Digital Banking to Fintech:
Financial Services Innovation & AI-Driven Banking

