	Series A & Series B
1Q16	JD Finance	Lending	JD Finance is the financial subsidiary of JD.com, one of China's largest e-commerce platforms. JD Finance has a wide range of financial offerings such as wealth management, marketplace lending, insurance, consumer lending, and so on. It is a leader in consumer lending through JD Bai Tiao (blank note), an unsecured consumer credit offer through JD's e-commerce platform.	China	1,010	Venture
3Q16	Qufenqi	Lending	Qufenqi provides installment payments for mainly electronic products offered through its e-commerce platform Qudian, targeting the 500 million consumers with no credit card. Ant Financial is one of the major investors in the platform.	China	449	Series F
1Q16	Oscar Health Insurance	Insurance	Oscar is a health insurance company that aims to deliver a better health care experience through its interactive mobile Oscar app. Users of Oscar have access to simple and affordable plans and top doctors and hospitals. It currently offer plans in NY, California, and Texas.	U.S.	400	Private Equity
3Q16	51Xinyongka	Payments	51Xinyongka, also known as U51.com, offers a mobile app that allows users to manage credit card bills, invest in wealth management products, and apply for online loans and other personal credit-based financial services.	China	310	Series C
2Q16	Fenqile	Lending	Fenqile is a web-based online shopping mall that offers a wide range of products such as mobile phones, laptops, computers, and other large ticket products. The platform allows consumers to pay by installments. JD.com is one of the major investors.	China	235	Series C
2Q16	Clover Health	Insurance	Clover Health is a San Francisco-based insurance start-up that tracks all the inputs of a person's medical history through insurance claims to identify the customer's medical risk profile. It then helps the high-risk patients to become healthier and improve overall clinical outcomes. Clover Health receives premiums from Medicare.	U.S.	160	Series C
1Q16	WeLab Holdings	Lending	WeLab was founded in 2013 in Hong Kong. It operates two main online lending platforms — WeLend in HK and WoLaiDai in mainland China — to provide unsecured consumer credit.	China	160	Series B
2Q16	Weidai	Lending	Weidai is a marketplace lending and investing platform. On the lending side, it provides relatively larger ticket personal lending (up to RMB500k) with vehicles or properties as collaterals.	China	153	Series C
2Q16	Affirm	Lending	Affirm offers installment loans to consumers at point of sale. Checkout is made simple with Affirm with just a few pieces of information required for real-time credit decision. It increases the conversion rate of e-commerce platforms and offers consumers a cheaper alternative to credit card loans.	U.S.	100	Series C

Source: CB Insights and Citi Research

China dominates in Asia. It accounts for nearly all the large FinTech investments in Asia, especially in the \$50 million and above size range. Investment in Asia ex-China in 2015 was boosted by the investment by Alibaba/Ant Financial into Paytm, India's leading mobile wallet. VC funding to India slowed visibly in 2016 with only three out of 18 large VC deals in Asia coming from India, as valuation and other concerns mounted. The top Asia FinTech transactions in 2016 are nearly all from China.

Figure 11. Major FinTech VC Investment in Asia in 9M 2016

	Company	Product	Country	Deal Size (\$m)	Funding rounds
1Q16	Lu.com	Lending	China	1,216	Series A & Series B
1Q16	JD Finance	Lending	China	1,010	Venture
3Q16	Qufenqi	Lending	China	449	Series F
3Q16	51Xinyongka	Payments	China	310	Series C
2Q16	Fenqile	Lending	China	235	Series C
1Q16	WeLab Holdings	Lending	China	160	Series B
2Q16	Weidai	Lending	China	153	Series C
3Q16	Firstp2p	Lending	China	70	Series C
3Q16	One97 Communications	Payments	India	60	Unattributed VC - III
1Q16	Duanrong	Lending	China	59	Series B
2Q16	Mobikwik	Payments	India	50	Series C
2Q16	Paymax	Lending	China	50	Series C
3Q16	Yunnex	Payments	China	45	Series B
3Q16	Mobikwik	Payments	India	40	Corporate Minority
1Q16	Huize Insurance	Insurance	China	31	Series B
3Q16	Gongzi Qianbao	Enterprise Finance	China	30	Unattributed VC - II
3Q16	Juzhen Financials	Blockchain	China	23	Series A
3Q16	Wangyudashi	Payments	China	23	Series A

Source: CB Insights and Citi Research

Of the 27 FinTech unicorns (billion dollar private companies) in the world, eight were born in China. The U.S. still has the largest number – with over half the list of FinTech Unicorns¹ (see Figure 12). But the biggest FinTech private companies by total value, as well as cumulative funding raised, are now found in China. The Chinese dragons are now becoming very big. The two largest, Ant Financial and Lu.com, were valued at \$60 billion and \$18.5 billion respectively in their most recent private funding rounds.²

Figure 12. Number of FinTech Unicorns and Where They Were Born

Location	Unicorns	Total Value	Raised
United States	14	\$31.0B	\$5.7B
China	8	\$96.4B	\$9.4B
Rest of World	5	\$11.5B	\$1.8B
Total	27	\$138.9B	\$16.9B

Source: Visual Capitalist, September 2016

¹ According to Investopedia, “a unicorn, in the world of business, is a company, usually a start-up that does not have an established performance record, with a stock market valuation or estimated valuation of more than \$1 billion”.

² Wall Street Journal, 26 April 2016 and 26 January 2016, respectively.

Figure 13. Global FinTech Unicorns – Valuation (Latest Funding Round) and Summary Description

Company	Headquarter	Country	Valuation (\$bn)	Description
Ant Financial	Hangzhou	China	60.0	Runs Alipay, China's biggest mobile payment network with 450 million users. Also offers other financial services through Alipay wallet.
JD Finance	Beijing	China	7.0	JD Finance is a spin-off from Chinese online shopping giant JD.com. It provides credit for consumers shopping on JD.com, as well as other financial services.
Qufenqi	Beijing	China	5.9	An online Chinese electronics retailer that lets buyers pay in monthly installments.
Stripe	San Francisco	U.S.	5.0	Provides online payment processing, letting both businesses and companies accept payments over the Internet.
SoFi	San Francisco	U.S.	4.0	Offers peer-to-peer student loan refinancing, mortgages, and other types of personal loans.
Credit Karma	San Francisco	U.S.	3.5	Provides free online credit reports, offsetting the cost of paying for them with targeted advertising of financial products.
Oscar Health	New York	U.S.	2.7	Provides digital health insurance.
Mozido	New York	U.S.	2.4	White-label mobile payments, shopping, and marketing products which allow small businesses to send out offers to customers and collect loyalty points.
Adyen	Amsterdam	Netherlands	2.3	Payment platform that accepts multiple forms and methods of transactions.
ZhongAn Insurance	Shanghai	China	2.0	China's first online-only insurer. It was set up by Alibaba founder Jack Ma, Tencent chairman Ma Huateng, and Ping An chairman Ma Mingzhe.
One97 Communications	New Delhi	India	2.0	Runs Paytm, an online platform that lets people pay bills and shop online. It's India's largest mobile marketplace.
Avant, Inc.	Chicago	U.S.	2.0	Provides online loans.
Zenefits	San Francisco	U.S.	2.0	Provides payroll, HR, health insurance, and compliance management software for small businesses. It offers its platform for free and makes money by charging health insurers a broker fee.
GreenSky	Atlanta	U.S.	2.0	Allows businesses to quickly and easily offer credit to customers, letting them pay for goods and services in installments.
Prosper	San Francisco	U.S.	1.9	A peer-to-peer lending marketplace for consumers.
FinancialForce.com	San Francisco	U.S.	1.5	Makes cloud-based financial service apps covering accounting, billing, revenue recognition, supply chain management, and more.
TransferWise	London	U.K.	1.1	Provides online international money transfer with cheaper fees than banks.
Rong360	Beijing	China	1.0	A financial search engine that lets consumers compare and contrast all the various products that are being offered.
Jimubox	Beijing	China	1.0	Provides online peer-to-peer loans for small businesses and consumers
Funding Circle	London	U.K.	1.0	Offers a peer-to-peer marketplace for business loans.
Zuora	San Francisco	U.S.	1.0	Provides software that lets companies easily take subscriptions.
Coupa Software	California	U.S.	1.0	A cloud-based spending management tool which provides plug-in software to help identify savings in a business and helps to manage costs.
Kabbage	Atlanta	U.S.	1.0	Offers an online small business lending platform.
Gusto	San Francisco	U.S.	1.0	Provides Online payroll management. It offers cloud-based software that automates payroll and tax calculations for small businesses.

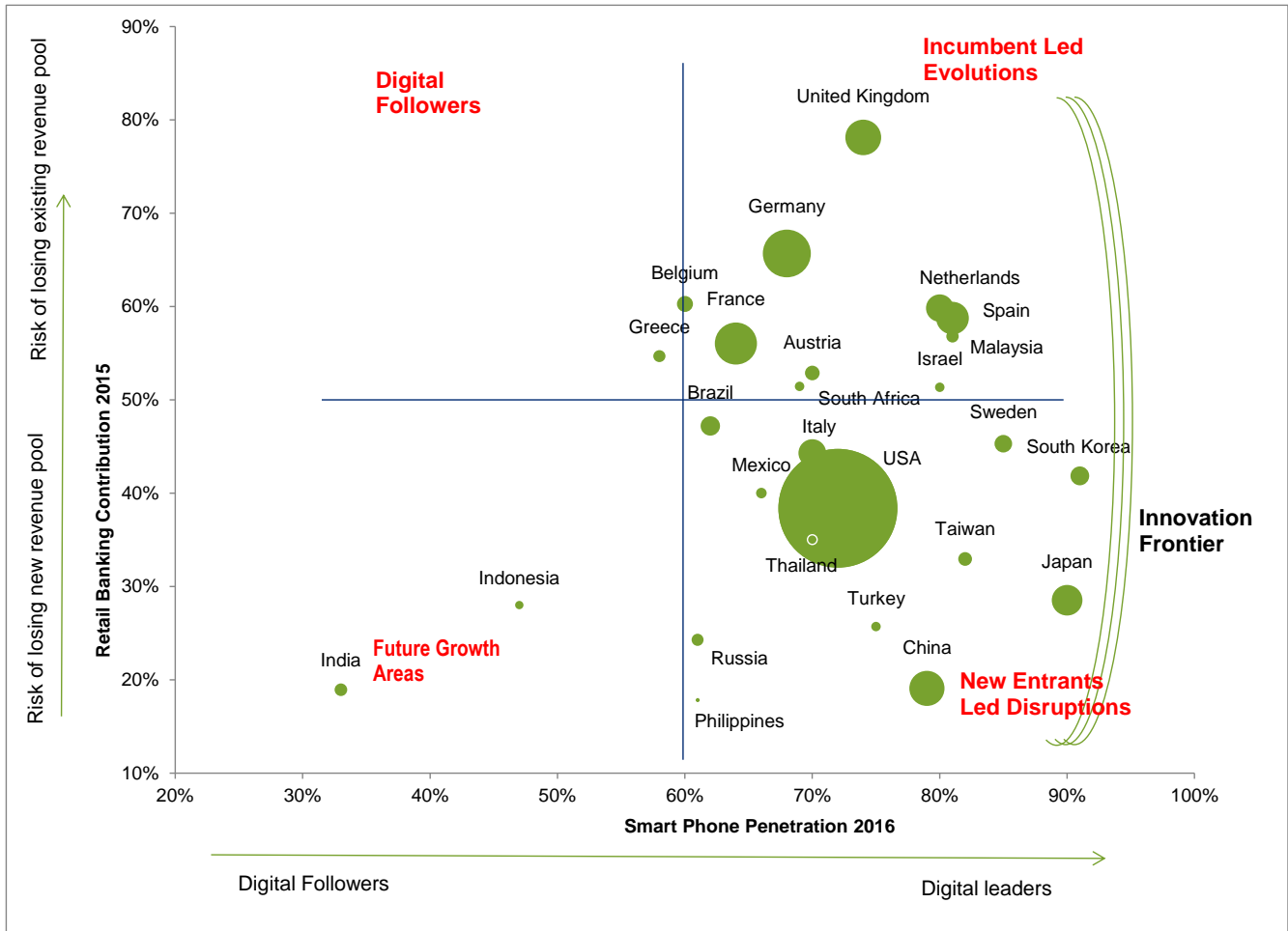
Source: Citi Research; Note: This list is not exhaustive

How Unique is China?

The rapid growth of Chinese consumer FinTech adoption and the large size of the Chinese FinTech dragons raise the question of whether developments in China provide a roadmap for the rest of the world to follow, especially other middle income countries and emerging markets. First, a quick outline of the magic ingredients that allowed the Chinese dragons to emerge: (1) high digital penetration combined with weak existing consumer/small and medium enterprises (SME) finance penetration; (2) rapid growth in internet users, especially mobile Internet; (3) rapid growth in the middle class; and (4) a light regulatory touch, at least initially.

China is at the sweet spot for FinTech disruption where the population is digitally enabled but the banking system is relatively under-developed (see Figure 14). The smart phone penetration rate of about 75% is among the highest in the world, similar to Western Europe. However, the exposure of the local banking system to consumer clients is similar to poorer emerging markets (~20% of total loans are consumer). China's banking system focuses on large corporate clients, state-owned enterprises (SOEs) and property, industry, and government-related activities. Meanwhile a rapidly growing, digitally enabled middle class has been left underserved.

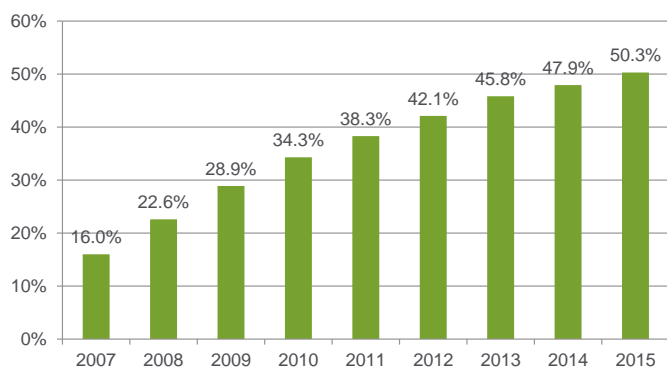
Figure 14. Mapping the Risk of Digital Disruption



Note: Retail bank contribution is measured as retail loans as a % of total loans. Sizes of the bubble is retail bank loans, the larger the bubble, the higher the retail bank loans. Source: Consumer Barometer with Google (smart phone penetration), Company reports and Citi Research

Rapid change is also a key characteristic of the Chinese experience that enabled the rise of the Chinese FinTech dragons. The rapid growth in Chinese Internet users is perhaps not a surprise relative to global peers, with penetration rising from only 16% of the population in 2007 to double that by 2010 (34%) and a similar percentage point increase (18ppt) likely to have taken place between 2010 and 2016. Interestingly, the growth rate of Chinese Internet users is now slowing. Two-thirds of urban China is already online and nearly everyone is using mobile.

Figure 15. China – Percentage of Internet Users



Source: CNNIC (Statistical Survey on Internet Development in China; As percentage of total population)

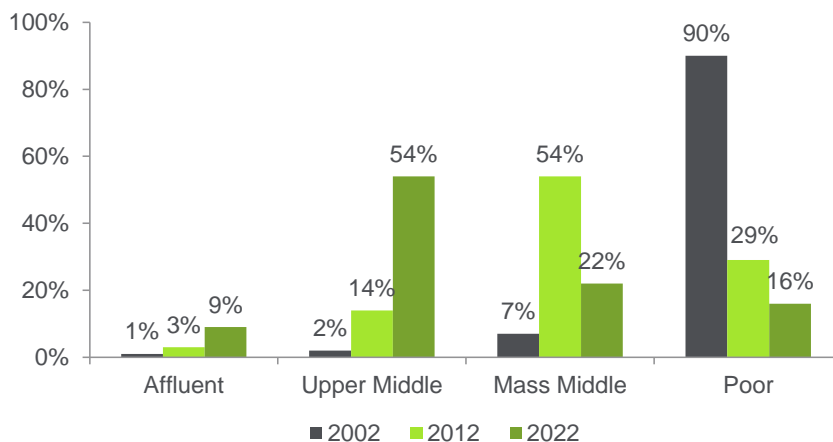
Figure 16. China – Percentage of Mobile Internet Users



Source: Source: CNNIC (Statistical Survey on Internet Development in China; As percentage of total population)

China became a mobile Internet economy about the same time that there was an explosion in the size of the middle class. The 'mass middle class' (household income of \$9,000-\$16,000) grew from only 7% of the population in 2002 to 54% in 2012. Combining these two developments created massive potential for the growth of Chinese e-commerce that rapidly grew to become the largest in the world. Given unsophisticated local banks compared to the U.S. or Europe, along with a light touch regulation at least initially, the domestic Chinese Internet companies expanded into payments and then other financial services. This all took place on a size dimension that was unique globally.

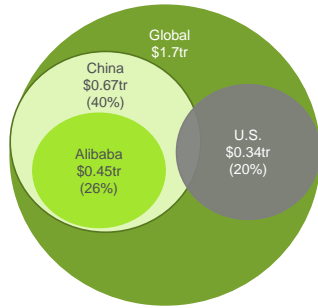
Figure 17. New Middle Class in China (% of population)



Source: McKinsey & Company. Household incomes: Affluent: >\$34,000; Upper Middle: \$16,000-\$34,000; Mass Middle: \$9,000-\$16,000; Poor: <\$9,000.

A lot of FinTech innovations in the U.S. or Europe have focused on one specific part of finance, e.g. lending, payments or wealth management. China is different. The local Internet giants have built one-stop financial shops around their original core offerings, be it e-commerce or social media. Some of the Chinese FinTech dragons are global leaders in business model innovation. We take a closer look at two next.

Figure 18. Global E-Commerce Mainly Comes From China and the U.S., 2015



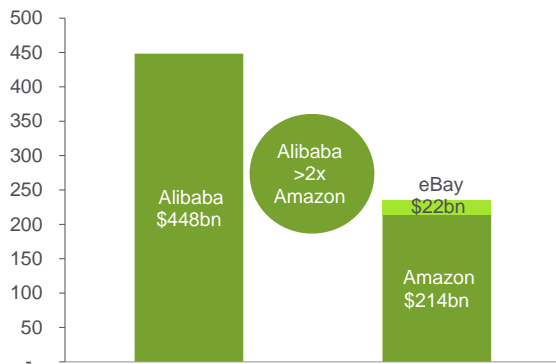
Source: eMarketer, Citi Research; Based on Gross Merchandise Value (GMV)

Ant Financial: From Payments to a Personal Finance One-Stop Shop

China's enormous e-commerce ecosystem is larger than that of any other country in the world in terms of gross transaction volume and it has created a commerce and finance ecosystem outside the banking system, which has enabled and funded new payments and financial services companies, often linked to the new Internet giants.

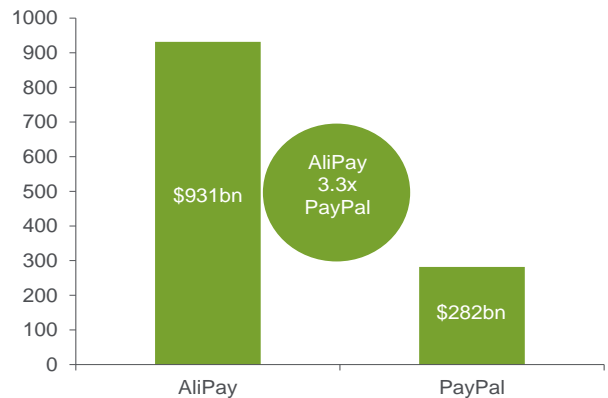
Ant Financial's success is inseparable from Alibaba's e-commerce ecosystem. Alipay was developed over a decade ago in 2004 as the payment gateway for Alibaba's e-commerce platforms. Today, Alipay has ~50% of market share in online third party payments and ~80% market share in mobile third party payments. Alipay's total payment value (\$931 billion) is over 3 times that of PayPal, thanks to Alibaba, which has a 2015 gross merchandise volume (GMV) of RMB 3 trillion (\$443 billion), 2 times that of Amazon.

Figure 19. Alibaba GMV Larger than Amazon & eBay Combined, 2015



Note Amazon GMV estimated to be 2x of Net Sales as around half of the sales on Amazon are from third party merchants
Source: Company reports and Citi Research

Figure 20. Alipay TPV Bigger than PayPal, 2015 (\$bn)



Note: Alipay TBV in 2015 is estimated based on disclosure in 2014 adjusted for growth in Alibaba's GMV.
Source: Company reports and Citi Research

But Ant Financial is not just about payments, even if this remains its core offering. Its success equally comes from its offer of a full suite of financial offerings ranging from wealth management to lending (see Figure 21). With a large user base of over 400 million, Ant Financial is able to accelerate user adoption to become a one-stop shop in consumer financial services.

Figure 21. Financial Products Under Ant Financial



Source: Company website

Yuebao (余额宝) is a good wealth management example of diversification beyond payments. Yuebao was founded in 2013. Its AUM grew exponentially to reach over RMB500 billion (\$72 billion) in just a few quarters. Investors in Yuebao are investing in a money market fund that can have higher returns than regulated bank deposits during periods of tight interbank liquidity. Investors also have the flexibility of instant access and daily interest calculation.

Yuebao is just the start of Ant Financial's venture into wealth management. Ant Fortune (launched in August 2015) is a marketplace for investment products ranging from mutual funds, wealth management products as well as gold ETFs. Ant Fortune has become a distribution platform for funds offered by asset managers. As a platform, Ant Financial also distributes third party insurance products, which digitalize and simplifies the very manual and complicated insurance sales process in China.

On the lending side, Sesame Credit (芝麻信用) is a remarkable attempt to build an independent credit bureau in China based on big data and digital footprints. Your Sesame score can be used via the Alipay app for a wide range of services with deferred payments including travel, hotels, shopping or simply applying for consumer credit. Users have access through the Alipay app to their own credit score, which can range from 350 to 950. Any score above 600 is an indication of good credit.

This bundling of financial services by non-bank providers is unique to China. While it may provide a roadmap for the U.S./global Internet giants (Google, Amazon, Facebook and Apple, the so-called GAFAs) to follow, it will be a lot harder to replicate the success of the BATs (Baidu, Alibaba, Tencent) in the West. One of our VC contributors to this report, Douglas Jiang from IDG Capital, argues that the BATs' success was highly dependent on the relaxed regulatory environment in China as they expanded (see page 47).

The GAFAs' core markets typically have a more tightly regulated banking market, and a well-established and diverse existing consumer finance ecosystem, hence the GAFAs have been in less of a rush to expand into financial services (unlike the BATs), and when they do so are more likely to focus on regulatory-light FinTech services that enhance their existing core products (e.g. payments or credit origination that supports e-commerce).

The GAFAs are also likely to distribute third party financial products rather than manufacture product themselves. Amazon has launched SME lending in eight countries (the U.K., Spain, Italy, France, Germany, China, India, and Canada) to offer short-term working capital to third party sellers on its platform. It also offers supplier financing to businesses in the U.S. and Japan. In the consumer lending space, Amazon partners with Hitachi Capital in the U.K. to allow for installment payments for large ticket purchases exceeding £400. The U.K. is believed to be the first country in which Amazon offers this service (which started in January 2016).

Social Finance, Invisible Finance

WeChat, the messaging app of Tencent, is a master of social finance. Payments are embedded into a master lifestyle app. The finance aspect of a transaction on WeChat is effectively "invisible", similar to that of an Uber user experience, with a Braintree-powered payment engine. Invisible finance is the technologically-realized solution to a truth that the oldest banker knows – financial products and services are a means to an end: to own a home, to provide for retirement, to go shopping, and so on.

So why is WeChat the global leader in social finance? WeChat is a social messaging app equivalent to WhatsApp and Facebook combined. It has 1.1 billion registered users, over 800 million monthly actively users, 600 million daily active users and over 200 million consumers have a credit/debit card linked to their WeChat account. It is the single most used app in China. Every Chinese adult on average spends around 1 hour a day on WeChat (Figure 22-Figure 23).

Figure 22. Number of Times per Day that WeChat Users in China Access WeChat, March 2016 (% of Respondents)

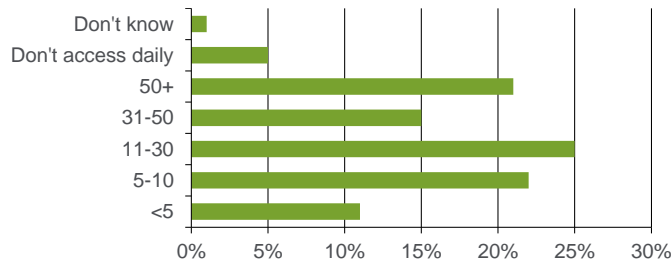
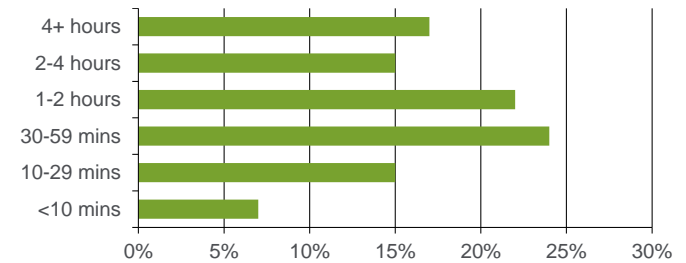
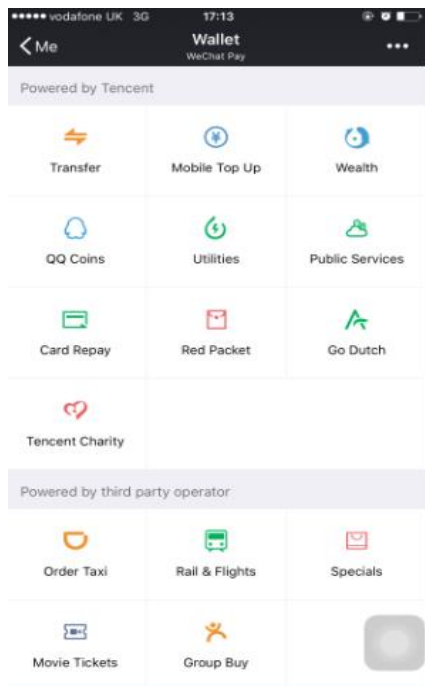


Figure 23. Daily Time Spent Using WeChat According to WeChat Users in China, March 2016 (% of Respondents)



Source: Tencent Penguin Intelligence and China Academy of Information and Communications Technology (CAICT), "2016 WeChat Impact Report", March 2016

Figure 24. Tencent Offers Fully Integrated Financial Services on WeChat Platform

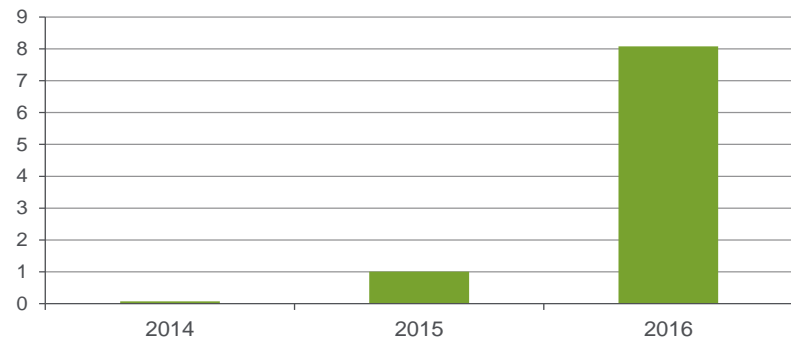


Source: Company website

WeChat has become a super app that almost every Chinese person heavily relies on. Chinese users rely on it for everything from ordering a taxi, to booking a rail or flight ticket, to buying movie tickets or exploring special offers. The list goes on. WeChat acts as a platform and offers these services through third-party providers.

The most used financial product offered by WeChat is the "Red Packet", launched just before Chinese New Year (CNY) 2014 to allow users to send money to family and friends, a tradition around CNY. It has quickly gone viral because it is free of charge and easy to use. The growth is explosive. During CNY in 2016, 8 billion "Red Envelopes" were sent and received, up from about 1 billion in 2015.

Figure 25. Number of WeChat Red Envelope Sent and Received on Chinese New Year (bn)



Source: Company Reports, Citi Research

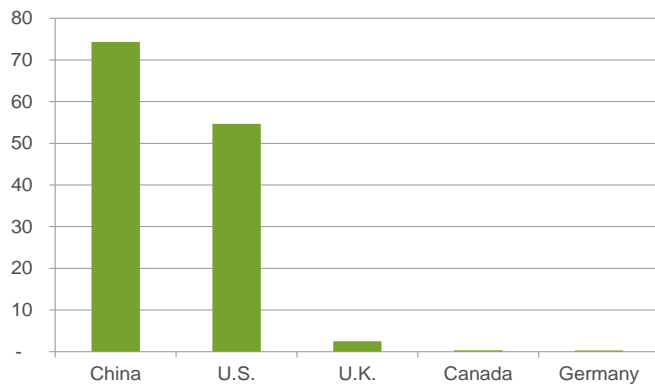
Controlling social aspects is a clear advantage for WeChat when it comes to cross selling. Tencent opened its online bank WeBank at the end of 2014 which offers basic savings product and consumer loans. The consumer loan product named "Weilidai" can be easily accessed through the WeChat app.

Lending is Dead – Long Live Lending

The sector is facing a few challenges that we highlighted in our March 2016 GPS report: (1) liquidity limitations; (2) capital requirements; and (3) increasing regulatory scrutiny. Other macro headwinds include a higher interest rate cycle which leads to higher expected returns for investors and potential higher loan losses.

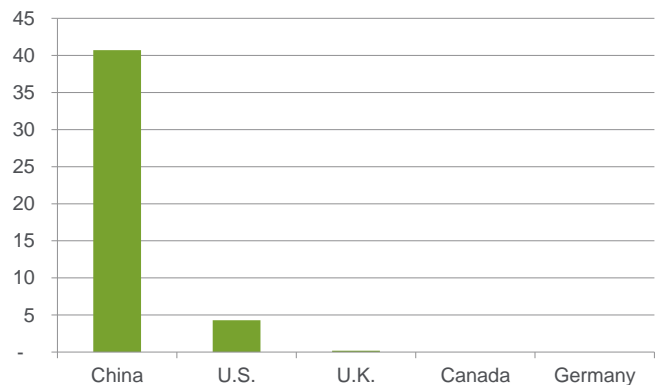
Despite the headwinds, many of the VCs who contributed to this report believe that marketplace or alternative lenders are here to stay. Several of the early payments success stories, have moved into providing credit to clients. While in countries such as China, where retail and SME customers are under serviced by incumbent banks, the FinTech lenders can play an important role of financial inclusion and growth. China has the world’s largest marketplace lending platforms, both by volume and number of users (Figure 26-Figure 27). On the latter metric, it is well ahead of the U.S. and others.

Figure 26. Marketplace Lending – Transaction Value, 2016 (\$bn)



Source: Statista, Citi Research

Figure 27. Marketplace Lending – Number of Users , 2016 (m)

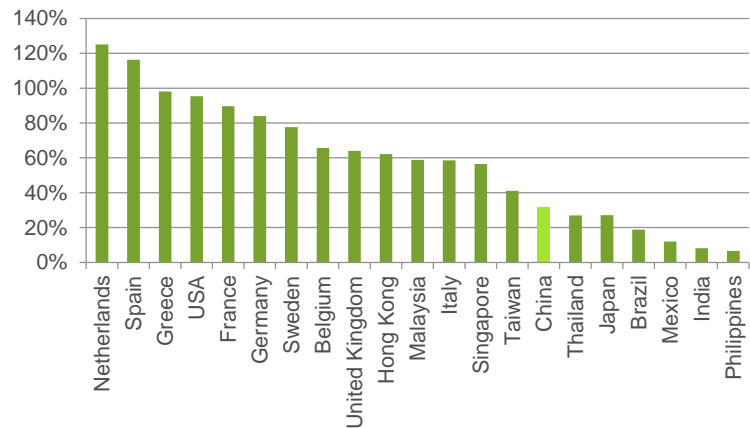


Source: Statista, Citi Research

China’s experience in FinTech lending is very different to the U.S. or Europe, both in terms of the overall credit industry picture and specifics around the business model:

1. In financially-developed countries such as the U.S., marketplace lenders often recycle existing debt (for example, consolidation of multiple credit cards). In markets such as China, alternative or marketplace lenders are usually extending new credit – they provide credit access to underserved segments. Personal lending in China is only about 30% of GDP, far behind the developed market counterparts (Figure 28).

Figure 28. Personal (Retail) Lending as % of GDP, 2015



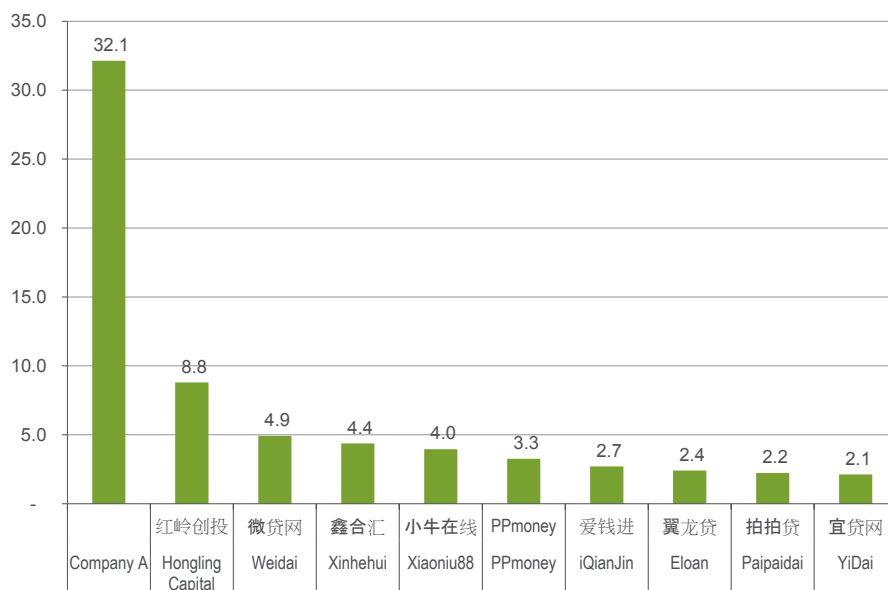
Source: Central bank disclosures and Citi Research estimates

- China's marketplace lenders are better classified as alternative lenders, which have different business characteristics than their Western counterparts. First, they often don't have institutional investors as a source of funding as is common in the West, and second, they operate an offline-to-online (O2O) business model where the borrowers are sourced offline and lenders are sourced online (although this could change due to new regulation).

One of our VC contributing authors, Douglas Jiang of IDG Capital, argues that the above characteristics more closely resemble the U.S.'s alternative financial services (AFS) companies that were set up in the middle of the twentieth century, rather than the quoted U.S. marketplace lenders. According to a study done by the FDIC, the AFS transactions account for more than \$320 billion annually ([link here](#)), and that's the direction of Chinese alternative lenders are heading for, in the view of Douglas Jiang.

The initial expansion of marketplace or P2P lending in China happened with light regulation. However, given the high incidence of fraud, the model is evolving in China with tougher regulation. For example, P2P lenders are no longer allowed to guarantee returns. Tighter regulation should lead to consolidation in the sector and help market leaders and others to take further market share (Figure 29).

Figure 29. China's Largest P2P Lenders by Transaction Volume, September 2016 (RMB bn)



Source: Wangdaishijia, Citi Research

P2P Regulation in China

China's P2P sector largely remained unregulated for many years, but discovery of fraudulent activities at large P2Ps like Ezubo and Dada Group and a rising number of failed platforms pressed the need for increased regulatory controls. The China Banking Regulatory Commission (CBRC) first announced draft regulations for online lenders in December 2015 for public consultation. Final regulations were subsequently implemented in April and August of 2016, with platforms being allowed an 18-month transition period for adhering to revised norms. Final regulations include:

- **Mandatory registration** – all platforms need to register with local financial authorities and obtain appropriate business licenses.
- **Minimum capital requirement** – regulators require P2P platforms to maintain a minimum capital level of RMB30,000.
- **Bank custodianship for customer funds** – all platforms must use custodian services offered by banking financial institutions to handle investor and borrower funds.
- **Regular reporting** - platforms need to submit routine reports detailing loan turnover and default rates to a government-established online lending central database.
- **Annual audits** – online players are required to conduct annual third-party audits and submit reports to regulators.

In addition, regulators also imposed specific restrictions to check the rampant growth of new platforms, protect customers from blow-ups and curtail system-level exposures.

A) Restrictions on P2P Platforms

- Prohibits sale of bank wealth management products (WMPs) and mutual funds; issue of asset-backed securities.
- Not allowed to accept public deposits, create asset pools or provide the borrower any guarantee for principal/returns. However, guarantees/insurance from third parties is permitted.
- Forbids offering automated investing tools that accept or manage lender funds. Also, disallows the platform from using funds to self-finance itself or fund related parties.
- Prohibits platforms from providing equity or project crowdfunding service.
- Restricts conducting offline business via physical locations, except for collecting loan information, loan review, collection and management of collaterals.

B.) Restrictions on Borrowers

- Individual borrowing capped at RMB200,000 (~\$29k) from a single platform, and cumulative maximum of RMB 1 million (!\$145k) across all P2P platforms.
- Corporate borrowing restricted to RMB1 million per platform and cumulative maximum of RMB5 million (~\$727k) across all P2P platforms.
- Borrowers must mandatorily disclose basic information such as annual income, assets, liabilities, credit report and loan purpose before accepting any loans.

Setting Up National Internet Finance Body

Sprucing up on regulatory control, the People's Bank of China (PBOC) established a self-regulating body in March of 2016, titled 'National Internet Finance Association' drawing nearly 400 members, including major banks, securities firms, insurance companies, and Internet finance companies including P2P and crowdfunding platforms. The association is tasked with responsibilities for (1) improving access to capital, (2) developing credit information infrastructure, (3) encouraging cooperation amongst players, and (4) protecting customer interests.

In the U.S. and in Europe, marketplace lenders could be expected to have the same strict level of compliance and risk management as banks. A couple of things are necessary for a marketplace to function: (1) liquidity; (2) transparency; and (3) trust. These attributes could take time to establish in a digital world with no branches or face-to-face contact.

Some of these issues can be addressed through a partnership model with incumbents, which has the liquidity, trust, and experience in compliance and regulation. The partnership model is increasingly popular in the developed market. OnDeck is collaborating with JPMorgan for SME lending. Similarly, Kabbage has partnered with ING and Santander in Spain and the U.K. respectively.

In the U.S. and Europe, marketplace lending's growth may be capped by tight regulation and the existence of a deep financial system, including (in the U.S.) the range of near-prime and sub-prime lenders. FinTech companies are more likely to be successful in lending where it is linked to payments.

U.S.: InsurTech, Healthcare and Others

FinTech investments in the U.S. have diversified in 2016. Lending was 58% of total funding in 2015, which has declined to 20% in 9M 2016. Insurance technology (InsurTech) on the other hand has taken off to attract the largest share of VC funding. In the U.S., the two largest FinTech VC fundings in 2016 were both from InsurTech. Oscar Health Insurance raised \$400 million in the first quarter of 2016, valuing the company at \$2.7 billion according to Forbes. Clover Health, a San Francisco based InsurTech, raised \$160 million in 2Q16.

Insurance became the hot new FinTech investing theme in the U.S. in 2016, replacing lending. One of our contributing VC authors to this report, Jay Reinemann of Propel Venture Partners, notes: "I am really interested in the insurance innovations but disappointed that there is so much money that has gone into InsurTech, pushing up valuations."

“ Insurance is ripe for a technology revolution...Insurance customers are generally poorly treated...[as]...underwriting does not consider new sources of data...[and]...smart devices could bring data and context to do better underwriting.

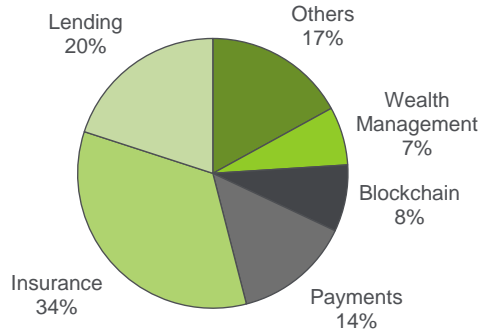
– JAY REINEMANN, PROPEL VENTURE PARTNERS

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For example, insurance companies could use connected smoke or water detectors to better underwrite home insurance and reduce damage. Cocoon, invested by Aviva Ventures, makes Internet-connected security devices for the home. Roost offers Wi-Fi enabled smart batteries for smoke and water detectors so that water or fire damage will not go unnoticed.

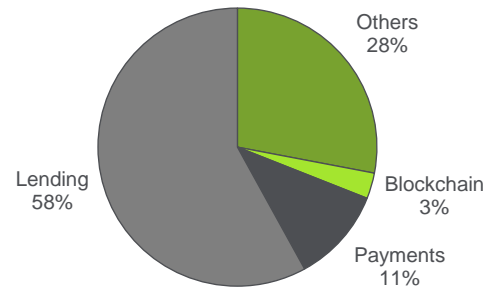
The same goes for auto insurers, which are using vehicle sensors to better understand driving behavior and better tailor price to risk and also reduce accidents. Wearable devices could help insurance companies to improve health insurance underwriting. FitSense enables health and life insurers to personalize products and services by using app and device data.

Figure 30. U.S. – VC Investments into FinTech, 9M 2016



Source: CB Insights, Citi Research

Figure 31. U.S. – VC Investments into FinTech, 2015



Source: CB Insights, Citi Research

Relative to bank tech, InsurTech has been slower to take off. For example, mobile banking apps have been around for a few years, but insurance products are still mainly offered through traditional distribution channels where the agents have considerable commercial power. Many insurance products are highly customized, relative to payments or banking, and FinTech innovators have found it harder to enter this segment.

InsurTech innovations can be largely grouped into two areas: (1) distribution innovation; and (2) product innovations.

Insurance product distribution often involves manually filling in long forms. This process can be simplified in the mobile and digital world where health records, exercise habits, and so on can be accessed through the customer's public health record or mobile devices. Distribution is not just about selling an insurance product; it is also about simplifying the end-to-end process of claiming against the policy.

Many U.S. InsurTech companies aim to provide superior customer experience in health insurance distribution. Oscar Health Insurance makes it possible for customers to book doctor appointments using a mobile app and reduces the waiting time to see a doctor. Clover Health tracks all the inputs of a person's medical history from insurance claims to identify the customer's medical risk profile. It then helps the high risk patients to become healthier and improve overall clinical outcomes.

Big data, IoT, and wearable devices allow an insurance company to be more creative and offer highly customized products to customers. For example, Metromile offers more cost effective pay-per-mile insurance offerings to low-mileage drivers.

Figure 32. Major FinTech VC Investment in North America, 9M 2016

	Company	Product	Region	Deal Size (\$m)	Funding rounds
1Q16	Oscar Health	Insurance	North America	400	Private Equity
2Q16	Clover Health	Insurance	North America	160	Series C
2Q16	Affirm	Lending	North America	100	Series C
1Q16	Betterment	Wealth Management	North America	100	Series E
2Q16	Bright Health	Insurance	North America	80	Series A
1Q16	StoneEagle	Payments	North America	76	Venture
2Q16	Circle Internet Financial	Blockchain	North America	60	Series D
1Q16	Digital Asset Holdings	Blockchain	North America	60	Venture
1Q16	Blockstream	Blockchain	North America	55	Series A
3Q16	Ripple	Payments	North America	55	Series B
1Q16	Cadre	Real Estate	North America	50	Series B
1Q16	LendUp	Lending	North America	50	Series B
1Q16	Aria Systems	Payments	North America	50	Series E
2Q16	Personal Capital	Wealth Management	North America	50	Series E
3Q16	GreenSky	Lending	North America	50	Unattributed
3Q16	InstaMed	Payments	North America	50	Growth Equity - VI
3Q16	Metromile	Insurance	North America	50	Corporate Minority
3Q16	LendUp	Lending	North America	48	Series C
2Q16	Payoff	Payments	North America	47	Series D
2Q16	Plaid Technologies	Financial Data	North America	44	Series B
1Q16	BlueVine	Lending	North America	40	Series C
1Q16	Blend Labs	Real Estate	North America	40	Series C
1Q16	Open Lending	Lending	North America	40	Venture
1Q16	OLO	Payments	North America	40	Series D
3Q16	Cyence	Insurance	North America	40	Series A
1Q16	AlphaSense	Institutional	North America	33	Venture
1Q16	Justworks	Insurance	North America	33	Series C
1Q16	Edgewater Markets	Institutional	North America	30	Private Equity
1Q16	Patreon	Lending	North America	30	Series B
1Q16	Namely	Insurance	North America	30	Venture
3Q16	CommonBond	Lending	North America	30	Series C
3Q16	Sift Science	Fraud	North America	30	Series C
3Q16	Vena Solutions	Enterprise Finance	North America	30	Growth Equity

Source: CB Insights, Citi Research

Europe Irrelevant for FinTech VC Investing?

With only around \$1 billion of total VC funding in the first nine months of 2016, Europe remains a small part (~10%) of global FinTech VC investments. European deal size is also noticeably smaller than that of China or the U.S. The largest FinTech VC deal this year in Europe raised less than \$50 million. So why is the European FinTech scene so small in VC funding terms?

Figure 33. Major FinTech VC Investments in Europe, 9M 2016

	Company	Product	Country	Deal Size (\$m)	Funding rounds
2Q16	Finanzcheck	Price Comparison	Germany	46	Series C
2Q16	N26	Mobile Banking	Germany	40	Series B
1Q16	Spotcap	Lending	Germany	34	Series B
3Q16	Smava	Lending	Germany	34	Series D
3Q16	FinanceFox	Insurance	Germany	28	Series A
3Q16	Velocity Mobile	Payments	U.K.	23	Series B
3Q16	Samllino.dk	Price Comparison	Denmark	22	Series A

Source: Citi Research

The lack of big technology companies in the region could be one of the explanations. The world's top 10 tech companies by market capitalization are all based in the U.S. or Asia. Europe had some of the world's best and largest tech companies. At its peak in 2000, Nokia was a \$300 billion market cap company. It was the biggest mobile phone maker in the world with about 50% smartphone market share in 2007. Today, the world's biggest technology companies originate in the U.S. or Asia.

Figure 34. World's Top 10 Technology Companies are Based in the U.S. and Asia

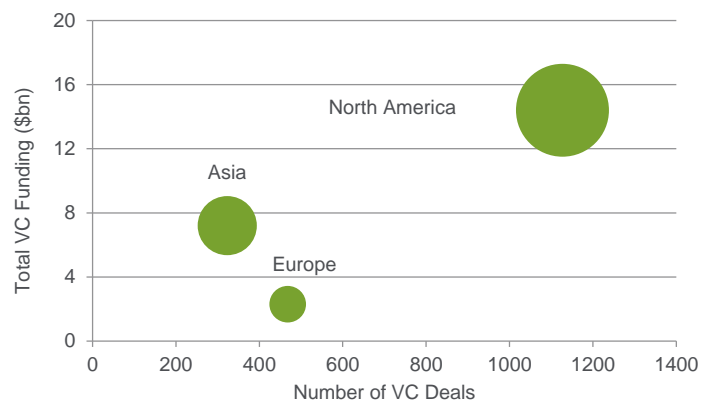
Company	Country	Market Cap	Founded
Apple	US	623	1976
Alphabet	US	548	1998
Microsoft	US	490	1975
Amazon	US	367	1994
Facebook	US	337	2004
Tencent	China	224	1998
Alibaba	China	216	1999
Samsung Electronics	South Korea	208	1969
Intel	US	174	1968
Oracle	US	159	1977

Source: dataCentral, Citi Research and Forbes World's Largest Tech Companies 2016; Market cap as of December 28, 2016

Europe is light on VC investing generally. Of the \$24 billion total VC investments across all sectors globally during 9M 2016, Europe only captured \$2.3 billion or sub 10%, vs 60% in the U.S. and 30% in Asia. Europe's VC investments as a percentage of GDP is only one-third of Asia and one-seventh that of U.S. On a slightly brighter side, the number of VC investments in Europe is higher than in Asia, albeit with smaller deal size.

Europe is literally old. The average age of top the 10 European companies by market cap is over 200 years – they were founded in the early nineteenth century on average. Many of the largest U.S. companies, in marked contrast, were founded in the past few decades. China's leading corporates are even younger. The largest European companies are concentrated in energy, pharmaceutical, consumer, and financial services while half of U.S. top 10 companies are tech companies.

Figure 35. Total VC Finding by Geography – All Sectors, 9M 2016



Source: CB Insights, Citi Research, World Bank. Size of bubble represents VC funding as % of GDP

Figure 36. Top 10 Largest Companies by Market Cap in each Region and the Founding Year (\$bn)

U.S.			China			Europe		
Company	Market Cap	Founded	Company	Market Cap	Founded	Company	Market Cap	Founded
Apple	623	1976	Tencent	224	1998	Royal Dutch Shell	228	1907
Alphabet	548	1998	Alibaba	216	1999	Nestle	221	1905
Microsoft	490	1975	China Mobile	214	1997	Roche	196	1896
Berkshire Hathaway	403	1839	ICBC	209	1984	Novartis	190	1758
ExxonMobil	374	1870	China Construction Bank	190	1954	Anheuser-Busch InBev	176	1366
Amazon.com	367	1994	PetroChina	138	1999	HSBC	159	1865
Facebook	337	2004	Agricultural Bank of China	132	1979	Total	123	1924
Johnson & Johnson	313	1886	Bank of China	129	1912	Siemens	103	1718
JPMorgan Chase	310	1824	Ping An Insurance	91	1988	Sanofi	102	1847
General Electric	280	1892	China Life Insurance	74	2003	Bayer	85	1863
Average	404	1926	Average	162	1981	Average	158	1805

Source: dataCentral, Citi Research; Market Capitalization as of December 28, 2016

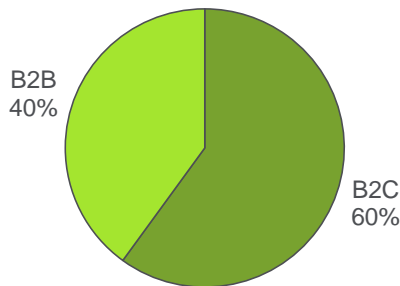
Within Europe, one bright spot for FinTech is Sweden. Stockholm is home to FinTech unicorns and other interesting private companies such as iZettle and Trustly. Why is Stockholm a mini-Palo Alto? There are four major contributing factors we will highlight:

1. A well educated population. The Universitas 21 has ranked Sweden as top 5 globally in National Higher Education systems.
2. Amongst highest mobile and Internet penetration in the world according to Internet Live Stats ([link here](#)). A government subsidy accelerated the adoption of personal computers in the early/mid 1990s.
3. There is a heritage of developing companies via private equity and venture capital. Stockholm has multiple multi-billion dollar start-ups including: King.com, Spotify, Skype, Mojang, and Evolution Gaming. Per capita, it is second in developing billion dollar software companies globally after Silicon Valley, according to a study done VC firm Atomico.
4. The FinTech success story of companies such as iZettle created an ecosystem and inspired other entrepreneurs to try. Also there are other successful stories in tech in general in recent years – Spotify, Minecraft and so on.

2017 and Beyond Outlook

From B2C and B2B – AI and Big Data, RegTech, Cybersecurity

Figure 37. VC FinTech Investments Mainly Target B2C Businesses, 9M 2016



Source: Citi Research, CB Insights; Based on 68 private FinTech companies that raised VC funding in 9M 2016. Split is based on number of companies (not value invested).

So far there is a skew in FinTech investing towards B2C based business models, both in the U.S. historically and especially in China today. During the first nine months of 2016, 60% of the 68 largest FinTech VC Investments by number and 85% of dollar value invested went to B2C companies. There are a few reasons for this B2C focus of FinTech funding:

1. U.S. tech VCs have a successful track record of investing in consumer oriented companies such as PayPal, Uber and AirBnB. The success of B2C models is even greater in China – and the market is still underdeveloped.
2. Silicon Valley investment is often momentum driven and money goes to what's hot and/or perceived to be broken. Improving the customer user experience and offering lower cost production are both low-hanging fruit.
3. VC investing can also have a time-scale that may not be long enough for B2B projects to reach fruition. B2C ventures, if successful, can have a shorter hockey stick payoff profile that is attractive to VCs.
4. Institutional banking involves greater complexity in fundraising large sums of money, which is much harder for start-ups. The depth of product expertise and infrastructure required also sets a higher bar than for a consumer application.

We are starting to see a shift towards B2B investments, particularly as financial institutions are increasingly involved in FinTech as direct buyers or via VC funds. There is increasing collaboration between FinTech and traditional banks. FinTech companies use banks as a source of funding and for access to product expertise; banks have also set up innovation centers and labs, sponsored hackathons, and other events.

Relative to the Silicon Valley-based tech VCs, bank affiliated VCs have greater weight in B2B FinTechs. For example, both Citi Ventures and Propel Venture Partners have portfolios with overweight companies that improve business efficiency (business tools) as well as security. One part of the value proposition of bank VCs for start-ups is access to their clients as start-ups are tend to be long ideas and short clients.

Figure 38. Major Bank Investments to VC-Backed FinTech Companies, 3Q 2015-3Q 2016



Source: The Pulse of FinTech, Global Analysis of FinTech Venture Funding, KPMG International and CB Insights, November 2016; Chart includes largest banks in the U.S. Europe, and Asia by assets under management with disclosed FinTech investments. Does not include data from independent venture firms associated with the above banks.

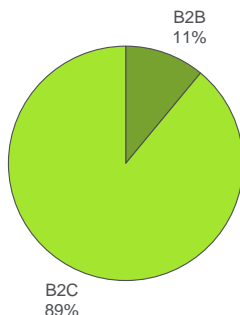
By dollar value invested, B2C still dominate in the U.S. fetching 62% of total VC funding in 9M 2016. There is however some evident shift, especially in the U.S., towards B2B based investments. There is a long tail of sub \$100 million B2B VC funding in the U.S. in 2016, often early stage or Series A-C funding.

By number, 56% of the 41 largest FinTech VC deals were B2B. The diverse B2B solutions range from payments infrastructure (e.g. Ripple), blockchain solutions for financial institutions (e.g. Digital Asset Holdings), enterprise tools for tax and accounting (e.g. Vena Solutions), etc.

There are fewer B2B solutions in Asia (mainly China), on the other hand, in part because the vast opportunities in consumer finance remain untapped by bank incumbents. This leaves space for Internet giants or corporate backed start-ups to grow into FinTech dragons.

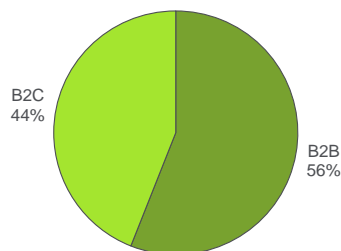
Moreover, in the next phase, Chinese companies could acquire or partner to add any missing hard core engineering solutions, which tend to be centered in the U.S. and Israel, or for B2B FinTech, in traditional financial centers such as London or New York.

Figure 39. Asia: VC FinTech Investment Split, 9M 2016



Source: CB Insights, Citi Research; Based on 18 private FinTech companies that raised VC finding in 9M 2016. Split is based on number of companies (not value invested)

Figure 40. North America: VC FinTech Investment Split, 9M 2016



Source: CB Insights, Citi Research; Based on 41 private FinTech companies that raised VC finding in 9M 2016. Split is based on number of companies (not value invested)

Artificial Intelligence, Advanced Analytics & Big Data

“Hi Siri, I am hungry, where can I get something to eat?” When I asked this question to my iPhone, Siri gives me a list of restaurants near me. Virtual assistants / bots are reaching mainstream adoption today. Amazon Echo has reached 5.2 million device sales this year, doubling the number from last year. The amount of “skills” third-party developers developed for Alexa surpassed 5,000 by end of 2016.

The level of artificial intelligence is deepening. Self-driving cars are hitting the streets (e.g. Google, Tesla). AlphaGo beat a leading Go player named Lee Sdol recently. In image recognition, Google’s PlaNet AI can identify locations where a picture is taken. The artificial intelligence that is prevalent in our daily lives is leading to a revolution in financial services, powered by the recent exponential growth in computation and big data.

Figure 41. Amazon Echo Worldwide Sales (in millions of units)

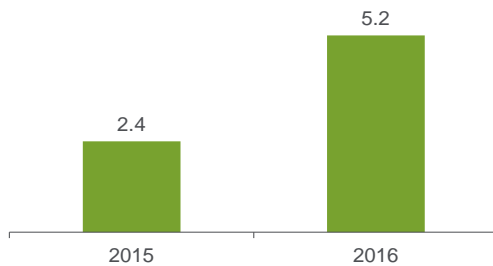
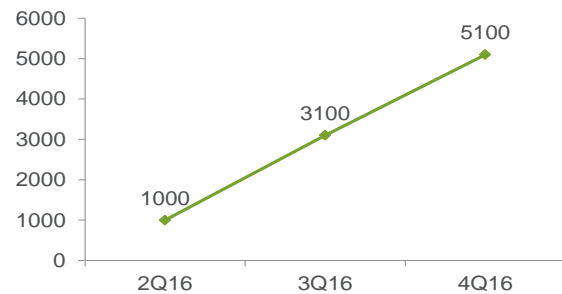


Figure 42. Skills available in Alexa Skills Store



Source: Consumer Intelligence Research Partners, Statista DMO, Amazon.com, NPD Group

Advanced analytics and artificial intelligence (AA-AI) can be applied in every part of banking from real time customer engagement, to more efficient operational processing to better risk and fraud management. For example, in consumer banking, DBS uses virtual agent technology for customer Q&A in its Internet-only DigiBank application. HSBC, USAA, Wells Fargo, and Capital One are using facial and voice recognition for customer identify verification. PayPal uses deep learning to prevent payments fraud. AA-AI is also widely applied in corporate banking and markets for better processes and market insights. Figure 43 lists selected use cases of artificial intelligence in banking.

Figure 43. Advanced Analytics – Artificial Intelligence Use Case in Banking

The banking industry has already started piloting and implementing AA-AI use-cases across areas

NOT-EXHAUSTIVE

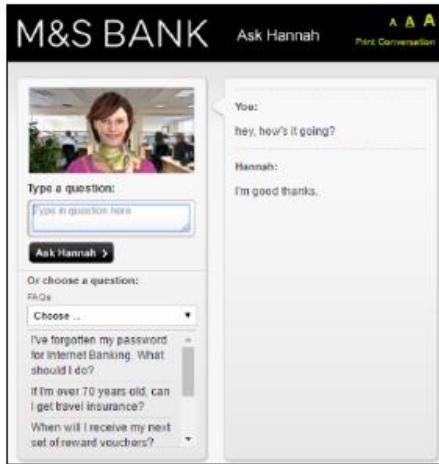
Area	Consumer	Corporate	Markets
Real time analytics	<ul style="list-style-type: none"> Paypal uses real time payment fraud analytics CapOne uses RTA for customer engagement 	<ul style="list-style-type: none"> JP Morgan uses real time analytics for small business loan approvals 	<ul style="list-style-type: none"> Goldman Sachs uses real time analytics to monitor trade fraud
Predictive analytics	<ul style="list-style-type: none"> Chase and BBVA use ML-based techniques for card fraud, and for targeted customer offers CapOne uses ML-based techniques for payment spend analytics and personalized coupons/alerts 	<ul style="list-style-type: none"> JP Morgan uses ML techniques for funds flow analytics Goldman uses Machine Learning in its "AppBank" to automate corporate systems management 	<ul style="list-style-type: none"> JP Morgan uses ML techniques for real time trade risk management Credit Suisse, DB and Goldman have deployed ML-based high frequency trading platforms
Machine Learning	<ul style="list-style-type: none"> LendingClub/ Kabbage report use of ML for credit scoring and risk management 	<ul style="list-style-type: none"> Multiple banks: Tracking of corporate accounts to notifying banks for assistance, Automated sanctions compliance management 	<ul style="list-style-type: none"> Bank of America, Morgan Stanley deploying robo-advisors with ML-functionality State Street uses ML based analytics for portfolio and asset management
Deep Learning	<ul style="list-style-type: none"> PayPal uses deep learning techniques in discovering payment fraud 		
Video / Image Analytics	<ul style="list-style-type: none"> HSBC, USAA, Wells Fargo and CapOne use facial and voice-based biometrics for identity Mastercard testing "Selfie Pay" in North America 	<ul style="list-style-type: none"> Barclays & Wells Fargo use face and voice recognition to validate corporate users 	<ul style="list-style-type: none"> Charles Schwab utilizes image pattern recognition to identify trading patterns
Graph analytics	<ul style="list-style-type: none"> Santander uses graph analytics for customer 360 profile generation 	<ul style="list-style-type: none"> JP Morgan uses graph analytics for cyber intrusion detection 	<ul style="list-style-type: none"> Goldman Sachs uses graph analytics for compliance and fraud analytics
Natural Language Processing & Generation	<ul style="list-style-type: none"> Capital One and Bank of America working on Amazon Echo based applications – for account management and payments initiation DBS uses NLP to review customer chat logs to enhance quality of customer interactions 	<ul style="list-style-type: none"> State Street piloting use of Natural language based techniques in its custodian tools 	<ul style="list-style-type: none"> ICICI, HDFC are piloting use of NLP based techniques to generate research advisories for wealth management customers Deutsche Bank uses news sentiment analytics for financial forecasting
Virtual Assistants / Bots	<ul style="list-style-type: none"> DBS uses virtual agent technology for consumer Q&A in its DigiBank App BBVA's web-based virtual agent app uses NLP RBS uses "Luvo", its virtual agent chatbot to help mortgage customers chose the best fit loan 	<ul style="list-style-type: none"> HSBC uses virtual assistants to help business customers navigate through product detail 	<ul style="list-style-type: none"> E*Trade uses virtual agents to assist trading with market Q&A Multiple banks undertaking pilots for use of virtual agents to support traders with real time information
Robotic Process Automation	<ul style="list-style-type: none"> Wells uses RPA for mortgage processing and reconciliations Chase uses RPA for ledger reconciliations ICICI bank uses RPA to automate reconciliation of ATM declined transactions & disputes 	<ul style="list-style-type: none"> Chase uses RPA for reconciliations and technology support. Danske Bank uses RPA in quality assurance and ledger reconciliations 	<ul style="list-style-type: none"> Goldman Sachs uses RPA for market reconciliations JP Morgan uses RPA to automate trade ledger reconciliations, testing automation and for FX account and ledger mgmt.

Source: Citi Digital Strategy

Within banking, there is a wide adoption of virtual digital agents (or assistants), which are automated software applications that enable human interactions through natural language processing. When integrated with AI-based knowledge bases such as expert systems, they can perform multiple autonomous roles such as customer service agents, transaction enablers, information providers, and back-office workflow automations. Tractica estimates the virtual digital assistant (VDA) market will reach \$15.8 billion worldwide by 2021, unique active consumer VDA users will grow to 1.8 billion, and enterprise VDA users will rise to 843 million. Below are non-exhaustive examples of VDAs by different banks.

Figure 44. "Hannah" by M&S Bank

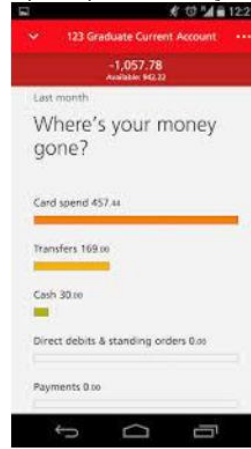
- Chat-based Q&A
- In-conversation surveys



Source: CB Insights

Figure 45. "Smartbank" by Santander

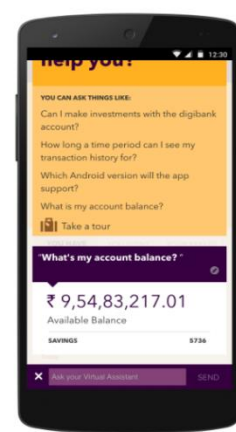
- Process simple user requests
- Voice-enabled account alerts
- Spend pattern analysis



Source: CB Insights

Figure 46. "Digibank" by DBS

- Repository of 10,000 queries
- Conversational chat agent
- Account self-service



Source: CB Insights

Figure 47. "Nina" by Swedbank

- Conversational chat agent
- Account self-service



Source: CB Insights

Figure 48. "Ally Assist" by Ally Financial

- Real time contextualized Q&A
- Targeted offers



Source: CB Insights

Other key advanced analytics and artificial intelligence (AA-AI) techniques and their application in financial services include:

■ **Real Time Analytics:** Real time decision making.

- **Personetics.** New York-based. Founded in 2010, it enables digital banks to interact with customers in real time. Personetics offers three major offerings: (1) Assist: a digital self-service solution that empowers customers with personalized, context-aware and timely support resources; (2) Engage: provides real-time, predictive and actionable insights and financial advice to the customer; and (3) ChatBot: enables financial institutions to use messaging apps to engage with customers, powered by predictive analytics.

- **Machine Learning and Predictive Analytics:** Machine learning (ML) is the ability to learn from data without being explicitly programmed. The knowledge can then be applied to predict future behavior based on trends from past data.
 - **H2O:** H2O predictive analytics can be used in various industries. In financial services, it catches evolving patterns in fraud and money laundering activities and automates new credit application approvals. In insurance, H2O automates insurance product recommendations and improves customer intelligence. In healthcare, it prescribes personalized medicine, saves patient lives, and reduces cancer fatalities.
- **Deep Learning:** Multi-layer ML processing to identify higher level of abstractions.
 - **IBM Watson:** IBM Watson Financial Services has two parts: customer insights and risk and compliance, leveraging on Watson's cognitive power. Financial institutions are able to have a deeper understanding of customer profitability and behavior, hence offer more personalized offerings. At the same time, Watson is transforming banks compliance and regulation, especially after the recent Promontory acquisition (See RegTech section for details).
- **Video/Image/Graph Analytics:** analysis of image / video streams / graphs, to derive insights from attributes patterns.
 - **3VR:** 3VR analyze video data. Its application for financial services includes integrating facial recognition analytics with alarm systems to prevent ATM fraud, uncovering and evaluating suspicious activities at ATMs in real time, and automatically alerting authorities to suspicious behavior.
 - **Neo4j:** Neo4j can help to uncover connections within graph databases. This can help to detect fraud in financial services, especially fraud rings comprised of stolen and synthetic identities. It can uncover difficult to detect patterns that outstrip the power of a relational database.
- **Natural Language Processing & Generation:** Recognition and generation of natural human language using computation analytics.
 - **Narrative Science:** Narrative Science utilizes advanced natural language generation (Advanced NLG) to transform data into narratives. USAA uses Narrative Science Quill™ platform to turn mountains of data into digestible written reports that read like they were written by a human hand.

It shouldn't be a surprise that VCs have invested heavily into big data analytics. As AA-AI is becoming both a revenue and cost driver for financial institutions, the investment in big data and AI is expected to continue in coming years.

Figure 49. Panel VC Investments into Big Data & Analytics-related Tech Companies

VC	Portfolio Company	Category	Description	Location	Headquarters
Citi Ventures	Ayasdi	Big Data & Analytics	Ayasdi taps into the massive amounts of client, product, and market-related data to uncover hidden insights, to create predictive models, and ultimately to automate your business with intelligent applications.	U.S.	Menlo Park, CA
Citi Ventures	Datameer	Big Data & Analytics	Datameer's end-to-end big data analytics application for Hadoop (open source software framework for storage of large data sets) enables business users to discover insights in any data via data integration, iterative point-and-click analytics, and drag-and-drop visualizations, regardless of the data type, size, or source.	U.S.	San Francisco
Citi Ventures	Pepperdata	Big Data & Analytics	Pepperdata's software runs on existing Hadoop clusters to give operators predictability, capacity, and visibility for their Hadoop jobs.	U.S.	Sunnyvale, CA
Arbor Ventures	DemystData	Big Data & Analytics	DemystData's proprietary Attribute Platform works with more data sources than anyone else, including telecom, social, ID, fraud, websites, text, news, logs, and more to help banks, insurers, and other customers to optimize workflows and more accurately screen their potential customers.	ASEAN	Singapore

Source: Citi Research

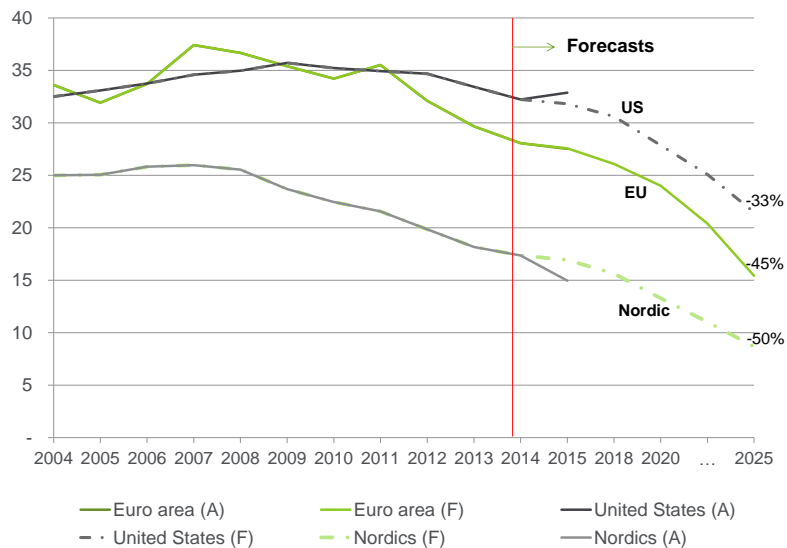
Banks' Uber Moment

The wide adoption of artificial intelligence and automation in financial services would have a profound impact on product distribution, customer services, and ultimately, the cost structure of the incumbent banks. As we discussed in our GPS report ([link here](#)), developed market banks are expected to cut their number of branches by another 30-50% from the level in 2014 and the number of full time employees (FTEs) could halve from the peak in 2007-2008.

The consumer banks in the U.S. 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. 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.

One year has passed since the initial estimates based on 2014 data. Success begets success. The Nordic banks are exceeding our expectations. Branch density in the Nordics was down 14% in 2015 alone. The Euro area is in-line with estimates (-2% in 2015) and the U.S. banks are lagging our expectations, with branch density tipping up slightly in 2015. But with the increased ubiquity of the mobile Internet, increasing FinTech competition, and a sluggish revenue and profitability environment, we expect U.S. banks to follow their EU peers in cutting branches.

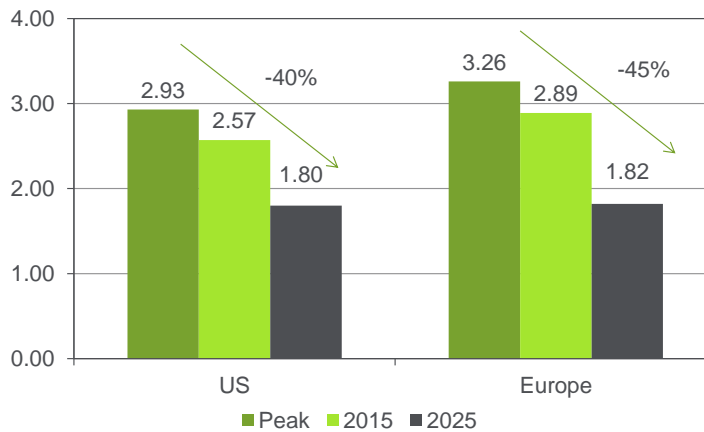
Figure 50. Commercial Bank Branches per 100K Adults by Region



Source: World Bank, Citi Research; F stands for Forecast, A stands for Actual

The future of branches in banking is about focusing on advisory and consultation rather than transactions. 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. If the banking system in Europe, Japan, and the U.S. operated with the same cost/income ratio 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 ([link to GPS report](#)).

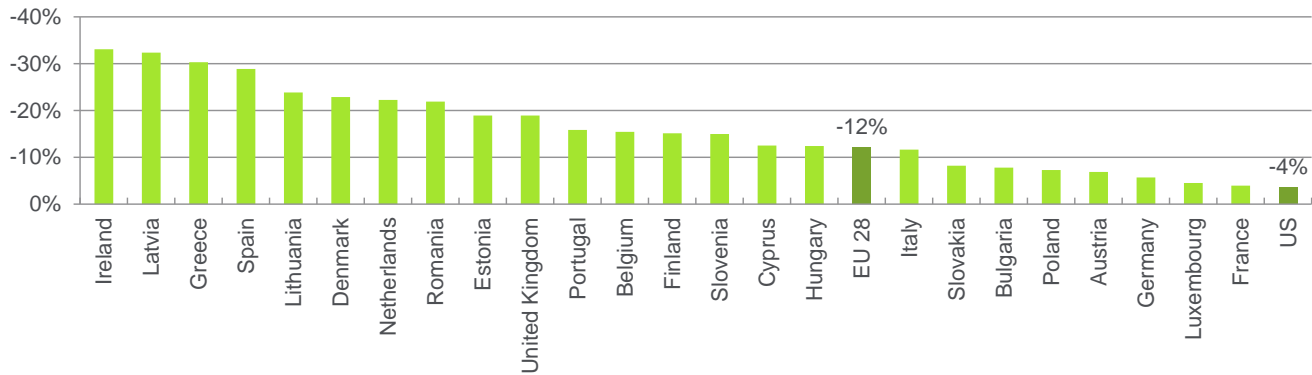
Figure 51. At the Tipping Point of Full-Time Employee Reduction (million)



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

EU banks on average have been cutting FTEs by around 2% per year since the great financial crisis. The crisis hit countries and the Dutch, the Danes and the U.K. are leading the employee reduction, while France, Germany and Italy are slightly behind. The U.S. banks are also behind European peers when it comes to employee reduction, maybe due to better profitability.

Figure 52. Banks Full-Time Employee Reduction, 2015 vs. 2008



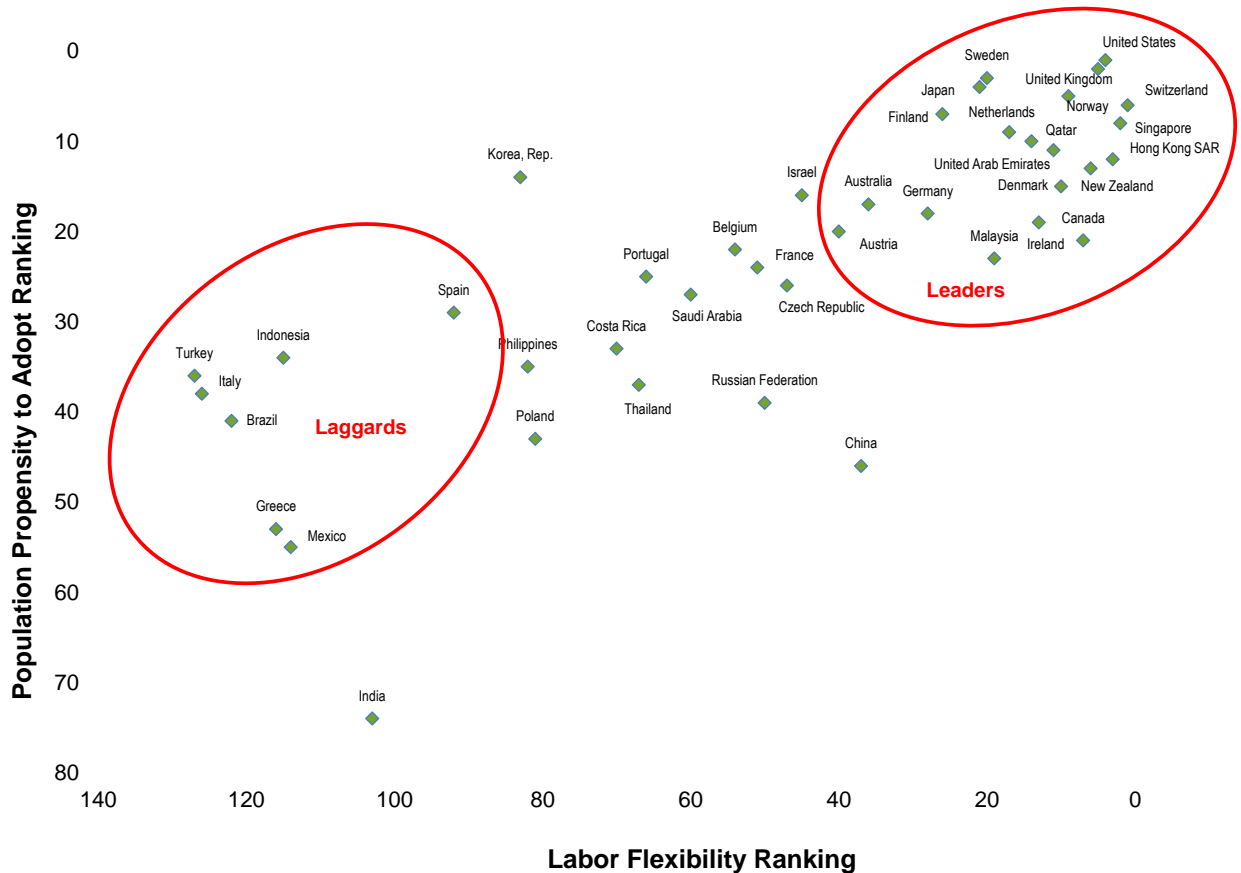
Source: ECB, United States Bureau of Labor Statistics (Financial Services, Credit Intermediation and Related Services), Citi Research,

The potential to cut branches and employees varies by markets. We identified two key factors that may enable incumbents to reengineer their business models. The first is flexible labor laws and the second is the digital readiness of society. In markets with inflexible labor laws, incumbent banks may find it hard to reduce their number of employees through automation. Banks can also cut branches with limited impact on market share and customer satisfaction if the society is digitally ready.

As shown in Figure 53, among developed market countries, the U.S., Singapore, Hong Kong, and Northern European countries rank high in terms of both labor market efficiency and digital savviness of the population, while the Southern European countries such as Italy, Greece, and Spain appear to lag.

Italy and Spain rank low (Range 1-140) when it comes to labor flexibility due mainly to low scores on hiring and firing practices (Italy and Spain) or relatively higher redundancy costs (Spain). Both make it harder for banks to reduce FTEs. Belgium and France are in the middle of the pack when it comes to hiring and firing. The Northern European countries rank higher.

Figure 53. Ability for a Bank to Reduce Costs Depends on Labor Flexibility and the Population’s Digital Readiness

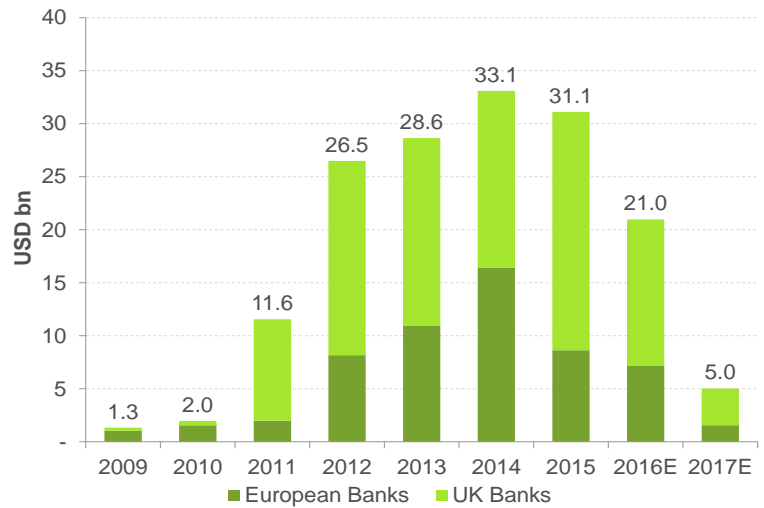


Source: Citi Research, World Economic Forum, Citi Digital Money Index; Labor Flexibility Ranking is based on 2015-2016 World Economic Forum Global Competitive Index 7th Pillar: Labour Market Efficiency. Range (1-140). Population Propensity to Adopt ranking is based on 2015 Citi Digital Money Index “Propensity to Adopt”. Range (1-90)

RegTech to Address Rising Compliance Costs

Within B2B, an area to watch in 2017 is Regulatory Tech (RegTech). The financial industry was hit by large litigation and conduct charges post the global financial crisis. A knee-jerk reaction to fix this issue was to invest in regulation and compliance. Banks solved the problem by hiring compliance and control officers.

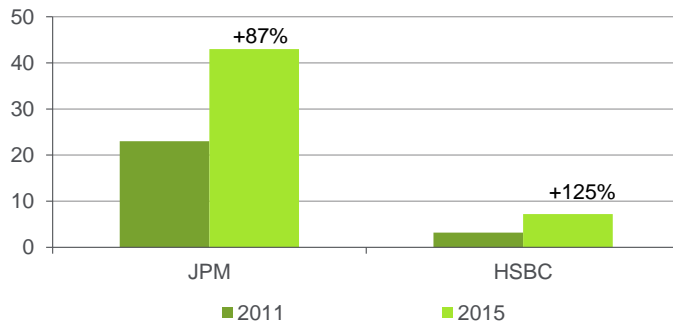
Figure 54. European & U.K. Bank Litigation and Conduct Charges, \$bn



Source: Annual Reports. Citi Research

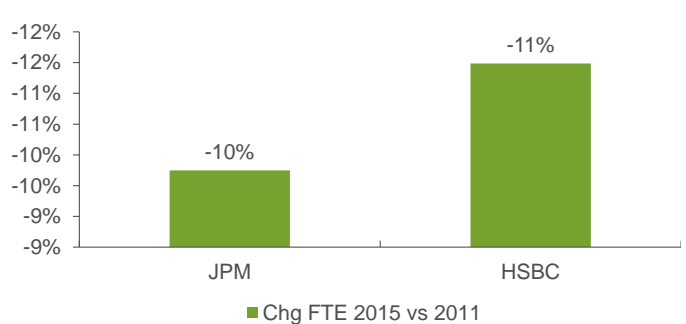
Although the overall headcount at banks was cut by over 10% on average over the last five years, the number of compliance and regulatory employees doubled (Figure 55-Figure 56). A McKinsey study estimated the cost of managing the regulatory environment to be more than 10% of all operational spending of major banks, at around \$270 billion per year.

Figure 55. Number of Compliance and Regulatory Employees Doubled on Average Over Last 5 Years (in thousands)...



Source: Citi Research, Company Reports; Each company defines compliance and regulatory employees differently, absolute number is less comparable

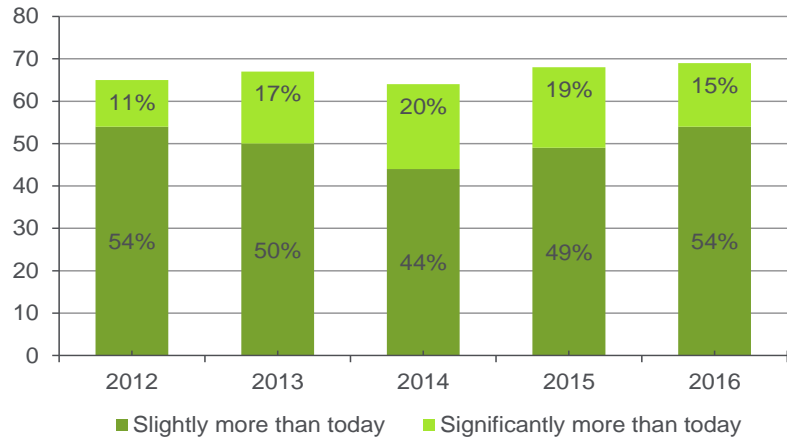
Figure 56. ...While Banks Cut Over 10% of Total Employees



Source: Citi Research, Company Reports

Moreover, there is no sign we are coming to the end of rising regulations in the industry. According to a Reuters survey of more than 300 worldwide financial institutions, 60-70% of the compliance professionals surveyed expect compliance budget to increase over the next year.

Figure 57. Expected Increase in the Total Compliance Budget over the Next 12M, 2012-2016

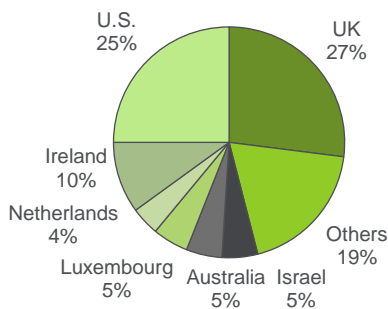


Source :Reuters, Cost of Compliance 2016, by survey of compliance professionals from more than 300 financial services firms worldwide including most of the largest global systemically important financial institutions (G-SIFs)

We see RegTech as a huge cost take-out opportunity for financial institutions. RegTech implements risk management and monitoring systems which could help financial institutions to identify, measure, monitor, and control risk.

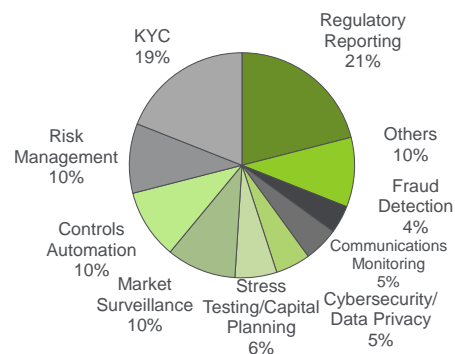
The U.K. and U.S. are leading in RegTech globally. Of the 127 RegTech companies that were tracked by Jan-Maarten (JM) Mulder, a FinTech investor and General Partner at Middlegame Ventures (Figure 58-Figure 59), over half are based in the U.K. and the U.S. Ireland is pulling above its weight when it comes to RegTech with 10% of the RegTech companies based there.

Figure 58. RegTech – the U.K. and the U.S. Dominate



Source: Citi Research; Based on 127 RegTech companies identified by Jan-Maarten (JM) Mulder, General Partner at Middlegame Ventures

Figure 59. RegTech – Regulatory Reporting and KYC in Focus



Source: Source: Citi Research; Based on 127 RegTech companies identified by Jan-Maarten (JM) Mulder, General Partner at Middlegame Ventures

By product, there are very diverse business models targeting every area of regulation including regulatory reporting, Know Your Client (KYC), risk management, control automation, and so on. At the moment, RegTech companies seem to be focusing on the easier-to-tackle areas of RegTech such as regulatory reporting and KYC, which both simplify existing processes and reduce manual inputs. There are very fragmented solutions targeting the more complex processes that require deeper understanding of the regulation and business.

KYC is a large and critical undertaking by financial institutions. Each financial institution need to perform its own KYC around client onboarding. It can be a time consuming and manual process for financial institutions. Rather than each bank coming out with its own KYC solutions, third-party FinTech companies are better positioned to create a common industry KYC standard. Trulioo is one of the RegTech companies that provide KYC verification in over 40 countries. There are over 20 start-ups globally providing KYC solutions for incumbents (Figure 60).

Figure 60. List of KYC FinTech Start-ups

Name	Country	Founded	Description
Albany Group	U.K.	2007	Client due diligence solutions
ComplyAdvantage	U.K.	2014	AML data and surveillance platform
Contego	U.K.	2011	KYC validation tools
Cynopsis Solutions	Singapore	2014	AML software to reduce cost of regulatory compliance
Encompass	U.K.	2012	Due diligence/onboarding automation and reporting
Fenergo	Ireland	2009	KYC data management
Financial Crimes Solutions	Australia	2011	AML risk assessment solutions
IdentityMind	USA	2011	Risk assessment of merchant accounts
Invoxis	France	2013	Automated onboarding and risk analysis process
KYC Exchange	Switzerland	2013	KYC data collection platform
KYC3	Luxembourg	2014	Customer intelligence monitoring solutions
KYC-Chain	Singapore	2013	Blockchain-based customer onboarding
Muinmos	Denmark	2012	Validates whether a client can trade in a service/instrument
Onfido	U.K.	2012	KYC background checking
OpusDatum	U.K.	2007	AML & sanctions transaction monitoring tools
Passfort	U.K.	2015	KYC data collection and verification platform
Provenir	USA	2004	Multiple source data analysis
Signzy	India	2015	Digital onboarding using AI and cryptography
Simple KYC	Australia	2015	Help with KYC & AML regulatory requirements
Skry	U.S.	2014	Transactions and counterparty monitoring on blockchain
Tradle	U.S.	2014	Blockchain KYC network
TransparlNT	U.S.	2013	Media screening for financial crime and AML compliance
Trulioo	Canada	2011	Electronic identity verification
Trunomi	U.S.	2014	KYC data management tool

Source: Jan-Maarten (JM) Mulder, General Partner at Middlegame Ventures

Over the longer term, a nationwide KYC utility could be beneficial to the whole of society and many regulators and governments are working towards this ideal. In India, the roll-out of their Aadhaar digital identity program facilitated easy customer onboarding, without which DBS's Digibank (and Internet-only bank) would be much harder to achieve.

Similarly, the Infocomm Development Authority (IDA) of Singapore is leading the development of a digital ID solution on mobile phones which would provide a digital proof of identity. This common digital identity and authentication infrastructure can then be leveraged on by financial institutions as well as other service providers. The service is being tested by Monetary Authority of Singapore (MAS).

Other countries working on digital identity include Digital 5 (D5), a group of five countries including the U.K., Estonia, Israel, New Zealand, and South Korea, with the common goal of pioneering digital government. One agenda for the D5 countries is to have a digital identity for delivery of public or private services.

Estonia is a leader in digital ID. All Estonians have a digital ID embedded in their smartphone SIM cards. They can do digital signatures for everything from parliamentary bills to legal documents. This hugely improves the efficiency of both the public and private sector — a legally functioning company can be set up in 20 minutes and 96% of population can pay taxes online in less than three minutes ([link here](#)).

The more difficult part of RegTech is how to optimize and automate the compliance communication and monitoring, risk management, and regulatory reporting. While there are FinTech companies addressing parts of the problem, there are a few issues with these kinds of solutions:

1. **Scalability:** The solutions developed may not apply to all financial institutions due to differences in internal processes. It might require high level of customization for each client.
2. **Security and data confidentiality:** RegTech companies are often processing highly sensitive customer data. Hence there is a higher requirement for cybersecurity and customer data protection, which smaller start-ups need time to prove. This will lead to the last related challenge
3. **How would a new start-up pass the increasingly stringent procurement procedure at large financial companies?**

We believe partnership could be one of the answers for issue 2 and 3.

We are also pleased to see larger organizations are getting into RegTech space. IBM's acquisition of Promontory, a risk management and regulatory compliance consulting firm, shows IBM's push to use technology to address the escalating manual cost of increasing regulation and risk management requirements.

IBM's Watson Financial Services platform will leverage on Promontory's regulatory and compliance expertise to machine train the cognitive solutions Watson provides. These solutions will include tracking regulatory requirement changes, risk modeling, and surveillance, as well as anti-money laundering (AML) and know your customer (KYC) offerings.

IBM or other larger institutions, in our view, are well positioned to create a comprehensive RegTech solution/platform that could become the industry standard. This may make it challenging for smaller or start up-RegTech companies to stay independent. Because of this, we see many such firms ending up as part of larger institutions.

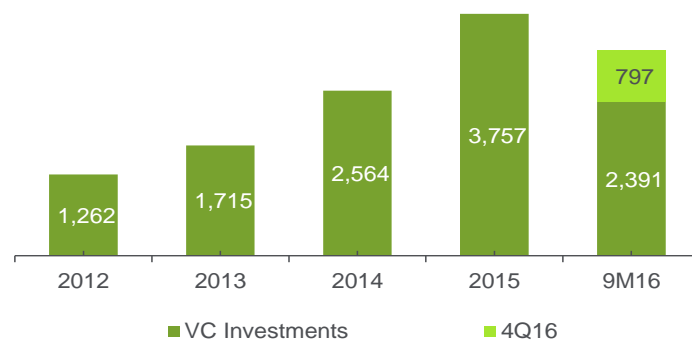
Cybersecurity

Strictly speaking, cybersecurity is not FinTech. Companies across the technology spectrum are investing heavily in cybersecurity. But it is even more important for financial service providers, as they safeguard customers' financial assets and hence are more prone to cyberattack than other industries. A study done by Mandiant in September 2013 showed that financial services tops the most targeted industry for cyberattacks out of a list of 26 industries.

Incumbent financial institutions are fully aware of the criticalness of safeguarding client assets and client data. They have spent large amounts on cybersecurity. According to Forbes (December 2015), the four largest banks in the U.S. will collectively spend \$1.5 billion on cybersecurity per year. Homeland Security Research Corp (HSRC) estimated the U.S. financial services cybersecurity market at \$9.5 billion in 2015 and \$68 billion cumulatively in 2016-2020.

The growth of FinTech boosted the investments into standalone cybersecurity companies that offer solutions to safeguard the younger FinTech start-ups from attacks. In 2015, total VC investments in cybersecurity reached \$3.8 billion. Although VC funding into cybersecurity slowed somewhat in 2016, similar to trends in other sectors, we expect around \$3.2 billion funding into cybersecurity. Of the panel VCs we interviewed, 13% of their portfolios are in cybersecurity. Bank-backed Citi Ventures and Propel Venture Partners have invested more than others.

Figure 61. Cybersecurity Global Yearly VC Investments (\$m)



Source: Citi Research estimates, CB Insights

Most of the cybersecurity companies that our panel VCs invested in are based in the U.S., which is the largest exporter of cybersecurity globally. Israel is also evolving as a cybersecurity hub, particularly around financial services. There are around 250 Israeli cybersecurity companies with annual revenues of \$3.5-\$4 billion (~5% of global market). These companies raised nearly \$1 billion of funding in the last two years (>10% of global investments in cybersecurity).

Israel's cybersecurity ecosystem started as a result of the strength of the talent pool coming out of Israeli Defense Forces (IDF). Nearly every citizen has to do mandatory military service, where they receive rigorous IT and computing training. This talent pool has attracted multinational corporates to setup cybersecurity research centers in Israel. There are over 25 leading multi-national corporations (MNCs) in Israel including Microsoft, IBM, and ARM, to name a few. The supply of VC capital to fund the development cybersecurity start-ups in Israel is strong: \$3.6 billion was invested in Israel start-ups in 2015 and \$2.8 billion in the first half of 2016, according to KPMG and Zirra.

Chinese companies (FinTech and general) are investing heavily in Israeli companies to get access to advanced hard core engineering in cybersecurity and artificial intelligence. Notable investments, including a \$20 million investment made by Shenzhen-based technology group Kuang-Chi in eyeSight Technologies, a leader in machine vision and gesture recognition in May 2016. Kuang-Chi also launched a Tel Aviv-based fund to invest \$300 million in Israel and abroad.

As mentioned previously, MNCs are also active. In September 2015, Microsoft acquired Israeli firm Adallom, a firm focusing on securing client assets over the cloud, for around \$320 million. ARM bought Sansa Security, a provider of IoT and mobile trust and security technologies, in July 2015 for around \$100 million.

Figure 62. Panel VC Investments into Cybersecurity-related Tech Companies

VC	Portfolio Company	Category	Description	Location	Headquarters
IDG Capital	FraudMetrix	Internet Security	Development of security products against Internet risks and fraud. It addresses account fraud, transaction fraud, payments fraud, business fraud, Internet credit fraud, and corporate internet fraud.	China	Hangzhou
NFT Ventures	ZignSec	Security	ZignSec's verification platform brings together a combination of technology and data, with a focus on identifying the user behind every transaction. This simplifies KYC and AML process and secure login.	Nordic	Stockholm
Citi Ventures	Cylance	Security	Cylance applies artificial intelligence, algorithmic science, and machine learning to cybersecurity and helps companies, governments, and end users to prevent most advanced cyber threats.	U.S.	Irvine, CA
Citi Ventures	DB Networks	Security	DB Network's patented technology is based on deep protocol extraction, machine learning, and behavioral analysis to give customers real-time and continuous situational awareness of their database infrastructure.	U.S.	Carlsbad, CA
Citi Ventures	Illusive Networks	Security	Illusive Networks produces technology that deceives cyber attackers by planting false information about a given network's resources. Network administrators are alerted when cyberattackers use security deceptions in an attempt to exploit the network.	Israel	Tel Aviv
Citi Ventures	Pindrop	Security	Pindrop provides risk scoring for phone calls to detect fraud and authenticate callers. Pindrop's patented and proprietary audio analysis technology analyzes 147 different features of a phone call. This analysis provides location, that helps identify the uniqueness of a device and attaches it to a caller.	U.S.	Atlanta, GA
Citi Ventures	Tanium	Security	An enterprise solution that allows you to query and modify managed computer assets in seconds, regardless of the size of the network.	U.S.	Emeryville, CA
Citi Ventures	vArmour	Security	vArmour offers security solutions specifically aimed at enterprises that run services and apps across multiple clouds.	U.S.	Mountain View, CA
Propel Venture Partners	Brave	Security	The new Brave browser automatically blocks ads and trackers, making it faster and safer than your current browser.	U.S.	San Francisco, CA
Propel Venture Partners	Civic	Security	Civic lets you know when new accounts are opened with your personal information. This gives you the control to identify which ones were authorized by you and take action on the ones that weren't.	U.S.	Palo Alto, CA

Source: Citi Research

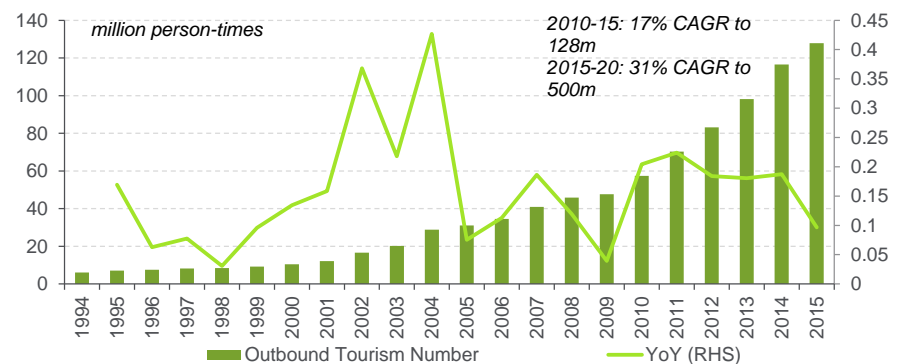
Geographic Expansion

Established FinTech companies are likely to expand beyond their domestic market for growth. Alibaba is the most ambitious company among the Chinese Internet giants when it comes to international growth. Jack Ma, founder of Alibaba, is pushing to generate over 50% of Alibaba's revenue outside of China.

A lot of the expansion comes through acquisitions. In April 2016, Alibaba paid around \$1 billion for a controlling stake in Lazada Group, an e-commerce platform in Southeast Asia. In 2015, together with Foxconn and SoftBank, Alibaba invested \$500 million in Snapdeal, a leading e-commerce platform in India. In the same year, Alibaba and its affiliate Ant Financial invested close to \$680 million in Paytm, Indian's largest mobile wallet, claiming a ~40% of stake.

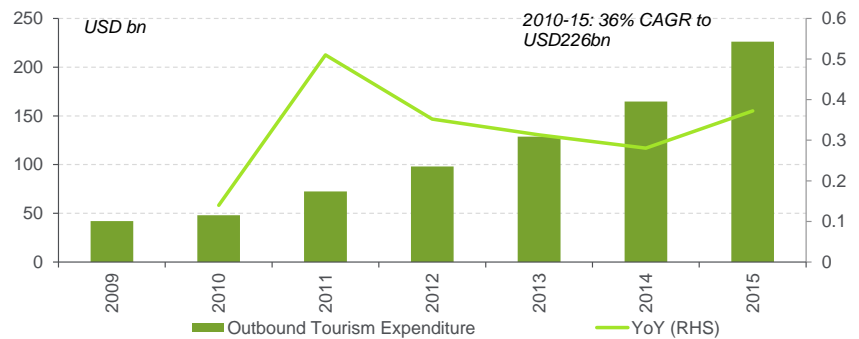
Alipay is following the Chinese overseas tourism mega trend and trying to capture the growth in Chinese overseas spending. Chinese tourists in Las Vegas will be able to use their Alipay app to pay for purchases via Verifone mobile point of sale (mPOS) terminals. A similar collaboration with First Data has been unveiled, allowing use of Alipay in California and New York from November 2016.

Figure 63. Number of Outbound Trips by Chinese Tourists



Source: CTA, CNTA

Outbound spending by Chinese tourists has increased at a compound annual growth rate of 36% between 2010 and 2015. A recent study by Visa forecasts Chinese outbound travel spending to increase by 86% between 2015 and 2025 in constant real currency terms. This is a huge opportunity for the likes of Alipay who want "over one million merchants outside China" and "over two billion worldwide" users (Douglas Feagin, Head of Alipay International).

Figure 64. Chinese Outbound Tourist Spending

Source: CNTA, MOF, Citi Research

It is much harder for FinTech, especially B2C FinTech, companies to penetrate into new markets compared to other consumer tech companies due to: (1) regulation; (2) language and cultural differences, which result in different customer preferences; and (3) different credit culture and so on.

Some FinTech companies overcome the aforementioned challenges through partnerships with incumbent banks. For example, Kabbage, a U.S.-based SME lender, partners with ING in Spain and Santander in the U.K. to grow into SME markets abroad.

It's relatively easier for B2B+based businesses to expand internationally. For example, Stripe provides payment application programming interfaces (APIs) for businesses to accept online payments. It has evolved to become the leading online payment engine and handles billions of dollars of payments per year. It is now available for businesses in 25 countries and accept payments from anywhere in the world.

Preferred Business Models by Interviewed VCs

In our interviews, we asked the VCs to elaborate on their favorite FinTech business model. **Please note this is not and should not be viewed as a stock recommendation or any recommendation from Citi, but instead is a VC's preference on FinTech business models.**

The diverse selections of FinTech business models cover lending, payments, insurance, wealth management and business tools. The common themes are:

1. Payments, especially e-commerce payments, can reap large economy of scale and valuations (e.g. Alibaba, Tencent, and PayPal). Payments are also a gateway to broader financial services.
2. Lending is still popular among VCs, especially in the emerging markets where there is an underserved customer segment. In China, CreditEase was one of the earliest alternative lenders that broadened its business into wealth management. JUMO is a leader in micro credit in Africa over mobile devices leveraging on big data and smart analytics.
3. Business tools that improve the efficiency of customers are also in favor. Whether it's a software treasury solution for real estate companies, easy-to-use online accounting software over the cloud that creates sticky customer bases and rich customer data for cross-selling or financial services API for FinTech companies to easily access banks' payment infrastructure, there is an unmet need for increased efficiency.
4. InsurTech is gaining investor interest. The focus is on the distribution of products. For example, a product offered by Dubai-based Bayzat, helps clients to compare the insurance offerings from many providers in a fragmented market

Interview with IDG Capital

About IDG Capital – China-Focused

IDG Capital is a China-focused private equity and venture capital fund with \$7 billion of capital under management. It was one of the earliest American venture capital firms to enter the Chinese market since the early 1990s. IDG Capital is also becoming the controlling shareholder of IDG Ventures, the global investment arm of IDG Group.

IDG Capital invests in early- to growth-stage companies with a focus on five high-tech-related sectors including Internet, mobile & tech, healthcare, modern services & brand, industrial technology & resources, and media, tourism & real estate.

It has an investment portfolio of over 500 start-up companies, including companies such as Ctrip, Sohu, Baidu, Tencent and Xiao Mi, 120 of which have completed public offerings or successful exits.

Breyer Capital, founded by early Facebook investor Jim Breyer, is the U.S. partner and sponsor of IDG Capital.

Figure 65. IDG Capital Partners – FinTech Investments

Date	Invested In	Type	Round
Jun-16	Circle	Blockchain/Cryptocurrency	\$60M / Series D (Lead)
Jun-15	iQunxing	Supply chain finance	\$10M / Series B (Lead)
Dec-14	Qingsongchou	Crowdfunding	\$2M / Series A (Lead)
Sep-14	Weccash	Consumer Credit	\$7M / Series A (Lead)
Nov-13	FraudMetrix	Internet Security	\$2M / Series A (Lead)
Sep-13	Wacai	Wealth management	\$10M / Series A (Lead)
May-11	CreditEase	Alternative lending	\$10M / Series B (Lead)

Source: Crunchbase, Citi Research

About Douglas Jiang

Douglas Jiang is a Director at IDG Capital. He is devoted to FinTech and other finance-related innovation globally with a China angle. He also takes a special interest in blockchain. Douglas and his team made investments into numerous FinTech start-ups in areas like alternative lending, blockchain, wealth management and securitization in China, the U.S., and Europe.

Prior to joining IDG Capital, Douglas was a research analyst at EJP Capital, researching long/short opportunities on U.S. and HK-listed Chinese stocks and other China-related names, and an analyst at Oppenheimer & Co.

IDG Capital Q&A with Douglas Jiang

Compared with other industries such as music and travel, why is digital disruption in financial services slow to come?

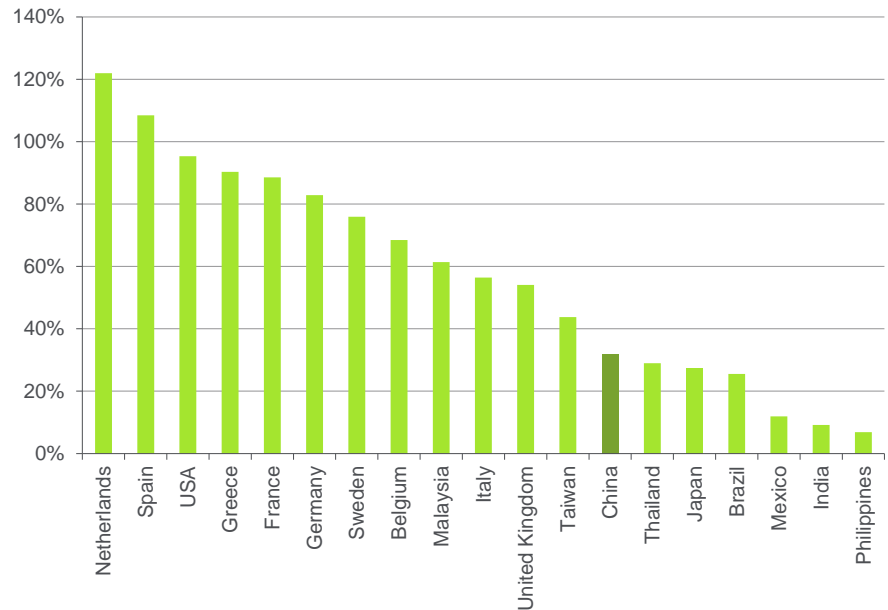
Compliance is the main reason for slow progress in financial innovations compared to other industries. Financial innovations are constrained by regulation. There is also the issue of potential systemic risk that regulators constantly look into.

The second issue is trust. Health and financial services are arguably the two areas that require the most consumer trust. The trust level needed for e-commerce or any other on-demand services such as taxi hailing are much lower. For FinTech companies, it will take a longer time to gain consumer trust.

(In your region) What aspects of financial services are more/less exposed to FinTech disruption by new entrants or incumbents?

This varies highly by market. In China, payments have already been disrupted by digital wallets such as WeChat Wallet and Alipay. There is still much to do in lending, particularly consumer lending. Most incumbent banks do not have a good consumer lending proposition. That opens up opportunity. Furthermore, Chinese households are underleveraged, leaving scope for a huge growth opportunity.

Figure 66. Personal (Retail Lending) as % of GDP, 2015

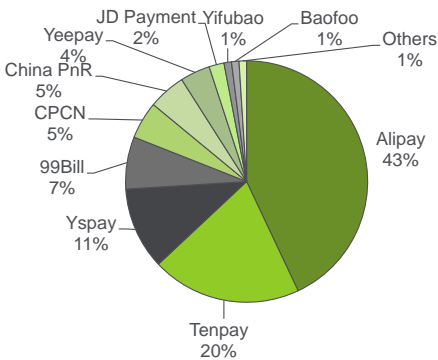


Source: Central bank disclosures and Citi Research estimates

How long do you think it will take FinTech companies to have meaningful market shares in the markets where you invest?

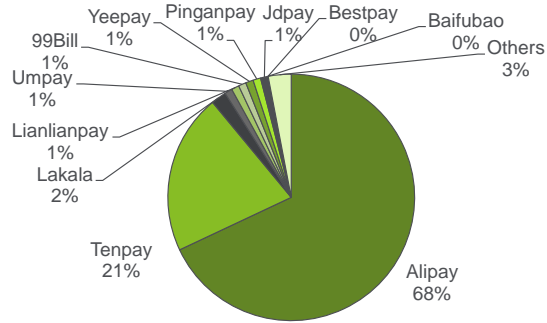
This could happen rather rapidly in China. The payments industry is already a done deal with Alipay and WeChat taking dominant market share in online/mobile payments.

Figure 67. Market Share of China's Main Online Third Party Payment Players in 1Q 2016



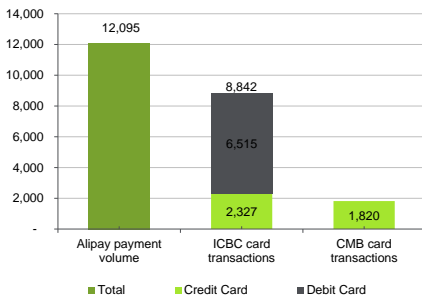
Source: iResearch Global Inc. Note: 1. Online payments refer to money transfers made on the Internet under the payment command of users via desktop or laptop; 2. Only non-financial payment companies above designated size are considered in calculation of GMV, excluding banks and UnionPay; 3. iResearch will calibrate historical data based on latest market information.

Figure 68. Share of China's Main Third Party Mobile Payment Companies in 2015



Source: iResearch Global Inc. Note: Only third party companies are considered in calculation of GMV, excluding banks and UnionPay. iResearch will update historical data in accordance with the latest market conditions.

Figure 69. Alibaba Payment Volumes vs. ICBC, CMB Card Payment Volumes, 2015 (RMB bn)



Source: Company reports, iResearch and Citi Research estimates

Alternative lenders in China have their own unique characteristics compared with Western counterparts. They often don't have institutional investors as a source of funding as lenders do in the West. They often operate an offline-to-online (O2O) business model where the borrowers are sourced offline and the lenders are sourced online. More importantly, they serve an underserved SME or consumer lending market.

All of these characteristics resemble the alternative financial services (AFS) companies in the U.S. that were setup in the middle of the twentieth century. According to a study done by the FDIC, AFS transactions are more than \$320 billion annually. I think this is the direction that Chinese alternative lenders are heading for.

Over the past 12 months, marketplace lending has received increased investor scrutiny, especially in the U.S. How do you view this segment?

As I mentioned earlier, I still see huge growth potential in China's alternative lending space due to the low consumer credit and SME lending penetration. I can see three winning business models for alternative lenders.

First, a model involving partnerships with incumbent banks. This model is increasingly popular in the U.S., where you see the likes of OnDeck collaborating with JPMorgan for SME loans. Similarly, Kabbage partners with ING and Santander in Spain and the U.K., respectively.

Figure 70. Marketplace Lenders and Banks Form Partnerships

Marketplace Lender	Banks
Funding Circle	Santander, Royal Bank of Scotland
Kabbage	ING, Santander, Scotiabank
Lending Club	Union Bank, Alliance Partners, Citi
MoolahSense; Funding Societies	DBS
OnDeck	JPMorgan
Prosper	160 independent and community banks
Zopa	Metro Bank

Source: Citi Research

Second, a wealth management business model. An example of this would be CreditEase in China— one of the first peer-to-peer (P2P) lending companies in China. Over time, it has rebranded itself away from P2P lending and more into wealth management. Investors can choose from a wide range of investment products such as private equity, real estate, and fixed income as well as P2P loans.

Lastly, service providers to the institutional lenders, chartered and non-chartered alike, can also be winners. Companies like WeCash partners with consumer finance companies, P2P lenders, e-commerce platforms and so on to make a loan decision within minutes.

We should increasingly see specialization in the P2P lending space. Some will specialize in the wealth management side to attract investments while others will focus on originating quality loans in vertical markets.

What are the biggest challenges for FinTech new entrants? Customer acquisition? Regulatory burden? Other?

Compliance and control is the biggest challenge in my view. If you were to look at the fall of Lending Club, it was mainly a compliance issue. At the early stage of a FinTech company's development, regulation tends to be lighter for FinTech companies than banks, but over time FinTech companies will need to enhance regulation and compliance as they grow bigger.

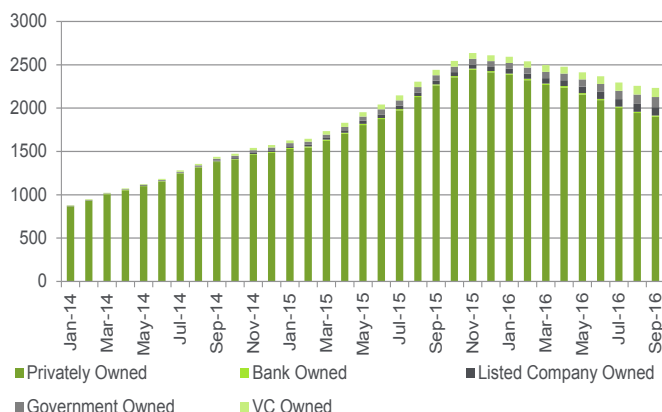
Is regulation a barrier to entry in financial services? How are FinTech companies regulated in your market/s?

Regulation is absolutely a big barrier to entry. One of the reasons that Chinese FinTech companies have reached the scale and size they are today is because of the relatively flexible regulatory environment in China.

When WeChat and Alipay started in payments, there were virtually no KYC or AML requirements. The Internet giants (BATs) were allowed to become financial giants with limited anti-trust issues. The time window of light regulation over the past decade has been a golden opportunity for China FinTech companies.

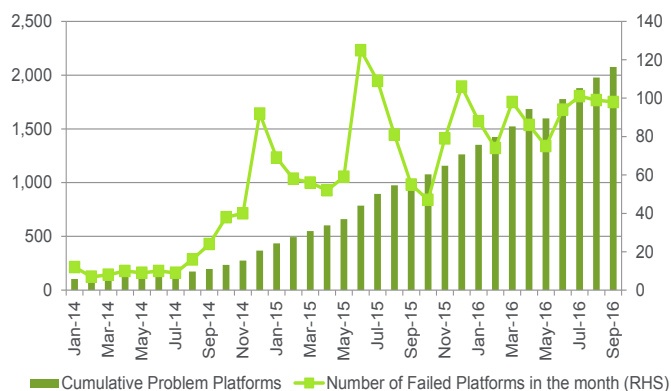
However, regulators in China are increasingly tightening up oversight in FinTech, especially after some high profile defaults in the P2P lending space.

Figure 71. China – Number of P2P Platforms Declined Since End-2015



Source: Wangdaizhijia, Citi Research

Figure 72. China – Number of Failed P2P Platforms



Source: Wangdaizhijia, Citi Research

How have incumbent financial institutions in your country/region responded to digital disruption and FinTech new entrants?

Most major Chinese banks have adopted mobile banking to retain digitally-savvy customers. They are relatively safe for now given the broad customer reach and geographical footprint.

The city and regional commercial banks can only be more aggressive in lending given the pressing competition landscape. These banks cannot compete with the "Big Four" state-owned banks in capital markets or confront fierce competition from aggressive joint-stock banks in metropolitan areas. Plus, they don't have roots as strong as those of rural commercial banks in rural regions. As they traditionally do not have expertise for the new venture, they tend to collaborate with the tech enablers to get business. For example, WeCash, a credit assessment platform based on big data, is used by some banks to grow consumer and SME lending. We also see established players like China Merchant Bank working with enablers like iQunxing, the Coupa-like service, for better efficiency in supply chain financing.

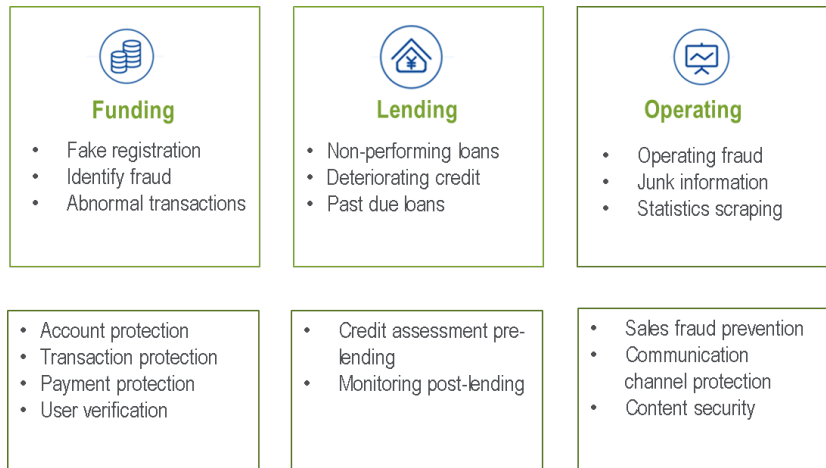
Generally speaking, according to the latest survey done by McKinsey with 40 leading banks in China, Chinese banks would certainly turn more attention toward retail and transactional banking for higher risk-adjusted return on capital (RAROC) as the economy growth slows down. Thus enablers in these two fields will be in greater need during such transition.

How important is cybersecurity for FinTech new entrants as a business opportunity and a risk/threat?

We see cybersecurity both as a threat and a barrier to entry, as well as an opportunity. Companies like FraudMetrix provides customized security protection to alternative lenders, payment companies, e-commerce platforms, financial institutions, and so on, can help the industry protect themselves from cyberattacks. FraudMetrix's security verification is done using core technology such as fingerprint recognition, Internet proxy IP check and address matching.

Looking at its solution to alternative lenders, for example, FraudMetrix leverages on the vast amount of credit data it has across multi-platforms to improve the risk management of the alternative lenders. It helps alternative lenders to prevent fraud and reduce credit risks.

Figure 73. FraudMetrix – Solution to Alternative Lenders



Source: Company website, Citi Research

Are FinTech companies better at analyzing and using client data than banks? Why have banks been slow? Regulation? Culture?

I think banks have been slow because of their risk-averse culture. Most major banks have compliance and procedures for new ways of credit scoring. It will take a long time for any new credit engine to be designed and approved by a bank.

On the other hand, FinTech companies are nimble and fast with limited compliance procedures. FinTech companies also incentivize change and progress.

Overall, I don't think FinTech companies are better than banks today at credit scoring as they are not yet proven through credit cycles. In fact many aggressive new FinTech players are worse than banks in risk management. Nevertheless, some companies are improving rapidly over time and as they gather more client data. These data should allow these P2P companies to improve their credit engines and reduce credit losses over time.

What are your preferred FinTech models? Can you discuss examples of FinTech companies with these models?

The preferred FinTech models would vary by market. For many years, Chinese tech companies were copying successful business models in the West. Some of these copied models have evolved, improved, and gained massive scale and success. Copy cats become copy tigers: WeChat's advancement in social payments has been way ahead of the rest of world; the volume advantage of Qingsongchou, the mobile crowdfunding platform over WeChat now matches that of GoFundMe over Facebook. Now we are trying to replicate the success story in China overseas.

In China, we see three business models. First, mobile payment business models are already proven by big players. It's a way to acquire customers and cross-sell to other part of retail banking. We also watch new alternative lenders from a growth prospective. In China, alternative lenders service the underbanked SMEs and consumer credit. Lastly, we favor business models that can help city/regional commercial banks and even bigger banks to improve their RAROC through better retail and transactional banking services. China's urban commercial banks lack the nationwide distribution network in rural areas to capture the growth. Many of them collaborate with the enablers to broaden their outreach. For example, Bank of Beijing Consumer Finance Company works with WeCash to broaden its customer base.

China-specific

China is leading the FinTech innovation race, led by the Chinese Internet giants (or BATs). Why have the BATs been so successful in FinTech relative to the GAFAs in the West? Can the BATs' success be replicated elsewhere?

No. I don't think the GAFAs can replicate the BATs' success. The success of the BATs is highly dependent on the relaxed regulatory environment in China. The BATs' FinTech initiatives took off without much compliance burden.

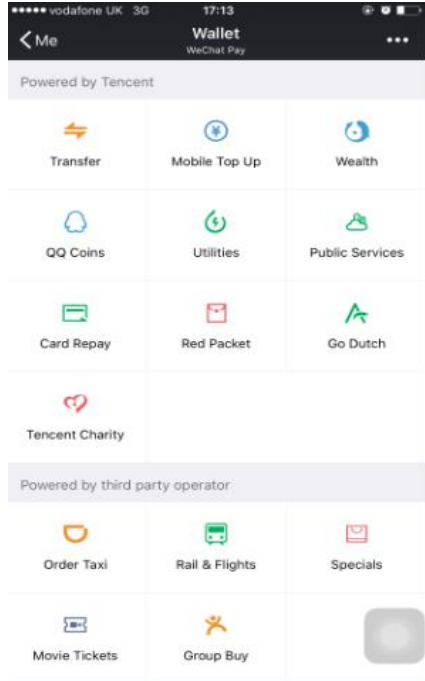
The GAFAs nevertheless operate in a tightly regulated Western market. There is a "too big to fail" concern by regulators if the GAFAs get into finance. The GAFAs' willingness to get into regulatory-heavy territory is also questionable. Hence, we believe the GAFAs will only focus on regulatory-light FinTech services to enhance their existing ecosystem such as payments (ApplePay), credit origination (Amazon does SME and consumer credit loan origination), and wealth management (Google Compare, which has been discontinued).

Ant Financial vs WeChat's financial offerings - I know I am not comparing apples to apples, but which one do you think will become a bigger financial player in China. Why?

It's yet too early to tell. I personally have more faith in WeChat.

WeChat has become a super app. I think controlling the social aspects of a transaction is a clear advantage for WeChat when it comes to cross-selling. But historically Alibaba has been more aggressive to venture into financial services

Figure 74. Tencent Offers Fully Integrated Financial Services on WeChat Platform



Source: Company website

Figure 75. Financial Products Under Ant Financial



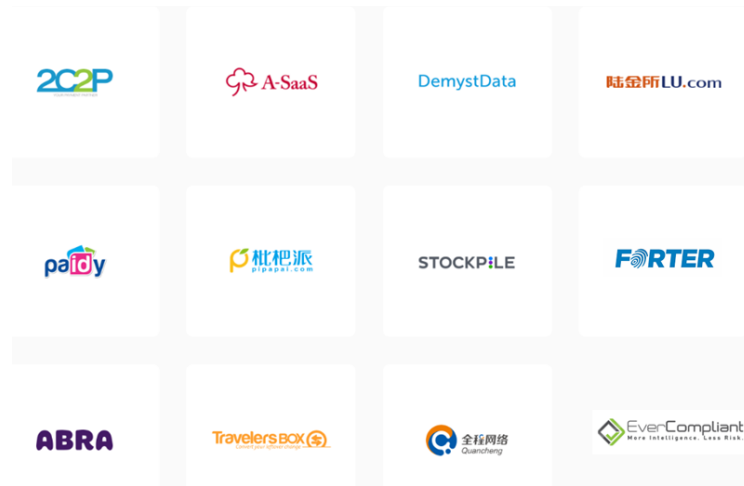
Source: Company website

Interview with Arbor Ventures

About Arbor Ventures – Asia-Focused

Arbor Ventures is a venture capital firm focused on partnering with exceptional entrepreneurs building technology companies in Asia. Arbor Ventures invests in entrepreneurs who have a deep understanding of their market and the tenacity to build a successful company. It has operations in Hong Kong, Shanghai, and Tokyo. There are 12 companies in Arbor's portfolio.

Figure 76. Arbor Ventures – Portfolio Companies



Source: Company website

Arbor was founded in 2013 by Melissa Guzy and Wei Hopeman with the aim to become the pioneering VC firm in Asia. Melissa believed that the rapid growth of tech start-ups and VC firms in Asia offered an interesting investment opportunity. Arbor Ventures was founded to have an impact on the intersection of financial services and digital commerce as well as to invest in companies that are immersed in fast-growing and transformational markets.

An area of interest for Arbor is to invest in online and mobile payments companies in Asia that have the potential to reduce cash usage among the growing millennial generation. It is estimated that by 2030, Asia will have 66% of the world's middle class, with mobile phone penetration in excess of 125% and dominated by millennials.

Arbor Ventures is also proud to be the first female-led VC firm in Asia.

About Melissa Guzy

Melissa Guzy is the Founder and Managing Partner of Arbor Ventures and has more than 25 years of experience as an entrepreneur in Silicon Valley and as a venture investor in Asia and Silicon Valley. Previously, from 2001-2012, Melissa was a Managing Director and member of the Investment Committee at VantagePoint Capital Partners. Prior investments include Finisar, Pure Digital (acquired by Cisco), Oxford Semiconductor (Acquired by PLX Technology), and iWatt (acquired by Dialogics). Melissa's current boards include DemystData, Paidy, TravelersBox, and EverCompliant.

Melissa attended Wellesley College and received a master's degree in finance from the University of Florida. She is the author of the paper "Venture Capital Returns and Public Market Performance". She has been a guest lecturer on the venture capital industry at the University of Florida, Hong Kong University, Chinese University of Hong Kong and the Hong Kong University of Science and Technology. Melissa is a member of the Venture Operating Committee for HKVCA, a Hopkins Fellow and participated in the Women's Leadership Program at Harvard University.

Arbor Ventures Q&A with Melissa Guzy

Compared with other industries such as music and travel, why is digital disruption in financial services slow to happen?

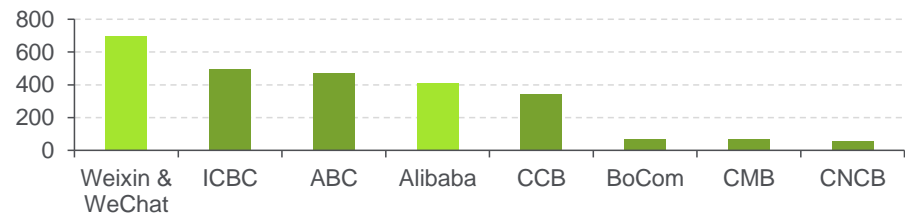
Music itself is digital. Travel is digital as well to some extent. Once you have the database and the digital infrastructure, it is fairly natural to scale and expand globally.

On the other hand, there are no open APIs for financial services or banks globally. The banking infrastructure globally is very fragmented. Even for the same bank operating globally, there would be system differences in each country in which it operates.

In order to have disruption across markets, there needs to be an open architecture. Internet companies and social media are narrowing the border to some extent. The number of users on Facebook or WeChat is comparable to the 10 largest populations in the world.

The biggest bank in the world by number of users is WeChat.

Figure 77. China – Retail Customer Numbers at Banks and Internet Companies 2015 (m)



Source: Company reports, Number of active users

(In your region) What aspects of financial services are more/less exposed to FinTech disruption by new entrants or incumbents?

In China, we have seen tremendous disruption in payments as well as significant growth in alternative lending and wealth management. We are starting to see an increase in InsurTech too.

Insurance in Asia is relatively under developed versus the West. The process is still very paper-based and there is no electronic filing. InsurTech in Asia is about removing paper and removing opaqueness.

There are two business models. One is based on price comparison and the other is around distribution. One of the world's most innovative distribution platforms was developed by ZhongAn, which is distributing both traditional and non-traditional insurance products through WeChat.

Outside of China in ASEAN, there are a lot of interesting payment innovations especially in the Philippines and Indonesia. Payments innovation is about taking away the high-90% cash usage in these countries. Remittances are interesting too for the Philippines.

I also see opportunities in RegTech across Asia. In RegTech, financial institutions are under increasing pressure to identify, measure, monitor, and control risk by implementing effective risk management systems, which is a nascent area being addressed by FinTech start-ups. So these areas warrant more focus over the next few years. An interesting area of RegTech is around tackling cross border fraud, AML, and KYC.

How long do you think it will take FinTech companies to have meaningful market shares in the markets where you invest?

Some of the companies are already gaining meaningful market share. The ability to penetrate markets will depend upon the sector and geography as well as whether the application is B2C or B2B. Additionally, we know that B2C companies are quicker to market but the needs of financial institutions to improve and streamline their systems is a tremendous B2B market opportunity for start-ups, but potentially more complex.

A lot of FinTech innovations in Asia are B2C-oriented as opposed to B2B. Hence, we see less innovation around things like blockchain as well as cybersecurity; however they remain very important areas of FinTech.

The B2C-focused nature of FinTech in Asia, maybe with the exception of Japan, could be due to a lack of supply of capital to B2B start-ups and the availability of data scientists in the region. Hardcore innovation is rare in Asia and is more centered in New York where there is the support of capital from large financial institutions. A lot of Asian companies are buying hardcore technologies from the U.S. or Israel.

What are the biggest challenges for FinTech new entrants? Customer acquisition? Regulatory burden? Other? Is regulation a barrier to entry in financial services? How are FinTech companies regulated in your market/s?

Profitable customer traction is a challenge for any start-up in almost every market segment and the FinTech market is no exception. In addition to the regulatory challenges which can be complex and often not well-defined, the technology platforms developed by start-ups need to be enterprise ready with world class security.

Regulation varies across countries but is not a key determinant of start-up success.

I struggle to find quality start-ups from Singapore despite government initiatives. The 'regulatory sandbox' proposed by the Monetary Authority of Singapore (MAS) is somewhat useful. There is a high concentration in trading technology and wealth management. Then you begin to question how much asset allocation software you need.

The Japanese government is surprisingly very forward thinking. It is actively promoting the adoption of Blockchain technology and is a big supporter of cryptocurrency.

Chinese regulators took a hands-off stance. They let the companies grow with very limited interventions and then adopted rules depending on the developments.

How have incumbent financial institutions in your country/region responded to digital disruption and FinTech new entrants?

We see many financial institutions wanting to partner with new FinTech entrants to complement their existing business as well as experiment with technologies that can reduce cost and improve internal workflows.

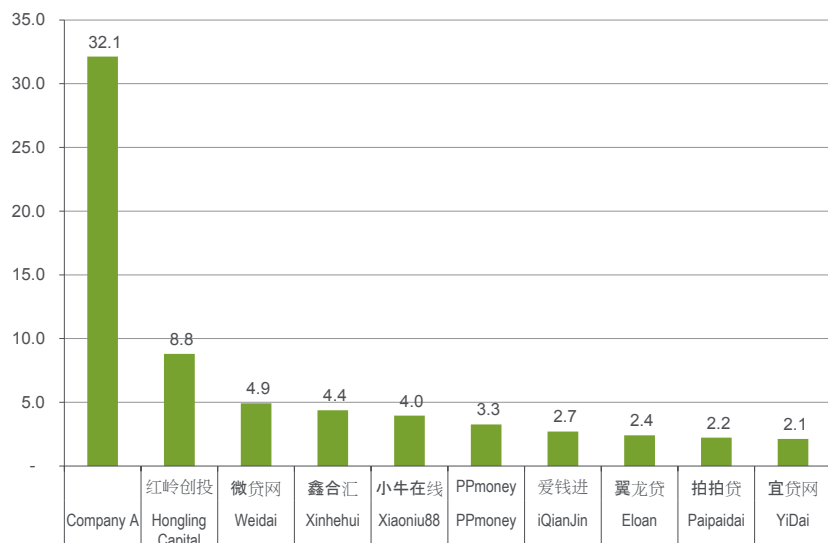
Even with the significant interest, time-to-market still remains a challenge when partnering with large financial institutions, which start-ups need to consider when developing their plan.

Over the past 12 months, marketplace lending has received increased investor scrutiny, especially in the U.S. How do you view this segment?

Marketplace lending in the U.S. was mainly focused on credit card consolidation and refinancing which is very different than in Asia, where the alternative lenders are providing loans to consumers and small businesses that are underserved by the traditional banks and therefore the demand is likely to be more sustainable in the long term.

The P2P model is evolving in China. Now regulation is getting tighter in the space. P2P lenders are no longer allowed to guarantee returns. This should lead to consolidation in the sector and help market leaders to take market share.

Figure 78. China's Largest P2P Lenders by Transaction Volumes, September 2016 (RMB bn)



Source: Wangdaizhijia, Citi Research

Are FinTech companies better at analyzing and using client data than banks? Why have banks been slow on better using their data assets? Regulation? Culture?

Yes, absolutely. FinTech start-ups have been very innovative to use both traditional and nontraditional data sources. They are not afraid to experiment with data sources.

Banks on the other hand are very scared of using new data sources due to regulatory and cultural conservativeness.

Interview with Dymon Asia Ventures

About Dymon Asia Ventures – ASEAN-Focused

Dymon Asia Ventures is a venture capital fund based in Singapore. It is part of Dymon Asia Capital, a leading Asia-focused alternative investment management firm with around \$5.2 billion of assets under management. Dymon Asia Ventures was launched in August of 2015. It provides early stage capital (seed to Series B) to FinTech start-ups in South East Asia. The areas of focus include asset and wealth management, insurance, and credit.

As of today, Dymon Asia Ventures has invested in five FinTech companies including Otonomos, Spark Systems, 4xLabs, WeConvene, and Capital Match Singapore.

About Christiaan Kaptein

Christiaan Kaptein is the Principal at Dymon Asia Ventures and is a Board Director of Otonomos and 4xLabs. Prior to Dymon Asia Ventures, Chris co-founded a global FinTech VC based in Hong Kong, investing in companies such as DemystData, 2C2P, and Exchange Corporation. Chris has spent 12 years in Asia across Taipei, Shanghai, Hong Kong, and Singapore. Earlier in his career Chris spent seven years across several business development functions with Robeco Group.

Dymon Asia Q&A with Christiaan Kaptein

Compared with other industries such as music and travel, why is digital disruption in financial services slow to happen?

Despite all the headwinds facing incumbents – legacy IT, regulatory costs, public scrutiny, and large vested interests — the financial institutions remain hard to disrupt. Incumbents still have:

- Customer trust (where else do you store \$1 million in cash?);
- Large amount of historic underwriting data and customer information; and
- Regulatory and compliance cover: high capital requirements to become a regulated financial institution

The combination of regulatory, information, and trust creates a barrier to entry for the sector. For example, in order to take customer deposits, a FinTech company needs to be regulated, private banking customers only entrust their wealth and information to those they trust, and loan underwriting requires access to information that enables underwriters to assess borrowers' capacity and propensity to repay. This explains the high barriers to entry in deposit taking.

(In your region) What aspects of financial services are more/less exposed to FinTech disruption by new entrants or incumbents?

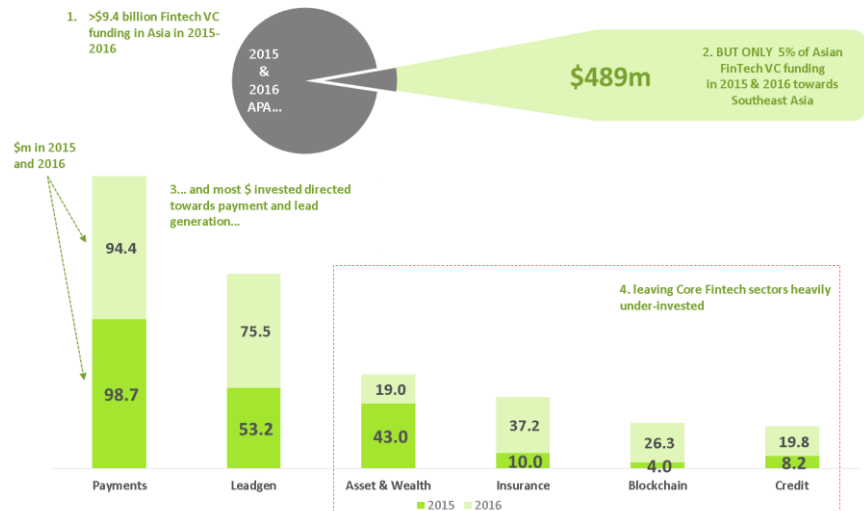
In Southeast Asia, the majority of VC funding is directed towards B2C, mainly in payments and lead generation. Credit, asset & wealth management, and insurance remain highly underinvested. VC interest in credit is gathering pace now.

We analyzed all FinTech VC investments in Southeast Asia in excess of \$1 million in 2015 and the first half of 2016. Altogether, we counted 59 funding rounds over \$1 million for a total of \$345 million.

Next, we allocated each round of funding to one of six categories; credit, asset & wealth, insurance, payments, lead generation (e.g. price comparison websites), and blockchain. As shown in Figure 79, payments and lead generation accounted for 78% of all FinTech VC funding in 2015 and 1H 2016. The remaining \$75 million was invested in credit, asset management, wealth management, insurance, and blockchain companies.

Figure 79. FinTech Funding in Southeast Asia by Sector, 2015-1H 2016

Southeast Asia Remains Underinvested



Source: Dymon Asia Capital (Singapore) Pte. Ltd

Payments and lead generation: Payments in Southeast Asia are mainly e-commerce payments or payment processing, e.g. Worldpay, Stripe, and third-party payment systems. Payments become a natural extension of e-commerce; hence there are so many investments in payments. The challenge for a lot of the payments start-ups is that margins are very small. It's very hard to make money in payments without scale.

Lead generation is also known as price comparison platforms. Users can use it to compare both banking and insurance products, e.g. there are comparison websites for consumer credit, personal loans, and credit card loans. Similarly, some SMEs use these platforms to get the best financing. On the insurance side, people can use lead generation to get prices on life insurance policies and so on.

CompareAsiaGroup (which offers lead generation) raised \$40 million, which is more than was raised in credit, blockchain, and insurance combined. Ruma raised a significant round of funding to build out its O2O network for payments and other over-the-counter services in Indonesia, and there are various companies building B2B cross-border payment solutions such as InstaReM, which recently raised a \$5 million Series A. Jimnexu raised \$3 million to build out XpressApply, a software as a service (SaaS) fulfilment as a service platform for banks and insurers to manage the entire flow from lead to on-boarding. CashShield offers a fraud protection solution for merchants.

Credit: Marketplace and other online direct lending is nascent across Singapore and Southeast Asia. All structural drivers are in place (we look at availability of alternative data, scalability, and cost efficiency of underwriting process, ability to offer a better user experience, a conducive regulatory environment, and liquidity from the lender perspective). Despite this, less than 0.1% of all loans are originated through FinTech start-ups. This contrasts with over 10% in China, and 2-3% in the U.S. and U.K.

The addressable market in Southeast Asia is over \$1 trillion in loans, and there are interesting companies getting built; some choose to go into credit scoring as a service (Lenddo, TrustingSocial), some choose to build plain vanilla marketplaces in the largest consumer markets (FundingSocieties, through Modalku), and others focus on more niche opportunities, such as Capital Match, the leading domestic factoring marketplace in Singapore (a \$36 billion annual market) and Provider, which offers a solution for cross-border migrant financing. Some of the challenges in this space include a patchwork of regulations across markets, a lack of centralized or bureau credit data, a challenging collection process, and, depending on where you are, various degrees of legal recourse. These challenges mirror those in China, and we expect the market to develop along similar lines.

Asset and wealth: In most markets in Southeast Asia, innovation in asset and wealth is mainly focused on retail brokerage. Singapore is an exception, and there are a wide range of interesting companies solving big, mostly B2B, problems. Foreign exchange (FX) is an obvious investment area, as Singapore is one of the largest FX hubs in the world and yet almost all FX trades still are cleared on trading venues in London and Tokyo. We are partnering with a company to provide a solution here called Spark Systems. There are a number of interesting marketplaces, such as SmartKarma, which changes the way market participants create, distribute, and consume investment insights. WeConvene offers a marketplace that connects buy-side, sell-side, and corporates for all things corporate access. Mesitis, through its account aggregation and visualization tool Canopy, helps private bank customers get a complete view of their wealth. 4xLabs builds software for moneychangers, as hundreds of billions of dollars a year of physical FX transactions go through moneychangers every year virtually without any technology.

Insurance: By far the sector that has attracted the least investment to date. MyDoc brings together doctors, patients, employers, and insurers through its healthcare communications platform. CXA has built an interesting wellness and flexible benefits solution on top of a traditional brokerage platform. MediPay in Indonesia provides APIs that connect medical service providers with insurers. The company facilitates insurance claims, authorization and payments. Claim Di facilitates communication between policyholders and their insurance providers.

Other areas of interest are micro-insurance and other direct-to-consumer insurance platforms. On the claims and underwriting side, there is little entrepreneurial activity to date that we know of.

Blockchain: In Southeast Asia, we are seeing an increasing number of start-ups both on the currency as well as smart contract side of blockchain. Coins.ph vertically integrates a cryptocurrency exchange with consumer banking solutions in the Philippines. Otonomos lets you form, fund, and govern your company on the Ethereum blockchain platform, offering a digital dashboard to manage your cap table, governance, and soon accounting, payments and analytics.

How long do you think it will take FinTech companies to have meaningful market shares in the markets where you invest?

Ten years in short.

Take payments processing for example. Some of the current incumbent payment processing started 10 years ago. The market is saturated and the cost of switching is high. Once you become the dominant player, it is difficult for new start-ups to come in.

The non-bank lenders will take significant market share in the next 10 years.

What are the biggest challenges for FinTech new entrants? Customer acquisition? Regulatory burden? Other? Is regulation a barrier to entry in financial services? How are FinTech companies regulated in your market/s?

We prefer B2B plays that serve business clients across Southeast Asia rather than try to build regional consumer businesses across a myriad of regulators, cultures, religions, and consumer profiles.

Southeast Asia is not one single market. You have all the usual setbacks of a heterogeneous market: multi-language, religion, regulation to name a few. Hence it is a lot harder to build a consumer business across the borders. You have to build it market by market. You need local knowledge, skills, and relationships in each country.

Many investors see Indonesia to be as big a market as China because of the size of the addressable market. The valuations of some of the FinTech companies in Indonesia are hence at a premium to regional peers. Another challenge is the currency risk of investing in Indonesia. You invest in U.S. dollars but the Indonesian Rupiah depreciates 7-8% a year due to inflation.

B2B will make a lot more sense, especially headquartered in Singapore, with its strong hold of jurisdiction, efficiency and corporate governance. Singapore is the gateway to Southeast Asia. A lot of global Internet giants are headquartered in Singapore. B2B companies will sell products and services to Indonesia-based B2C companies rather than trying to start a consumer brand in a foreign market.

In general, regulators in Southeast Asia are supportive of creating an environment where FinTech start-ups can thrive. Examples include regulatory sandboxes in Singapore and Hong Kong, regulatory frameworks for equity crowdfunding in Malaysia, intention to allow e-KYC in Thailand, and new credit bureau licenses in Indonesia.

Short-term trends are not to be confused with long-term structural changes, though, and economic cycles or exogenous events can swing the pendulum back easily as they have in the past.

How have incumbent financial institutions in your country/region responded to digital disruption and FinTech new entrants?

Some of the banks have invested selectively to support new product and market launches. DBS's investment in Kasisto to roll out their digital bank in India, which got one million customers soon after launch, is a good example. Internally, hiring is clearly skewing towards data and computer scientists, so we compete with the banks for talent to a certain extent.

Banks in Thailand are also doing interesting things around electronic KYC. Many of them have also set up VC funds to invest in FinTech.

For the rest, most of the engagement is of the “dipping of the toe” type through accelerators and hackathons that are expensed by marketing and do not eat into regulatory capital.

Over the past 12 months, marketplace lending has received increased investor scrutiny, especially in the U.S. How do you view this segment?

Investor scrutiny is driven by a shift in focus on behalf of investors from loan growth to loan quality that determines the ultimate success of digital lenders.

Credit is a focus segment for us. Compared to other markets, online direct lending (“ODL”, both marketplace as well as on-balance-sheet) in Southeast Asia is at a very early stage. We estimate ODL to account for less than 0.25% of total gross new loan volume in Southeast Asia. This compares to around 3% in U.S. and Europe and over 10% in China.

The under-penetration of consumer credit and SME credit in Southeast Asia is not equal to opportunity. A lot of the P2P platforms have not gone through the credit cycle. Lending out money is easy; getting money back is more difficult. A lot of the platforms could fail when the credit cycle turns. Those who can manage the credit risk would benefit disproportionately.

How important is cybersecurity for FinTech new entrants as a business opportunity and a risk/threat?

Very. We like cybersecurity wherever it touches directly upon customer data and credentials. We are also interested in cybersecurity as an underwriting asset class in insurance. How do you effectively price cyber risks?

There are some domestic cyber security opportunities in Southeast Asia. But Southeast Asia overall is not cutting edge when it comes to cybersecurity. Israel is better positioned.

Are FinTech companies better at analyzing and using client data than banks? Why have banks been slow on better using their data assets? Regulation? Culture?

On the front end, banks are pretty good in using data for customer acquisition and finding target customers.

Financial institutions typically have (much) more of it but are not as smart about deploying it in real time. Legacy IT systems, vested interests across different business divisions, and legal/compliance departments all contribute to this. In Southeast Asia in particular, a lot of the growth has been driven by cross-border mergers & acquisitions, resulting in a single customer-facing brand but multiple and completely separate back-ends behind them.

For example, AIA Group bought many businesses in different markets and regions, and all data sits in different markets on different systems. It is very difficult to have a centralized database.

Interview with Citi Ventures

About Citi Ventures – U.S.-Focused

Citi Ventures accelerates innovation and fuels growth at Citi by discovering, validating, and investing in new solutions that have the potential to transform the future of financial services. We partner closely with Citi's businesses to turn these solutions into new sources of value for Citi, our customers and our partners. Citi Ventures' unique model combines the best of the external innovation ecosystem with Citi's 200 years of know-how to create a systematic approach for conceiving and scaling new solutions for Citi's customers.

In venture capital, we champion and partner with entrepreneurs, making strategic investments in start-ups that are developing solutions across commerce & payments, data, analytics & machine intelligence, financial services & technology, marketing & customer experience and security & enterprise IT.

We power an ecosystem of programs and partnerships that enhance Citi's ability to capitalize on emerging trends. We provide strategic guidance, partnership opportunities for Citi's global innovation labs to drive the exploration and adoption of cutting-edge technologies and business models.

We drive enterprise-wide, lean start-up-based growth initiatives across Citi's businesses through an end-to-end system that we've embedded inside the company to drive growth amid uncertainty. We're infusing a culture and mindset of bold discovery, experimentation and validation to channel employee creativity and generate valuable insights that enable us to pursue new opportunities for value creation to benefit our customers.

About Arvind Purushotham

Arvind Purushotham co-heads the Venture Investing group at Citi Ventures. He invests in companies in financial services, security, and enterprise infrastructure. His portfolio includes BlueVine, Betterment, C2FO, Chef, Cylance, Click Security, Persado, Pindrop, Plaid, Silver Tail Systems (acquired by EMC), Tanium, and vArmour. In addition, Arvind helps lead partnerships between portfolio companies and Citi's business units.

Prior to Citi, Arvind spent nearly a decade as a Managing Director at Menlo Ventures, where he was an investor and board member at companies including Kazeon Systems, Cavium Networks, Solidcore, nCircle Network Security, Intelligent Results, and Vhayu Technologies. Previously, Arvind was a Design Engineer and a Program Manager at Intel Corporation.

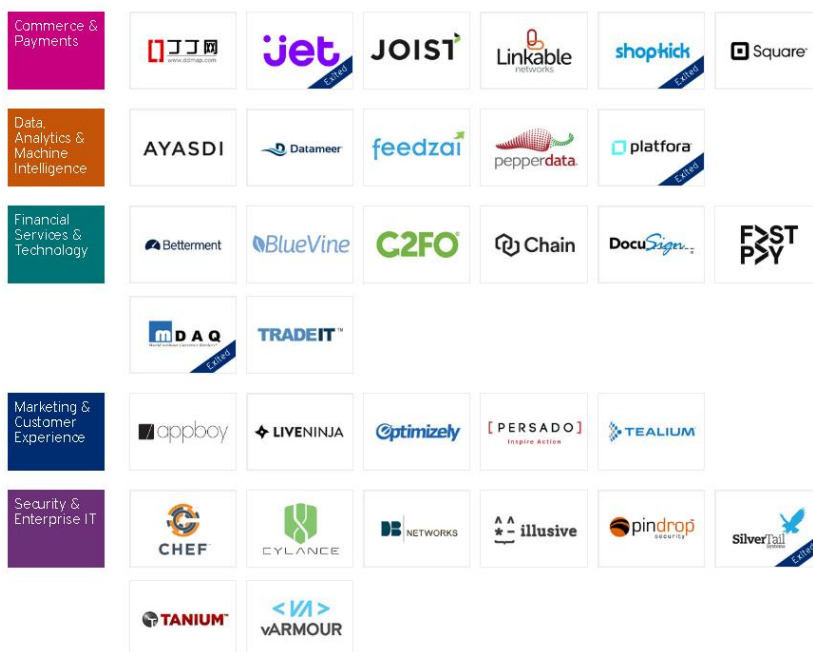
Arvind obtained his BSEE from the Indian Institute of Technology, Madras, an MSEE from Case Western Reserve University, and an MBA with distinction from Harvard Business School. He enjoys running, photography, and reading in his spare time. Arvind is passionate about golf, a passion, sadly, that his skill level does not match. He lives in Palo Alto, CA, with his wife and two sons.

Citi Ventures Q&A with Arvind Purushotham

Tell us a little bit about your Venture Investing program? What are your goals, and in what areas do you invest in?

We make strategic investments in top-tier start-ups that work on ideas and technologies that intersect with Citi’s businesses across five key areas: (1) Financial services and technology; (2) Commerce and payments; (3) Data, analytics & machine intelligence; (4) Security & enterprise IT; and (5) Customer experience and marketing technology. Our team meets each year with several hundred start-ups in various stages to gain a deep understanding of emerging trends and engage with the most passionate entrepreneurs. When Citi Ventures backs a start-up, we offer access and introductions across Citi’s global network of industry experts, partners, and longstanding customer relationships. Our team accelerates the adoption of new technologies through proof-of-concept testing and in-market piloting, ultimately helping our portfolio companies to scale.

Figure 80. Citi Ventures – Areas of Focus and Portfolio Companies



Source: Citi Ventures website

Compared with other industries such as music and travel, why is digital disruption in financial services slow to come?

FinTech disruption is happening today in a way that has not been possible in the past because of multiple reasons.

1. Customers have become more comfortable conducting financial transactions online. When it comes to personal finance, the perceived risk is greater when trying something new since losing a music library is far less impactful than losing your life savings. It has taken some time, but customers are now willing to bank online and on mobile at unprecedented rates. In fact, customer demand for convenient online experiences led to the rise of many FinTech companies that could provide superior interfaces, particularly on mobile. Now, over 75% of the population uses online banking and over 51% of smartphone users use mobile banking.

2. Infrastructure and the willingness of existing financial firms to support FinTech companies using their regulatory license and infrastructure, such as Apex Clearing in brokerage, and WebBank and Charles River Bank in lending.
3. Stream of talent from Wall Street is better able to navigate the complex financial ecosystem and regulatory environment. Financial services is more complex than consumer Internet to operate in. Post-crisis, a number of highly experienced individuals from financial services with deep knowledge regulation, compliance, and back-end processes, left to join new companies or start new companies in financial services.
4. New technologies. New technologies, and particularly smartphones, paved the way for reaching customers in a way that previously was not possible. The advent of the mobile phone created an opportunity for Square to reach millions of consumers with their small card readers. Machine learning created the ability to better analyze and understand customer behavior for fraud management in financial services.
5. And finally, availability of capital. Financial services companies are capital intensive. It takes not only equity operating capital, but also debt capital or reserve capital if you are in lending. The long period of a low interest rate environment has left many institutions searching for yield. These institutions were willing to place their capital on platforms like Prosper or Lending Club or with new insurance start-ups. This was a critical component contributing to the growth of marketplace lending.

(In your region) What aspects of financial services are more/less exposed to FinTech disruption by new entrants or incumbents?

CB Insights published an informative chart last year highlighting how every aspect of consumer banking is being targeted by new entrants, from savings accounts to mortgages. We see fewer start-ups addressing institutional business needs. Institutional banking involves treasury management or fundraising large sums of money, and that is harder for start-ups to go after. The depth of product expertise and infrastructure required also sets a higher bar than for a consumer application.

Figure 81. FinTech is Attacking Every Part of a Bank's Value Chain

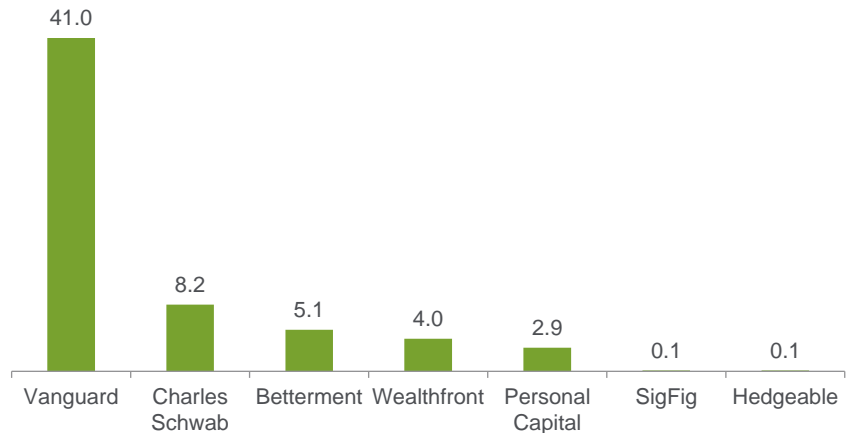


Source: CB Insights

Also, nearly every part of financial services requires a license to operate. We see the most activity in payments and lending, where MSB (Money Services Bureau) licenses and lending licenses are easier to acquire, and there is not a need for a bank charter. In mature markets like the U.S., obtaining a new banking charter is very hard, so that impacts the opportunity for start-ups to attack that segment of the market.

Opportunities identified by start-ups are also eventually pursued by incumbents. Incumbents can catch up if they are actively being responsive to changes in the market, by becoming “fast followers” in a sense. Look at Charles Schwab— they adopted robo-advising after seeing the rise of companies like Betterment. Now, Charles Schwab has ~ \$10 billion in assets under management for its robo-advisor product.

Figure 82. Robo-advisors' AUM in U.S. Dollars (Mid-2016)



Source: Company website, Citi Research

How long do you think it will take FinTech companies to have meaningful market shares in the markets where you invest?

The remarkable thing I have observed about FinTech companies is the pace of growth. Companies have been able to scale because of technology, distribution, and capital unlike anything we have seen in history. SoFi reached \$6 billion in originations in 4 years. Betterment took only 3 years to reach \$1 billion in assets under management; Charles Schwab took 6 years to reach the same \$1 billion in assets under management from their inception. So while individual companies may not have significant market share, I would posit that many of them are already meaningful companies.

In the payments space, companies like Square and Stripe completely changed the way small businesses, and big businesses frankly, are thinking about payments processing in the matter of a few years. The pace at which it can happen is faster than you think.

Moreover, we see many of these companies democratizing access to financial services and creating access where there previously was none. The robo-advisors are bringing the cost of long-term asset management to a lower tier than the current providers. Avant is providing credit to a lower FICO tier than other lenders. Prosper is enabling access to consumer loan investments, and companies like Fundrise and RealtyShares are creating access to real estate investments, while AngelList and CircleUp are creating investor access to early stage companies. These companies are creating new opportunities and growing the pie rather than only carving out a slice.

What are the biggest challenges for FinTech new entrants? Customer acquisition? Regulatory burden? Other?

There are two challenges entrepreneurs and investors think about.

First, customer acquisition. Often at the beginning, start-ups grow fast by offering something that didn't exist in the market, by tapping an unmet demand. Early adopters and fans use social media to make a service popular. But after that early adopter period, consumer focused companies need to have a well-managed marketing program to drive customer acquisition.

Unless you completely upend the business model of an industry, as Square did early on, companies need to raise significant capital to run customer acquisition campaigns. While start-ups have strong digital marketing DNA, they still have to compete with incumbents for customers. You will notice that start-ups eventually get to a point where they too employ traditional channels like direct mail and television. SoFi started a direct mail program a long time ago, and if you're in the U.S., you will see companies like Betterment and Credit Karma running television ads.

The second challenge, particular to lending companies, is capital. We talked about capital to run marketing, but for a lending company, they need to raise debt early in their life to grow their business. If a company is targeting \$15-20 billion in originations in a year, the team has to create that level of capacity on their balance sheet to drive that growth. Historically, there have been great examples of non-bank lenders, like Capital One in the early days, who successfully did that. But start-ups with large capital needs are also impacted by macro factors and liquidity cycles more than your traditional technology start-up.

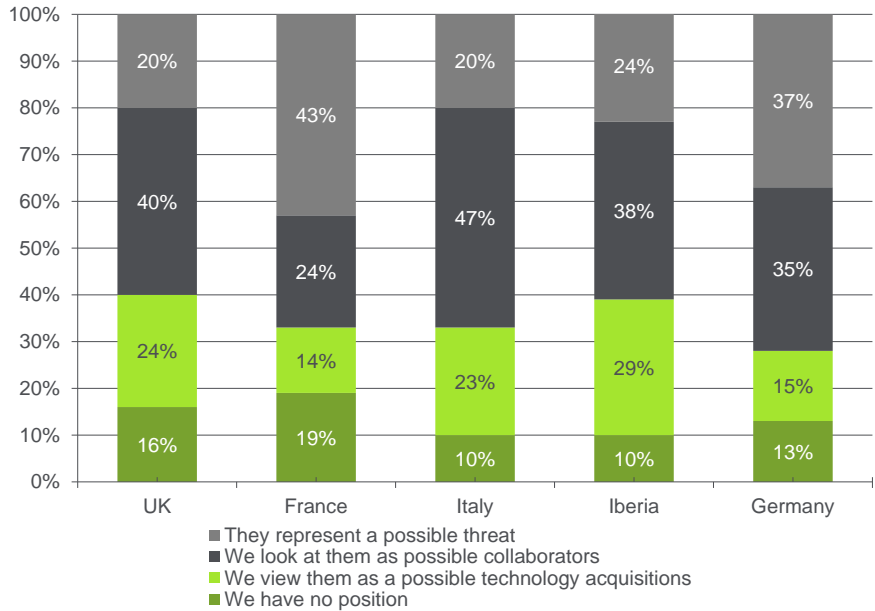
Is regulation a barrier to entry in financial service? How are FinTech companies regulated in your market/s?

Absolutely, you don't need a license, or be able to prove viability to a regulator, etc. when you launch a consumer Internet app or e-commerce site. However, that is necessary in our industry. It requires, capital, experience, time (waiting periods), and historical success. Regulation is an obstacle, but not an insurmountable barrier to entry. Having a team that understands the regulatory ins and outs, as well as investors who are patient with that process are necessary to start a company in this space, but it is not a guarantee of success.

How have incumbent financial institutions in your country/region responded to digital disruption and FinTech new entrants?

We are increasingly seeing incumbents and FinTech start-ups work together. At Citi Ventures, we champion entrepreneurs that partner with our portfolio companies to actively inform start-ups' product roadmaps to help them scale their businesses. And accelerate the adoption of new technologies and business models within Citi. However, many incumbents are challenged to find talent to build modern user experiences and struggle with inflexible infrastructure stacks, while FinTech companies lack capital and distribution. This manifests in a variety of ways.

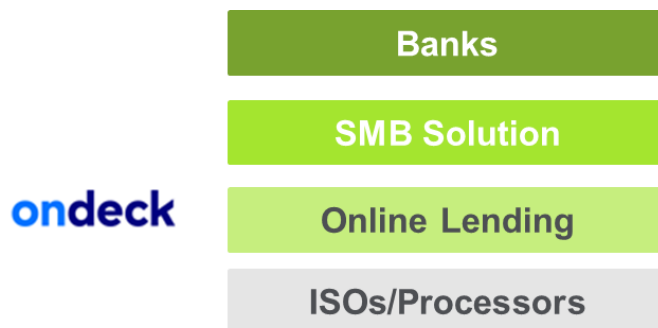
Figure 83. How European Banks View FinTechs 2016



Source: SAP and IDC. Based on Interviews of 253 European financial institutions

1. Large companies are partnering and collaborating with FinTech start-ups. BBVA and JPMorgan Chase both partnered with OnDeck to white label its technology, and American Express is launching small and medium business loans with Lendio. Citi has worked with online lenders as well. It can be a win-win for both parties.

Figure 84. OnDeck Collaborates with Banks

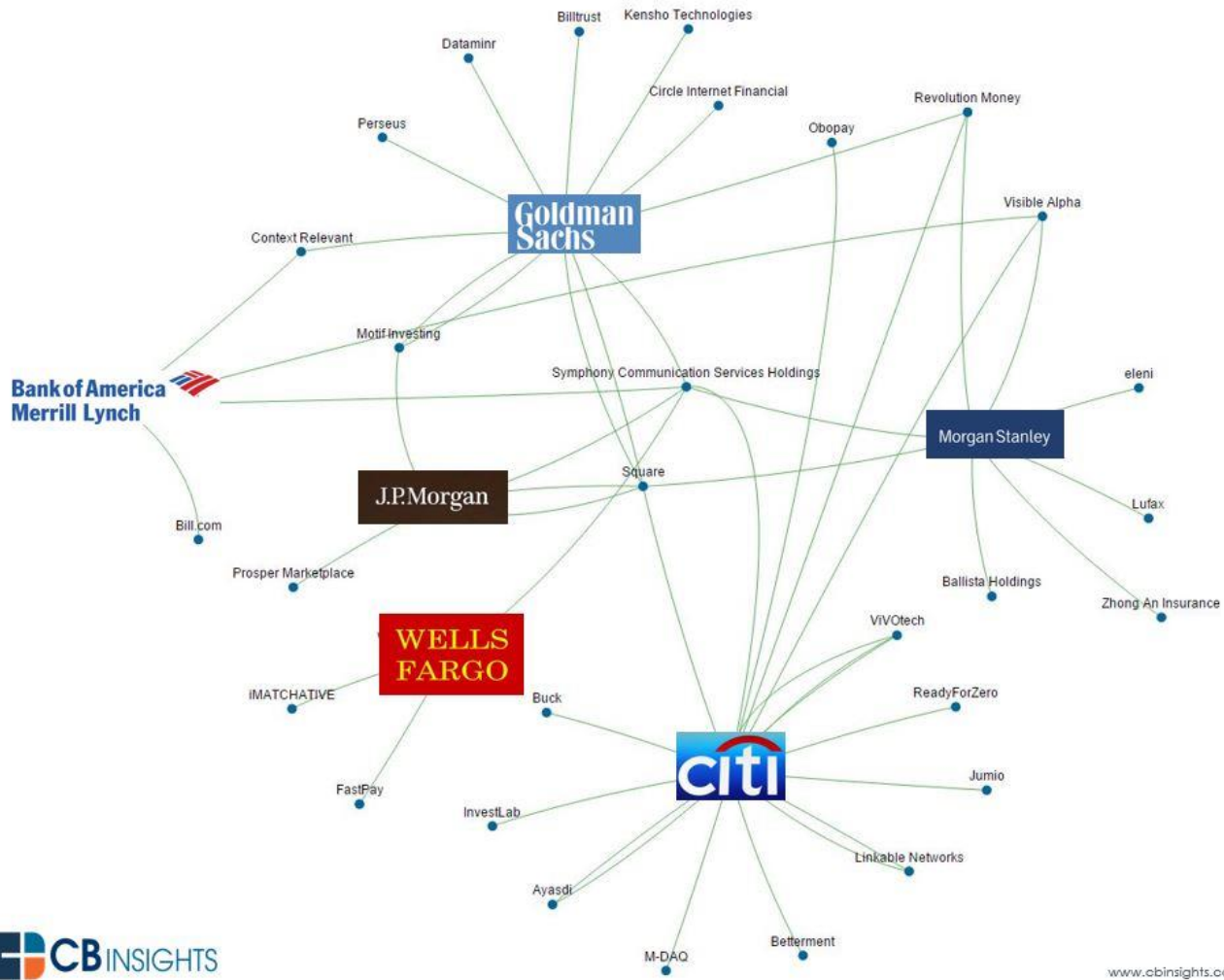


Source: Company Presentation

2. We see acquisitions happening to augment teams that understand APIs, platforms, and user experience (UX). Capital One acquired Level, BBVA acquired Holvi and Simple, and Blackrock acquired FutureAdvisor.
3. We see corporations investing in start-ups to support the growth of new products, business models, or customer demographics. BBVA invested in Atom Bank, R3 has a number of banks involved, Goldman Sachs invested in Motif, and Citi Ventures is an investor in Chain, C2FO, BlueVine, and FastPay.

Figure 85. Big Banks are Disrupting Within by Investing in FinTech Companies

Major Bank FinTech Investment Map Since 2009



www.cbinsights.com

Source: CB Insights

Over the past 12 months, marketplace lending has received increased investor scrutiny, especially in the U.S. How do you view this segment?

Marketplace lending created a different type of direct-to-investor platform that did not exist before. It was an innovative way to connect consumer need for loans and excess capital. In many ways, it was meant to replace banks, which take deposits and lend out loans. However, over the past year, it has become clear that it is necessary for these institutions to have the same strict level of compliance and risk management as banks.

For as long as there is capital that is searching for a return and borrowers looking for credit, marketplace lenders will continue to exist. Collaborative consumption is being embraced across all sectors. People are willing to buy cars, rent a house, or order a car service on online marketplaces, and now they can get a loan, search for insurance or obtain a mortgage online.

There are a number of things that are necessary for a marketplace to function: (1) liquidity; (2) transparency; and (3) trust. While these aspects are as old as banking itself, new entrants need to learn how to build this online when there isn't a retail branch and face-to-face contact.

How important is cybersecurity for FinTech new entrants as a business opportunity and a risk/threat?

Cybersecurity is a necessity in financial services, whether you're an incumbent or a start-up. A breach is the fastest way to go out of business as a start-up. As we spoke about earlier, if my video call to a friend is intercepted, it's bad, but not critical. However, if I am transferring money to a loved one and it gets intercepted, that is a big deal. So it is imperative that start-ups pay attention to cybersecurity from the get-go.

It can be an opportunity if the FinTech has a particular understanding of cybersecurity that gives them a leg-up: for example, using a new technology to enable a delightful customer experience while not compromising security can be a strategic advantage.

Are FinTech companies better at analyzing and using client data than banks? Why have banks been slow on better using their data assets? Regulation? Culture?

FinTech companies are more sophisticated and willing to try new things when it comes to alternative data and have modern data infrastructure to do so. Our portfolio company BlueVine looks at thousands of variables to help with identifying fraud. They are able to conduct continuous underwriting, whereas many banks only review accounts once a quarter. For example, when there is a change in the customer population, BlueVine has the ability to account for this change by modifying their fraud models.

Sometimes start-ups are late in complying with the regulations around data usage for underwriting. Yes, this area is quite heavily regulated as well, but like rest of compliance, they put systems in place as they mature. As far as the big banks, they have to deal with legacy architecture problem, and they have much more scrutiny from regulators around this issue.

What are your preferred FinTech models? Can you discuss examples of FinTech companies with these models?

Start-ups do best in asset-light areas where technology plays a big role. We think marketplace models for lending, equity fundraising, investing, and other areas of financial services have a long-term future.

We also like API-based businesses that remove friction by giving developers an easy way to include sophisticated services. We recently invested in a company called Plaid, which is an emerging leader in providing developers connectivity to access consumers' bank accounts and other financial information. We are also excited by application of machine intelligence to various aspects of financial services. We recently invested in Feedzai, which has specialized in applying machine learning to fight fraud.

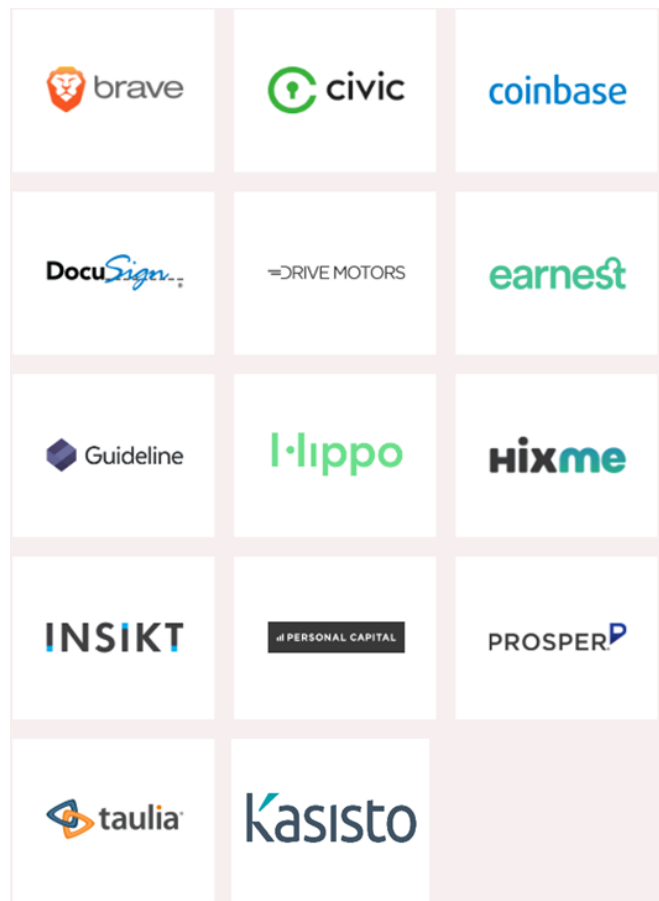
Interview with Propel Venture Partners

About Propel Venture Partners – U.S.-Focused

Propel Venture Partners is an independent venture capital firm based in San Francisco focused on investment opportunities at the intersection of technology and finance. Propel has a relationship with its limited partner BBVA. The Propel team believes that the future of financial services will be realized by rethinking and rebuilding as well as disruption, and will partner with technology-driven teams that are challenging too-big-to-fail incumbents in financial services.

Before Propel Venture Partners was founded, BBVA invested in FinTech through its \$100 million in-house venture arm, BBVA Ventures. In February 2016, BBVA Ventures transferred its VC portfolio to Propel Ventures and injected another \$150 million of investment. BBVA will be a limited partner (LP) of Propel Venture Partners.

Figure 86. Propel Venture Partners Investment Portfolios



Source: Company Website

About Jay Reinemann

Jay Reinemann is the partner at Propel Venture Partners. Jay has been immersed in the financial services sector throughout his career, much of it as an investor. After college, he worked at Old Kent Financial Corporation (now Fifth Third), Andersen Consulting, and then Visa, where he held operational and investor roles and eventually led Visa's Corporate Ventures and Strategic Alliances group.

At Visa, Jay led investments in Tripwire (acquired by Belden), Good (acquired by Motorola), MobileWay (acquired by Sybase), Application Security (acquired by Trustwave), Spi Dynamics (acquired by HP), WAY Systems (acquired by Verifone), and I-S-Cubed (out of business).

After Visa, Jay joined the founding team of an early stage social commerce start-up and founded a FinTech venture fund, Altai Ventures, which was slightly ahead of the curve but failed to raise capital during the financial crisis. But the experience only increased his drive for FinTech innovation and paved the way for him to join BBVA in 2011.

Propel Venture Partners Q&A with Jay Reinemann

Compared with other industries such as music and travel, why is digital disruption in financial services slow to come?

The success of disruption in music and travel industries is a result of fierce competition and contention by a lot of start-ups in the industry. These start-ups were founded around 15-16 years ago to evolve to the media and travel giants we have seen today.

Furthermore, Silicon Valley generally understands consumer Internet businesses but not really finance. Not until the post-financial crisis did industry people move into venture and we started to see more financial innovations.

How long do you think it will take FinTech companies to have meaningful market shares in the markets where you invest?

I could only guess from the experience of PayPal. PayPal was founded in 1998 and took 18 years to reach the market share it has today. Assuming it would take similar amount of time for other FinTech companies, some of them have been around for 10 years, it could take another 7-8 years for them to become meaningful. By 2023 we should see significant market shift in the financial industry to the new business models.

(In your region) What aspects of financial services are more/less exposed to FinTech disruption by new entrants or incumbents?

Silicon Valley investment is often momentum-driven and money goes to what's hot and perceived to be broken. Migrating to digital distribution channels is often first targeted (e.g. robo-advisors). These are often low-hanging fruits that aim to improve customer experience and reduce costs.

Areas that Silicon Valley doesn't understand are less exposed now but should increase over time. For example, foreign exchanges and capital markets businesses are largely untouched by FinTech innovations.

Another area that I find particularly interesting is insurance. In New York, insurance has replaced lending to become the hottest area of investing. The insurance companies could improve underwriting using new technology, new devices (e.g. use connected smoke or water detectors to better underwrite home insurance and reduce damage). The same goes for car insurance that uses vehicle sensors to understand driving behavior or to reduce accidents.

What are the biggest challenges for FinTech new entrants? Customer acquisition? Regulatory burden? Other?

One of the challenges is the mismatch of a typical investor's investment horizon and the time taken for FinTech companies to take off. The cycle it takes to exit is longer than most VCs would expect. Consumer segment technology has much faster turnaround.

Another recent challenge is higher customer acquisition costs driven up by increased competition and overfunded start-ups. It's really hard to get from 10,000 customers to 50,000 and then even harder to get to 1 million customers. Finding efficient customer acquisition channels becomes more difficult when growth is subsidized by venture funding.

Nevertheless, once the company gets to the scale or tipping point, things go much faster than analog channels.

How have incumbent financial institutions in your country/region responded to digital disruption and FinTech new entrants?

Big banks in the U.S. have not taken much radical action so far. Recently, there are a lot more innovation groups looking at what's going on in Silicon Valley. Many banks are looking closely at blockchain/Bitcoin use cases but those are mostly experiments and not commercial deployments.

It's very difficult for banks to buy tech companies for various reasons. First, tech company valuations are higher than banks. Second, capital consumption of owning a tech company is high for banks and the goodwill mark-to-market runs through the P&L statement. And lastly, most FinTech start-ups don't want to work for a bank.

Is regulation a barrier to entry in financial services? How are FinTech companies regulated in your market/s?

Regulation affects both banks and FinTech companies but large financial institutions are affected more. When speaking to regulators, the research side and the implementation side are very detached. The research side is more forward-thinking to innovations while the regulators are more conservative.

LendUp, an alternative payday loan lender, was hit by \$6.3 million fine, refunds, and settlements by the Consumer Financial Protection Bureau (CFPB) and California Department of Business Oversight.

Ripple was fined by the Financial Crimes Enforcement Network (FinCEN), a division of the U.S. Treasury Department, for failure to register with FinCEN and AML practices.

FinTech companies will need to mature and improve compliance. The regulatory burden is higher for FinTech than other industries and regulation also makes bank corporate VC more difficult than other tech corporate VC.

Some regulators such as the U.K. Financial Conduct Authority (FCA) are more informed and forward looking. The Bank of England is even thinking about digital currencies. The U.S. is well regulated but the U.K. FCA is friendlier.

Over the past 12 months, marketplace lending has received increased investor scrutiny, especially in the U.S. How do you view this segment?

Overall the technology used by marketplace lenders and the credit/risk teams are very good, sometimes even better than the incumbents. Marketplace lending platforms are also good at servicing and acquiring, and are much more efficient.

The issue is with liquidity and funding. Some P2P platforms grew lending faster than the funding could support. They have taken risks they shouldn't have taken. Over the longer term, these platforms need to secure more consistent sources of liquidity. They need to demonstrate to investors that the quality of assets is high and to borrowers that the quality of service is good.

How important is cybersecurity for FinTech new entrants as a business opportunity and a risk/threat?

I don't think FinTech companies are allocating as much resources as they should into cybersecurity. We haven't seen many problems so far, but it's a core part of what FinTech companies need to do. I prefer business models where the founder understands cybersecurity.

Are FinTech companies better at analyzing and using client data than banks? Why have banks been slow on better using their data assets? Regulation? Culture?

Regulation requires that the different variables used by banks for credit scoring are non-discriminating. This limits the kind of social data that banks can use for credit assessment. So far there is also limited evidence that social data is better than the conventional approach in credit decisions. Social data is often supplementary. One area that some FinTech companies use for small and medium enterprise lending is a Yelp rating to understand the quality of the business. Transaction data is also used. Some vendors pool transaction data from banks.

Banks have not done much with data as it takes long time for regulator to approve the use of the new data and it's hard to test how the new credit engine will perform over longer credit cycle. Banks in general are hesitating to take on higher risk for aforementioned challenges.

The ability for incumbent banks to attract top data scientists continues to be challenging. The work environment and the culture are not as attractive as that of companies like Google, LinkedIn etc. Tech firms in Silicon Valley get talent fresh out of university and pay much higher comp packages than banks.

What are your preferred FinTech models? Can you discuss examples of FinTech companies with these models?

It really depends. There isn't one industry or single company that will take all. I am really interested in the insurance innovations but disappointed that there is so much money gone into InsurTech.

Insurance customers are generally poorly treated. The underwriting does not consider new sources of data and technology implemented, smart devices (e.g. smoke detectors) brings data and context to do better underwriting. To some degree, this could also bring in new customers by tailoring the products better.

In our portfolio, we appreciate Personal Capital's approach to investment advisory that improves the conventional model and is better than a robo-advisor. It is not a robo-advisor as we believe a human is still important in the investment process.

It tries to address the pain point that people with money have little time to meet advisors, while the industry is still based on face-to-face and paper recommendations.

Moving the client interaction to digital channels is not only more efficient but also more user-friendly. Personal Capital has financial tools to help customers in financial decisions. Rather than asking the customers the risk tolerance levels, it can make the assessment based on the holistic portfolio and spending behaviors.

The average investment is approximately \$200,000 at Personal Capital, much higher than robo-advisors because of the trust. Real advisors make a difference. The average management fee of 90 basis points is also higher than robo-advisors' 25 basis point fee due to trust and quality of service but lower than 125+ basis points charged by traditional managers.

Interview with NFT Ventures

About NFT Ventures (Northern European-Focused)

NFT Ventures is venture capital firm investing exclusively FinTech start-ups in the Northern European region. NFT Ventures looks for established start-ups with strong, scalable concepts and dedicated teams. It supports entrepreneurs to establish and scale their businesses and maximize growth to become market leaders.

NFT Ventures' portfolio consists of 30 FinTech companies in Northern Europe challenging various part of a banks value chain, including but not limited to small and medium enterprise lending (Toborrow), mortgage aggregators (Lånbyte), online advisory (Avtal24) and payments (Betalo), among others.

About Johan Lundberg

Johan Lundberg is the Founding Partner and CEO at NFT Ventures. He has extensive expertise in the Northern European payment market, focusing on payment cards, transactions, and other bank related products/services.

Before founding NFT Ventures, he took numerous consulting roles, advising banks with payment strategies and implementing payment solutions. He was Head of Marketing for MasterCard in the Nordic Region until 2011.

Passionate about FinTech innovations, he is an entrepreneur himself, and founded Betalo, a payment company that facilitate bill payments with card.

NFT Ventures Q&A with Johan Lundberg

Compared with other industries such as music and travel, why is digital disruption in financial services slow to come?

Financial services have higher barrier to entry: the legal situation, the authorities and also the complexity of the industry. That also leads to the fact that there are limited investors in the industry that understand it and can do good investments and understand the infrastructure and ecosystem of banking and financial technology.

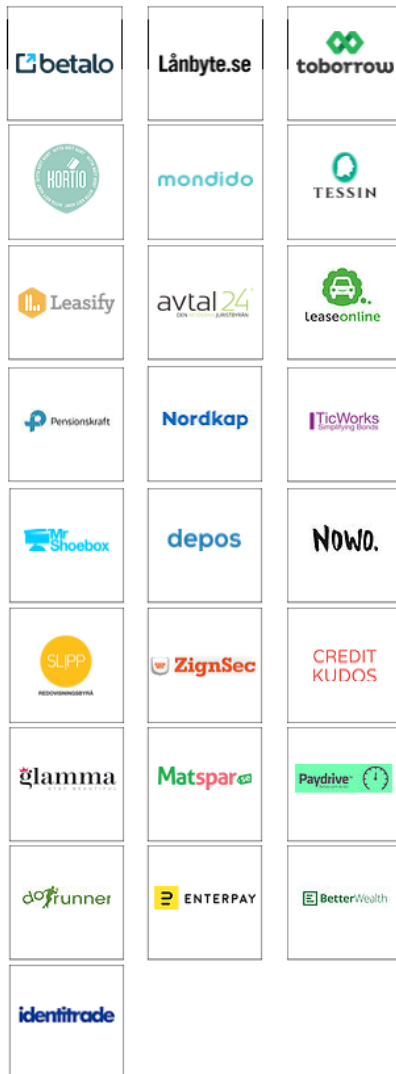
The knowledge of financial industry is very hard to gain. It's easier for a start-up to go into music because it is a global phenomenon. You use music in all countries in the same perspective. Banking is different. The products offered by banks across countries are similar but also different due to the legal and regulatory situations.

What has changed now is that we have smart phones that helped FinTech companies to reach out to new customers. Hence I expect faster growth now as more and more financial services can be done on mobile devices.

(In your region) What aspects of financial services are more/less exposed to FinTech disruption by new entrants or incumbents?

In Sweden, I see FinTech disruption across all spectrums of financial products. We have done 30 investments and none of them are directly competing with each other. In the U.S., we see a bias towards marketplace lending platforms and more consumer-oriented services, but here we see a totally different scene.

Figure 87. NFT Ventures – Portfolio Companies



Source: Company Website

Figure 88. Fin Tech Companies in Sweden



Source: LetsTalkPayments; goMEDICI.com

I think the reason why the U.S. is strong in consumer is that U.S. tech VCs have a successful track record of investing in consumer-oriented companies such as PayPal, Uber and AirBnB. In California, the combination of Hollywood (the movie industry, the gaming industry, the animation industry) with Stanford (the knowledge-driven industries) puts you in a very good position when it comes to consumer-branded services. That means the U.S. is less strong in B2B.

New York on the other hand tries to position itself as a FinTech hub and focusing on B2B. We are yet to see New York taking off as a FinTech hub. In Stockholm/Northern Europe, we have both consumer-focused as well as B2B propositions. There is diversity in the cases we receive.

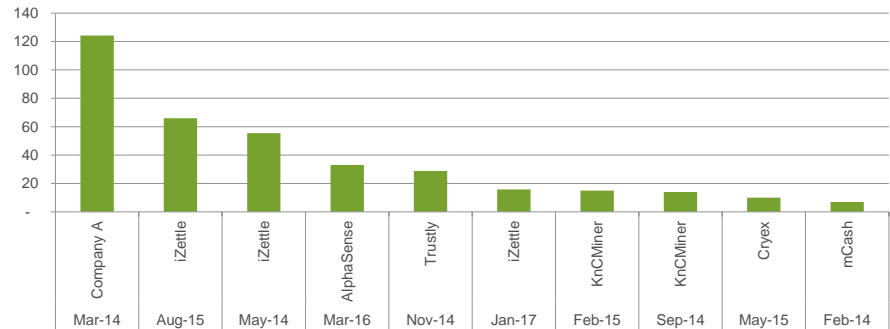
How long do you think it will take FinTech companies to have meaningful market shares in the markets where you invest?

I hope it will be faster but I think it will perhaps take 2-4 years for the companies to reach the levels. We have seen investments that struggle at the beginning and then take off. It takes time. Banking and financial services takes longer than other industries. You need to have patience.

It's very difficult to change customer behavior in banking and insurance than in clothing, for example. In Sweden, companies like iZettle have taken off. In banking, you need to change customer behavior, need to build trust and confidence in the system and secure the customer reputation and so on. iZettle started in 2010 and only become big around 2013.

iZettle has now gone global. International expansion can be challenging for FinTech companies. Every time a company goes into a new market, there are new barriers, new regulation, and new ways of doing banking.

Figure 89. The Largest Ten FinTech Funding Rounds in Nordic Region (last few years)



Source: thenordicweb.com

What are the biggest challenges for FinTech new entrants? Customer acquisition? Regulatory burden? Other?

Regulation and knowledge are the biggest hurdles. Compared to other industries, knowledge is important for financial industry. You need to understand the infrastructure and ecosystem of banking and see where my propositions fit in and make a difference.

Generally the founder of a FinTech company tends to come from the financials industry with extensive industry knowledge. Of course there are exceptions. Jacob de Geer, the founder of iZettle, was from tech industry. Nevertheless, he has chosen the value chain in payments with the lowest transaction value and margin. Payments are a volume game. If he had more knowledge of the industry, he would perhaps have done this differently. That's why iZettle is expanding into lending and other services over the last year. If the founders were from this industry, they might have realized this earlier to complement their initial service offering.

Capital need and regulatory burden are also challenges. It's very hard to attract customer and build customer base. It's extremely difficult to change customer behavior in banking. We have seen some successful examples with MobilePay and Swish, but those are initiatives backed by the banks.

How have incumbent financial institutions in your country/region responded to digital disruption and FinTech new entrants?

Swish and MobilePay are positive responses by incumbents. One of the biggest challenges we had to our investments was that it was hard to connect to the infrastructure and ecosystem of banking. Initially banks were very conservative to get into new innovations. But we started to see Nordic banks gradually opening up to FinTech start-ups since the second half of 2015. The banks are open to listen to FinTech companies and explore new solutions.

Some banks selectively invested in FinTech companies. Nordea invested in Wrapp, a reward app where one can get offers and rewards from shops and brands by connecting to your bank card.

The new national payment scheme such as Swish can be a big threat to products such as Visa/MasterCard. Swish is a free P2P payment solution developed collectively by the Swedish banks. Visa/MasterCard should be scarified (scared and terrified). Swish is used by 4.7 million people in Sweden and started going into point-of-sale (POS) environments. Glemma, a salon booking application we invested in, connects to Swish. Money can be directly transferred from a customer's bank account to the merchants.

The banks can bypass the Visa/MasterCard rail and reduce the payment fees that are currently charged by Visa/MasterCard network.

MobilePay in Denmark is already available to merchants. Danske Bank has the potential to own the largest payment rail in Denmark through MobilePay, especially if MobilePay could use bank to bank rail transfer helped by the Directive on Payment Services (PSD2) initiatives in Europe.

Visa/MasterCard payment volume could go up a bit because of slight inflation, economic growth and further reduction of cash usage. The tipping point for Visa/MasterCard volume to decline could happen as soon as 2020, due to the rolling out of the Swish payment terminals. There is still some work to do for Swish to improve the front end to make it more user-friendly, and over the long term the Visa and MasterCard edge is to become international service provider.

Is regulation a barrier to entry in financial services? How are FinTech companies regulated in your market/s?

Regulation is a barrier to entry but also a strength. You need trust in the financial system. But the regulators need to align regulation with the stages of companies. What we have seen in London and Singapore with the establishment of a 'regulatory sandbox' is interesting. The sandbox would enable the companies to grow. Sweden on the other hand has the most difficult regulation on FinTech in Europe. The regulators in the Nordics need to be more start-up friendly, in our view.

Regulators have a lot of power over the survival of the start-ups. This contradicts with the government promotion of innovation and because of this we think regulators should give more help and support.

The Nordic FinTech companies were able to thrive despite of the tough regulations. The success story of iZettle created an ecosystem and inspired other entrepreneurs to try. Also there are other successful stories outside FinTech – Spotify, MineCraft and so on.

Over the past 12 months, marketplace lending has received increased investor scrutiny, especially in the U.S. How do you view this segment?

The lending platforms need to develop their models. They also need to diversify sources of funding. Lendify has done that. Toborrow is doing that to have industrial-based capital into the system. They also need to get more customers onto the platform.

Otherwise we have not seen much impact to valuation from Lending Club because of the diverse nature of start-ups here in Stockholm.

How important is cybersecurity for FinTech new entrants as a business opportunity and a risk/threat?

We promote security and trust over growth. We don't want companies to be out of business in a year or two. We want them to stay. Hence they need to be secure, safe and build the trust level. Cybersecurity is therefore a big focus for our companies.

There will be attacks especially when there is money in the system. A company like ZignSec, which is an interface that connects to the bank IDs across the Nordic countries could help prevent attacks by providing under one agreement to start-ups which would give them bank ID access in each Nordic country rather than having them connect to every single interface.

Are FinTech companies better at analyzing and using client data than banks? Why have banks been slow on better using their data assets? Regulation? Culture?

The reason banks are slow is because of their laziness. The banks and the credit card companies collect enormous amount of data. They have the best opportunity in all kinds but they do nothing. If they had started using the data a few years ago, they will be in a much stronger position. Banks perhaps also have an ability issue – the lack of data analysts. Data will be crucial.

What are your preferred FinTech models? Can you discuss examples of FinTech companies with these models?

We have 5 to 6 companies that really stand out as stars out of 20 investments. The stars are slightly heavier on B2B side. There is no common theme among them. They are all volume based, all scalable and efficient in terms of cost. They all compliment the banking chain and not challenge them.

Interview with Vostok Emerging Finance

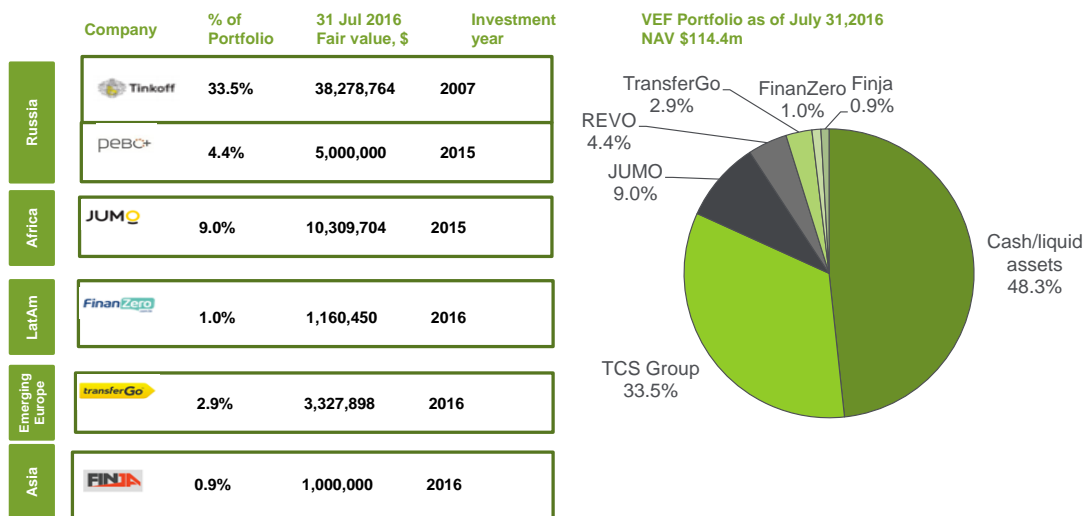
About Vostok Emerging Finance – EM-Focused

Vostok Emerging Finance (VEF) is a listed venture capital fund with a market capitalization around \$125 million that invests in fast growth FinTech companies in emerging markets. VEF takes minority stakes and board representation and helps drive value creation through to exit.

VEF has taken the view that there is a plentitude of focus in developed market FinTech (in the U.S., U.K., Sweden etc.), where there is an abundance of VC and bank incubator capital. Vostok on the other hand focuses on the often overlooked emerging market arena, especially once you go beyond China and India (and arguably Brazil); there is limited FinTech venture capital in play.

Public market investors can gain exposure to emerging market FinTech through Vostok Emerging Finance, which makes it a fairly unique market asset. To date, VEF has invested in 6 companies in Russia, Africa, Brazil, Asia, and Eastern Europe.

Figure 90. Vostok Emerging Finance Portfolio Companies



Source: Company Reports

About David Nangle

David Nangle is CEO of Vostok Emerging Finance. David has spent his career to date focused on the emerging markets financials. Initially David was with ING Baring’s Emerging Markets Research team from 2000 to 2006, where he was head of EMEA financials research. David then joined Renaissance Capital in Moscow and has spent the majority of his professional career there, helping the firm develop and grow their financials franchise and research footprint from a strong Russia base to a leading pan-EMEA and frontiers franchise. Through his career he has worked across many diverse emerging market countries on projects, deals, and research mandates all within the broader financials space, spending the latter years with more innovative financial sector plays like Tinkoff Bank in Russia and Alior Bank in Poland. David holds a degree in B. Comm International (French) from University College Dublin Ireland.

Vostok Emerging Finance Q&A with David Nangle

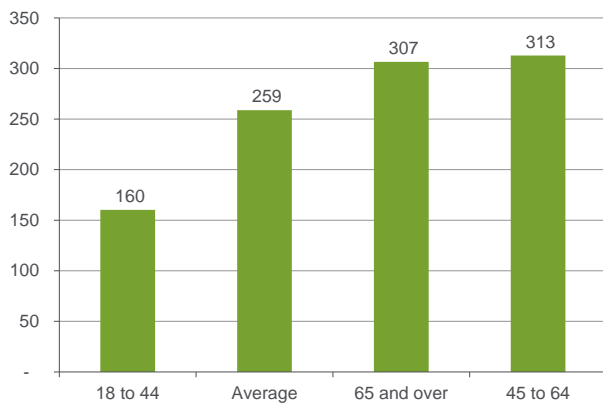
Compared with other industries such as music and travel, why is digital disruption in financial services slow to come?

I put this down to demand driven factors (consumers), more than supply side (banks). Not to be ageist, but I think this is principally due to the average age of the user group of the segment in question, with music more aggressively consumed by a younger generation, than that of financial services.

There is nothing cool about finance, even FinTech, as cool as the word wants to be, struggles to make finance interesting to a younger generation and they are only forced into financial interaction by necessity, whereas music is driven by desire.

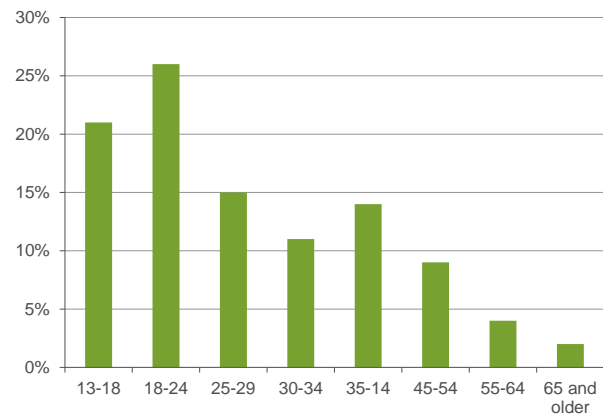
Go to a FinTech conference and then go to a music festival; they are worlds apart in coolness and average age. Speed and change of digital disruption of any sub-segment is generally driven by a younger generation, hence the speed of innovation in the music scene over that of finance, with travel arguably somewhere in-between.

Figure 91. U.K. – Household Wealth is Concentrated by Older Generation (Average Net Wealth Per Person in £000) September 2016



Source: HMRC, Citi Research; Based on identified wealth. Population averaged over the period 2011 to 2013.

Figure 92. U.S. – Spotify is Used by Younger Generations – Distribution of Spotify Users by Age, April 2015



Source: Statista

(In your region) What aspects of financial services are more/less exposed to FinTech disruption by new entrants or incumbents?

When it comes to emerging and frontier markets, it is our experience that it is the more basic core financial services where we see the most activity and disruption. Hence, payments (as a broad space) disruption is very much in focus here.

We come across numerous companies playing in the mobile money/wallet space and moving cash to digital or mobile currency, outside of the banking world and helping to facilitate payments of all forms. Specifically, we would highlight examples like bKash in Bangladesh, Fawry in Egypt, M-PESA in Kenya, Zoota through Africa and the numerous mobile wallets operating in India.

Furthermore, cross-border digital remittances (cross-border payments) is also a big growing FinTech theme in the emerging world, with names like Azimo, TransferGo, Remitly and others, all driving digital efficiency into this traditional cash in/out model.

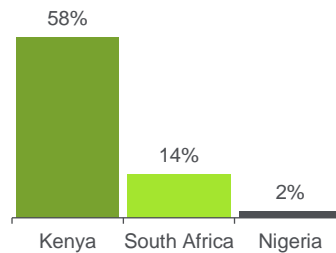
We find that the less-exposed FinTech areas in emerging markets are those areas that demand a more sophisticated financial backdrop and thus more suited to developed markets than emerging, like robo-advisors or equity crowdfunding. That said, despite the challenges, we do see a number of equity crowdfunding models trying to crack the emerging market space, most notably Movement Capital, while we came across our first emerging market robo-advisor recently in Brazil, Magnetis.

How long do you think it will take FinTech companies to have meaningful market shares in the markets where you invest?

First and foremost, across all emerging and frontier markets we see FinTech activity — it is everywhere. Beyond that simple statement, I would argue that FinTech is already having a meaningful impact across many emerging markets today and in extreme cases like China, it is in danger of dominating financial proceedings. Besides China, where Alipay, Tencent, and Baidu are really having a meaningful impact across consumer (and small and medium enterprise) financial services today, one has to look at the very raw frontier markets like Kenya or Bangladesh to see how FinTech payments offerings like M-PESA and bKash can take a meaningful share of payments flow (even dominate) when the non-cash offering that was there before only touched a small portion of the population and was substandard to begin with.

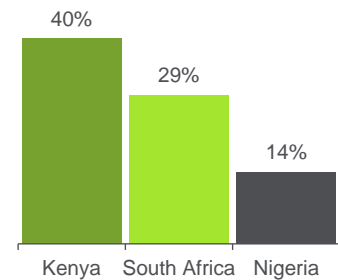
Much of FinTech success at country level and its ability to have a meaningful impact on proceedings has as much to do with the environment in which companies are operating (regulation, attitude and FinTech outlook of large incumbent peers) as it does with their own micro-level strategy, execution, and delivery.

Figure 93. Population with Mobile Money Accounts, 2014



Source: World Bank, Citi Research

Figure 94. Made Transaction from Bank Account via Mobile Phone, 2014



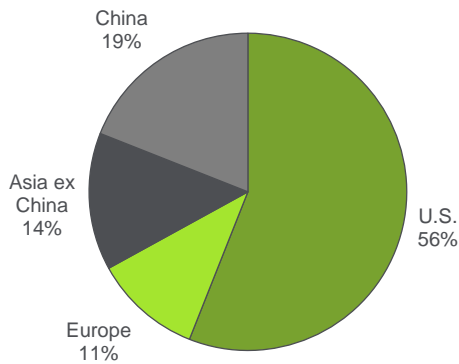
Source: World Bank, Citi Research

What are the biggest challenges for FinTech new entrants? Customer acquisition? Regulatory burden? Other?

In my experience, I would actually put access to capital as the key challenge for up and coming FinTech companies in the majority of emerging markets. If you are running a successful early-stage FinTech company in the U.S., U.K., Sweden, Germany etc., there is a plentitude of dedicated capital ready to support your story at every stage, with even deep dedicated pockets for seed stage investing.

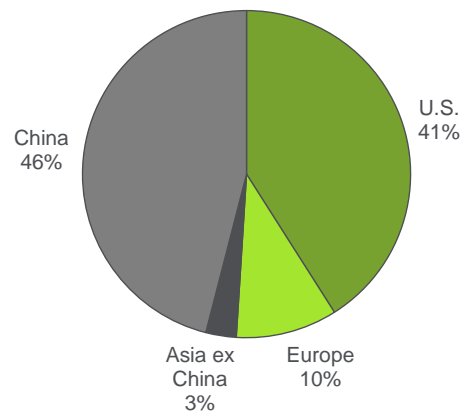
It is still our view that with a few exceptions (China, followed by India), this is still not the case across emerging markets. Furthermore, when capital is available, on average, it is more general (private wealth, family office etc.) capital as opposed to emerging market or FinTech-dedicated VC or private equity money. Just to be clear, we do find exceptional local VC houses on the ground in most markets we look at, which we see as key potential investment partners for us in our journey, but unlike the developed world, they are few in number and run a lot less assets under management. So, while we find no shortage of talent and ideas across emerging market FinTech, there just is not enough capital to support the ecosystem, which is an imbalance that works for us right now, but will change over time.

Figure 95. VC Investments by Geography, 2015



Source: CB Insights, Citi Research

Figure 96. VC Investments by Geography, 1H 2016



Source: CB Insights, Citi Research

How have incumbent financial institutions in your country/region responded to digital disruption and FinTech new entrants?

From our travels and research we have witnessed the whole range of reactions from both incumbent regulatory bodies as well as leading local established financial services players. The war on cash and hence FinTech support is a growing theme across emerging and frontier markets governments (India is high profile here while Pakistan is a current favorite of ours), while financial institutions still can be divided up between those wanting to collaborate and those ignoring the trends or even looking to quash the up-starts.

Look at some examples.....

In Russia, for us Sberbank has stood out amongst large old-school emerging market financial institutions with its dedication to driving a digital offering to its home market, while also being generally supportive of the local FinTech ecosystem. Tinkoff Bank, in that same market, is arguably one of the best digital banks around. In Turkey, the regulatory and banking environment has not been overly supportive to up-and-coming players. Banks like Garanti Bank, traditionally ahead of the banking curve locally, have not been keen for fresh competition, in our experience. For all the positive hype that M-PESA (and Safaricom) gets around the world for its successful mobile money play in Kenya, and we do not dispute their achievements, Safaricom has proven itself again and again to have some of the sharpest elbows in the market and is no friend to up-and-coming FinTech companies in that part of the world.

Is regulation a barrier to entry in financial services? How are FinTech companies regulated in your market/s?

For any financial services firm, new or old world, we have always viewed regulation as a cost of doing business as opposed to a risk of doing business. Many of our focus markets are still at that early stage in their regulatory cycle and hence can be viewed as regulation lite (although sometimes regulation illogical), which I guess is as close as you are going to get to an emerging market version of the FinTech sandbox that you have in the U.K. That said regulatory forces do move up the curve quite quickly, for example we are seeing a raft of rate caps moving through Africa for example, something which was well off the agenda until lately.

What we still find amazing in today's global world, how geography and physical borders remain a barrier to entry/exit for FinTech firms. We see very few examples of FinTech companies being able to succeed beyond their home markets. We see plenty of (becoming) successful FinTechs whose model is based upon a Western play like that of Square or Stripe, but very few that succeed beyond home market, similar to many of today's traditional financial institutions.

Are FinTech companies better at analyzing and using client data than banks? Why have banks been slow on better using their data assets? Regulation? Culture?

I am not sure it is a case of them being better at analyzing and using customer data, it is more a function of being much more focused on it with less distraction. FinTech's advantages over large banks, which drive this include:

- FinTechs have no legacy/incumbent revenue stream they need to defend
- They are generally starting from a blank piece of paper with no legacy systems and processes and thus can focus energies where it counts.
- They are generally not publicly listed with all the demands that come with it.

While there are clear advantages in having scale, we continually see more impressive customer focus and understanding, through focused use and manipulation of client data from smaller FinTech peers. In one case recently we experienced, an up-and-coming African FinTech company had an African IT budget of less than 10% of a global financial player in that region, but was still able to understand the needs and target the local customer base multiple times better. Much of the reason was that the majority of the global peers' tech budget was spent on legacy system maintenance as opposed to new technology focus.

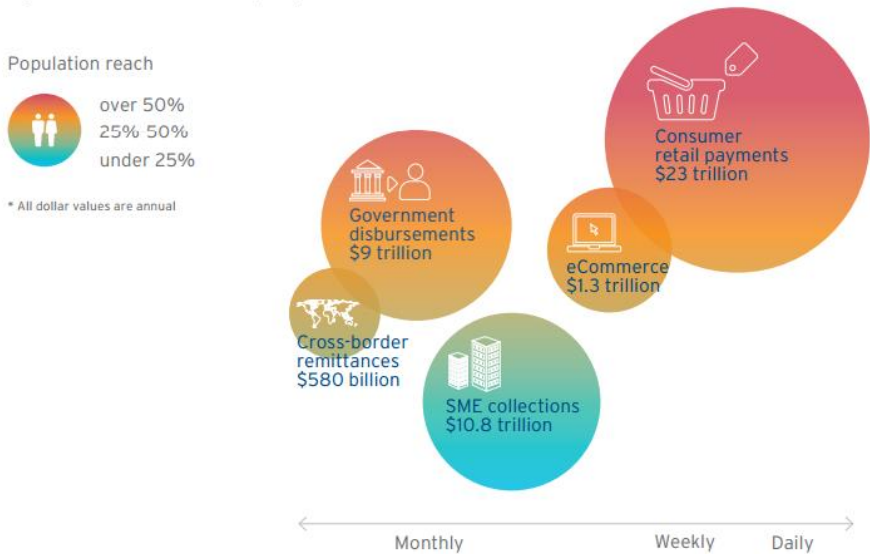
What are your preferred FinTech models? Can you discuss examples of FinTech companies with these models?

From a sector point of view, I have always loved credit, even before FinTech took credit scoring to a different level. If you back a well-run credit business at the right point in the cycle, it allows you to earn as you grow, is extremely attractive and capital efficient unlike most young businesses, which command a J-curve investment approach. It can also be a very profitable segment and consistently so if done well. It is not a coincidence that leading global FinTech payments companies like Square, have actually turned to credit as a key revenue/profit driver — it is just too tempting not to.

Within the payments space, I am enjoying the evolving remittances (cross-border peer-to-peer) space and the rise of mobile digital players, who continue to grow and eat into traditional cash in/out players' market share both locally and globally. About \$600 billion of global annual remittance flow (and rising) at an average take rate of ~8% (according to the World Bank), what's not to disrupt!

Last but not least, disruption in payroll and the SaaS accounting space is very attractive, with a lot of innovation and value being created.

Figure 97. Five "Flows" with Frequency and Reach



Source: Citi – Imperial College Digital Money Index, 2016

Geographically, we do like earlier stage frontier markets over more developed emerging as the FinTech solutions that appear can quite often be very unique to those local markets, so instead of getting the classic play on a developed market model (copy-paste-execute solution, think Rocket Internet), something unique is created. In the mainstream emerging world, we love Brazil, as it is simply the ripest FinTech market we have come across. The spread of interest rates across all consumer/small and medium enterprise products remains huge, coupled with settlement terms and process in the payments space that are so cumbersome and long dated. We respect Brazilian banks, but in our view, it is as if they have become masters of maintaining the most inefficient and thus profitable banking market on the planet. It's changing. Hence, we have seen more FinTech opportunities in Brazil than in all other emerging markets, outside of China and India.

Figure 98. FinTech Companies in Brazil



Source: LetsTalkPayments; goMEDICI.com

Interview with BECO Capital (Middle East- and North Africa- Focused)

About BECO Capital

BECO Capital provides growth capital and hands-on operational support for early stage technology companies in the Middle East and North Africa (MENA) region with a focus on the Gulf Cooperation Council (GCC).

It aims to support the technology revolution in the Middle East through investing in smart, early stage Internet and mobile companies in the MENA region, founded by amazing entrepreneurs that are creating transformational solutions that solve large regional problems. So far it has invested in 10 companies.

Figure 99. BECO Capital Portfolio Companies



The premier property portal in the Middle East



The leading limo aggregator in the Middle East



Online used car exchange and auction site



Career portal and course discovery marketplace



Mobile restaurant discovery platform



Sports league and event management company



A marketplace to buy and sell great stuff



Healthcare insurance comparison and management platform



Eliminates the need for usernames and passwords



A meeting based productivity app that directs results oriented meetings



Healthcare marketplace and automated bookings

Source: Company Website

About Amir Farha

Amir Farha is the CIO and Managing Partner at BECO Capital. Amir has over 10 years of experience being actively involved with a wide range of early stage ventures as an entrepreneur, mentor and investor, starting his career at CLS Capital Partners, a corporate VC firm based in London, followed by what was then the first seed capital fund in the MENA region, the Arab Business Angel Network, before becoming an entrepreneur himself. Amir has co-founded a number of local businesses in the UAE, including Tandem Partners, a start-up and small business advisory firm; Toolman, a property maintenance company; and Purple PR, a boutique PR agency. He holds a Bachelor of Science degree in Computer Information Systems and an Master of Science degree in Management from the University of Bath.

BECO Capital Q&A with Amir Farha

Compared with other industries such as music and travel, why is digital disruption in financial services slow to come?

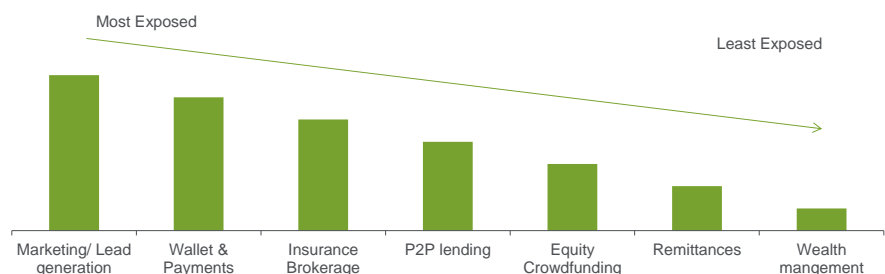
Banks in the Middle East have a lot of power and control over regulations on how the financial sector operates, given that most of them are backed by Governments and influential stakeholders. It is extremely expensive for new financial service providers to setup and comply with regulations. This limits the number of start-ups tackling this field by creating high entry barriers from both a regulatory as well as an investment perspective. Regulations continue to block the development of the sector. Old, traditional policies that have governed the financial sector today have yet to provide clear rules on new age FinTech services, and banks are worried about how these technologies are disrupting their existing lines of business but are slow at adopting these innovations because of internal bureaucracy.

(In your region) What aspects of financial services are more/less exposed to FinTech disruption by new entrants or incumbents?

Areas where regulations and cost of doing business are cost effective:

1. Marketing/Lead generation: most exposed, increasing output of sales personnel, while generating higher return on investment (ROI) for each \$ spent on marketing
2. Wallet & Payments: very exposed, with the existence of several large players providing online and mobile payment solutions for goods and services
3. Insurance Brokerage: growing exposure, with the ability to acquire insurance products over the internet vs. offline
4. P2P Lending: some exposure, with a handful of early stage businesses providing loans to SMEs in several markets
5. Equity Crowdfunding: less exposed as there is only one player that has established itself as a crowdfunding platform at a small scale
6. Remittances: little exposure, with several start-ups trying to provide remittance allowing for cross-border fund transfer
7. Wealth management: no real exposure, with few start-ups trying tackle this category using artificial intelligence

Figure 100. The Risk of FinTech Disruption in Middle East and GCC



Source: Citi Research, Interview with BECO Capital

Whereas there are more capital-efficient entry points for start-ups to attack early on in the evolution of the space (such as payments), it is only a matter of time till every part of the banking value chain is under attack from new entrants and the fundamental concept of a bank will be changed permanently.

How long do you think it will take FinTech companies to have meaningful market shares in the markets where you invest?

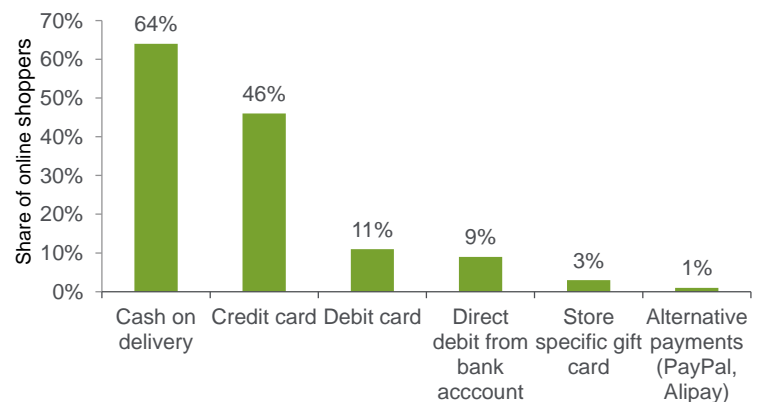
It depends on the category being attacked by the FinTech venture, and the definition of meaningful. If meaningful is greater than 20%, then it could take 10-15 years. The earliest category to grab market share would be payments, while other categories such as peer-to-peer lending and crowdfunding will take more than 10 years to mature.

What are the biggest challenges for FinTech new entrants? Customer acquisition? Regulatory burden? Other?

The single most important challenge for FinTech start-ups in the Middle East will be the regulatory environment and requirements. Today to acquire a banking license costs AED50 million (\$13.6 million) in regulatory capital in the UAE, which increases the friction for entrepreneurs to innovate and offer better tech-driven financial services since they cannot raise that kind of funding at inception.

Furthermore, on a more fundamental level, tech adoption has still been relatively slow as cash-on-delivery is still the majority of all e-commerce transactions in the Middle East.

Figure 101. Middle East – Preferred Payment Methods for Online Shoppers, 2016



Source: Statista

Security is a large concern as financial infrastructure is being digitized, while incorporating new fraud protection standards and technologies. Today, the GCC banking institutions face a growing threat of cyber-attacks and are slow to adopt new security solutions to address this problem.

Finally, the region's banking sector is owned by some of the largest and most powerful local families that will likely lobby against anything that can potentially disrupt their businesses. This can slow down the advancement of regulation to promote this sector.

How have incumbent financial institutions in your country/region responded to digital disruption and FinTech new entrants?

The leading banks have focused on strengthening their digital experience - particularly mobile banking - giving customers a wider range of services over the web versus in-store. Barclays and Payfort (an online payment gateway) have both launched FinTech accelerators in Egypt. Many banks are partnering with start-ups that provide FinTech solutions (e.g. payment gateways, remittance technology savings solutions etc.) while other larger banks are allocating capital to explore potential investments in the start-up space. Regulators, such as Abu Dhabi Global Markets, are looking to create "sandboxes" to provide start-ups with less regulated environments to test their products more quickly. This could facilitate the improvement of regulations as governments become more familiar with where the world of FinTech is heading and the solutions being developed.

Is regulation a barrier to entry in financial services? How are FinTech companies regulated in your market/s?

Yes, licensing requirements are expensive and not transparent enough. Banking and remittance licenses require AED50 million (\$13.6 million) regulatory capital; insurance brokerage requires AED3 million (\$0.8 million) regulatory capital. The application process is generally a relationship-driven process, where timeline is unknown and often extremely long and tedious. Once applied, the licensing issuance remains as a black box without clear guidelines on how to obtain a license, given one is able to meet the capital requirements.

Over the past 12 months, marketplace lending has received increased investor scrutiny, especially in the U.S. How do you view this segment?

It's attracted scrutiny because of one-off cases by mismanagement at the C-level. The business model for these start-ups has yet to be proven to have sustainable scale. Larger funds and banks have been chasing yield, providing capital on these crowdfunding platforms and reducing the yield (and margins for the marketplace). They are still solving a problem by giving small and medium enterprises more options to financing that they otherwise didn't have. However, we have yet to see how these companies will evolve and whether these marketplaces can provide value-added services to lenders and borrowers onto their platform to build ancillary services.

How important is cybersecurity for FinTech new entrants as a business opportunity and a risk/threat?

This is both a huge opportunity and a sizeable threat. Many traditional financial services have been targeted by cyber attackers. As cybersecurity solutions become more sophisticated and provide banks and governments with greater protection, then FinTech services will be able to flourish. On the other hand, FinTech start-ups should have security at the core of their offering in order to provide comfort and reliability to their customers. PayPal is a great example in this context: this FinTech pioneer was essentially building out a security infrastructure in order to prevent money laundering, identification theft and other hacking incidents. As such, in its early days, the company could have been mistaken for a security start-up rather than a payments company.

Are FinTech companies better at analyzing and using client data than banks? Why have banks been slow on better using their data assets? Regulation? Culture?

By relying so heavily on regulation and huge distribution networks as the primary means of value creation for the past decades, banks have become used to this world of limited competition, a mentality that has seeped into every aspect of the industry from culture to business processes. On the other hand, start-ups that are tackling the space understand that in an age where distribution is solved for through mobile devices, data is at the center of all financial transaction and have therefore been built with that core competency in mind. Moreover, bank legacy systems and software limit uses and understanding of data.

What are your preferred FinTech models? Can you discuss examples of FinTech companies with these models?

The most interesting FinTech companies are unique in that they fundamentally change age-old market failures and assumptions built by the financial industry by leveraging the sheer scale of the Internet and the amounts of data we are now creating on a daily basis. Two examples are:

1. Algorithm-driven student financing in emerging markets, where a large number of people need to attain practical skills that are typically taught at vocational schools which don't offer federal/institutional lending. As the economy is shifting to a knowledge-based economy, these vocational classes will gain popularity and many of the potential students who would need those skills the most to be competitive in the labor markets of the future will come from the emerging markets. A company that does that very well is South Africa-based Prodigy Finance, offering financing for MBAs from Africa and other developing countries.
2. Microinsurance: as data and liquidity in financial services increase, insurance will become more and more democratized and on a transactional basis, leaving opportunities for data-driven start-ups to facilitate this process in a more efficient manner (<https://www.cbinsights.com/blog/microinsurance-next-big-thing/>).

As for the region, we find several models that possess interesting characteristics:

1. Insurance: the fragmented insurance brokerage market and the traditional way they operate make it ripe for disruption, specifically within the healthcare industry. Streamlining the insurance acquisition and management process is one that can bring tremendous benefits to both businesses and consumers. Technology can facilitate all aspects of the process, from comparing insurance policies in real-time, to acquiring and managing their policies on-the-go. People can search for healthcare options, contact doctors, book appointments and track claims all within their mobile device. The data can be used to provide more customized policies over time, creating an even more transformational solution to the existing paper-based system that does a terrible job at tracking usage.

2. Savings: there are many ways that technology can assist in helping people save money. Rotating Savings and Credit Associations have been historically relevant to the region over the past 100 years and more. 25% of Egyptian households use rotating savings and credit associations (ROSCAs) to save money. These systems have predominantly been done in the physical world and can be revolutionized through technology, allowing them to build larger networks and ROSCAs that can change people's ways of saving money and allow low-income households access to larger pools of capital.

Figure 102. Portfolio Companies of VCs Interviewed (Non-exhaustive List)

VC	Portfolio Company	Category	Location	Headquarter	Total Equity Funding (\$m)
IDG Capital	Circle	Blockchain/Cryptocurrency	Europe	Dublin	136.0
IDG Capital	Qingsongchou Network Technology	Crowd funding	China	Beijing	20.0
IDG Capital	FraudMetrix	Internet Security	China	Hangzhou	40.0
IDG Capital	Ripple	Blockchain/Cryptocurrency	US	San Francisco	93.6
IDG Capital	Wecash	Consumer Credit	China	Beijing	26.5
IDG Capital	Wacai	Wealth management	China	Hangzhou	78.0
IDG Capital	CreditEase	Alternative lending	China	Beijing	20.0
Vostok Emerging Finance	Tinkoff Credit Systems	Internet Bank	Russia	Moscow	90.0
Vostok Emerging Finance	REVO/SORSDATA	Consumer Credit	Russia		5.0 *
Vostok Emerging Finance	JUMO	Marketplace Lending	Africa	Cape Town	10.3 *
Vostok Emerging Finance	FinanZero	Marketplace Lending	Brazil	São Paulo	1.1 *
Vostok Emerging Finance	TransferGo	Payments	Europe	London	6.1
Vostok Emerging Finance	Finja	Payments	Pakistan	Lahore, Punjab	1.0
NFT Ventures	Paydrive	Insurance	Nordic	Stockholm	0.7
NFT Ventures	Belato	Payments	Nordic	Stockholm	1.2
NFT Ventures	Toborrow	Marketplace Lending	Nordic	Stockholm	3.5
NFT Ventures	Leaseonline	Leasing	Nordic	Stockholm	0.7
NFT Ventures	Nordcap	Business Tools	Nordic	Stockholm	-
NFT Ventures	Pensionskraft	Pension	Nordic	Stockholm	0.5
NFT Ventures	Lanbyte	Alternative Lending	Nordic	Stockholm	-
NFT Ventures	Kortio	Comparison Website	Nordic	Stockholm	-
NFT Ventures	Mondido	Payments	Nordic	Stockholm	-
NFT Ventures	Tessin	Crowd funding	Nordic	Stockholm	1.9
NFT Ventures	Leasify	Leasing	Nordic	Stockholm	0.3
NFT Ventures	avtal24	Legal services	Nordic	Stockholm	2.1
NFT Ventures	TicWorks	Business Tools	Nordic	Stockholm	-
NFT Ventures	MrShoebox	Business Tools	Nordic	Stockholm	-
NFT Ventures	depos	Deposits	Nordic	Stockholm	-
NFT Ventures	NOWO	Consumer Credit	Nordic	Stockholm	-
NFT Ventures	SLIPP	Business Tools	Nordic	Stockholm	-
NFT Ventures	ZignSec	Security	Nordic	Stockholm	-
NFT Ventures	CreditKudos	Credit Scoring	Europe	London	-
NFT Ventures	Glamma	Payments	Nordic	Stockholm	-
BECO Capital	Bayzat	Insurance	Middle East	Dubai	1.0
BECO Capital	myki	Business Tools	Middle East	Beirut	-
Citi Ventures	Ayasdi	Big Data & Analytics	US	Menlo Park, CA	106.4
Citi Ventures	Datameer	Big Data & Analytics	US	San Francisco	76.8
Citi Ventures	Pepperdata	Big Data & Analytics	US	Sunnyvale, CA	22.0
Citi Ventures	ddmap.com	Marketplace	China	Shanghai	40.0
Citi Ventures	FastPay	Payments	US	Los Angeles, California	16.5
Citi Ventures	Jet	Marketplace	US	Hoboken, New Jersey	565.0
Citi Ventures	Joist	Marketplace	Canada	Toronto, Ontario	-
Citi Ventures	Linkable	Commerce	US	Boston, Massachusetts	40.4
Citi Ventures	Square	Payments	US	San Francisco	205.0
Citi Ventures	Betterment	Wealth Management	US	New York	
Citi Ventures	BlueVine	Alternative lending	US	Palo Alto, California	64.0
Citi Ventures	C2FO	Alternative lending	US	Kansas City, Missouri	70.7
Citi Ventures	Chain	Blockchain/Cryptocurrency	US	San Francisco	43.7
Citi Ventures	DocuSign	Business Tools	US	San Francisco	700.2
Citi Ventures	TradeIT	Business Tools	US	New York	
Citi Ventures	appboy	Business Tools	US	New York	45.1
Citi Ventures	Liveninja	Business Tools	US	Miami, Florida	3.0
Citi Ventures	Optimizely	Business Tools	US	San Francisco	146.2
Citi Ventures	Persado	Business Tools	US	New York	66.0
Citi Ventures	CHEF	Business Tools	US	Seattle	105.0
Citi Ventures	Cylance	Security	US	Irvine, California	177.0
Citi Ventures	DB Networks	Security	US	Carlsbad, California	23.8
Citi Ventures	Illusive Networks	Security	Israel	Tel Aviv	30.0
Citi Ventures	Pindrop	Security	US	Atlanta, Georgia	122.8
Citi Ventures	Tanium	Security	US	Emeryville, CA	302.3
Citi Ventures	vARMOUR	Security	US	Mountain View, CA	83.0
Propel Venture Partners	Brave	Security	US	San Francisco	8.5
Propel Venture Partners	Civic	Security	US	Palo Alto, California	2.8

Propel Venture Partners	coinbase	Blockchain/Cryptocurrency	US	San Francisco	117.2
Propel Venture Partners	DocuSign	Business Tools	US	San Francisco	-
Propel Venture Partners	Earnest	Alternative Lending	US	San Francisco	99.1
Propel Venture Partners	Guideline Technologies Inc.	Pension	US	Burlingame, California	9.0
Propel Venture Partners	Myhippo	Insurance	US	Mountain View, California	-
Propel Venture Partners	Hixme	Insurance	US	Agoura Hills, California	24.6
Propel Venture Partners	INSIKT	Alternative Lending	US	San Francisco	25.5
Propel Venture Partners	Personal Capital	Wealth Management	US	Redwood City, California	175.3
Propel Venture Partners	Prosper	Marketplace Lending	US	San Francisco	354.9
Propel Venture Partners	Taulia	Alternative Lending	US	San Francisco	136.7
Arbor Ventures	2C2P	Payments	ASEAN	Singapore	10.0
Arbor Ventures	A-SaaS	Business Tools	Japan	Tokyo	-
Arbor Ventures	demystdata	Big Data & Analytics	ASEAN	Singapore	12.0
Arbor Ventures	Lu.com	Marketplace Lending	China	Shanghai	1,690.0
Arbor Ventures	Paidy	Payments	Japan		--
Arbor Ventures	Pipapai.com	Marketplace	China		
Arbor Ventures	Stockpile	Wealth Management	US	San Francisco	15.0
Arbor Ventures	ABRA	Blockchain/Cryptocurrency	US	Mountain View, California	14.0
Arbor Ventures	TravelersBox	Payments	Europe	Istanbul, Istanbul	14.5
Arbor Ventures	Quancheng	Business Tools	China	Shanghai	30.0
Dymon Asia	Otonomos	Blockchain/Cryptocurrency	ASEAN	Singapore	0.2
Dymon Asia	Spark Systems	FX trading	ASEAN	Singapore	
Dymon Asia	4xLabs	FX trading	ASEAN	Singapore	
Dymon Asia	WeConvene	Business tools	Hong Kong	Hong Kong	3.2

Source: Crunchbase, Company Reports, Citi Research. * Estimates based on Vostok's ownership. Non-exhaustive.

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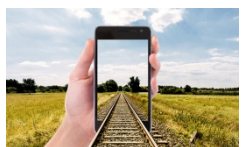
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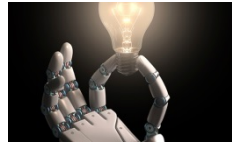
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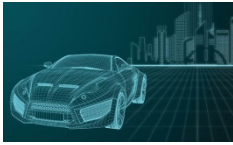
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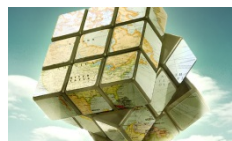
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Back in March, we argued that China was very important to the FinTech story and with investment flows into the area and a friendly environment for innovation it had become a home to many 'unicorns'. / **Those unicorns are now growing into dragons, a good reflection of their large size and in terms of implied total valuations.**



SHIFTING WEALTH

In the U.S., FinTech investments were dominated by lending in 2015, which made up 58% of total funding. / **In the first nine months of 2016, investments have shifted in the U.S. to Insurance Technology and we believe it will further move towards Regulatory Technology.**



TECHNOLOGY

The initial focus of FinTech innovation was creating product that helped the customer experience in an e-commerce world or offered lower cost production.. / **Going forward, we expect a shift to business-to-business investments, particularly as financial institutions are increasingly involved in FinTech as direct buyers or via venture capital funds.**



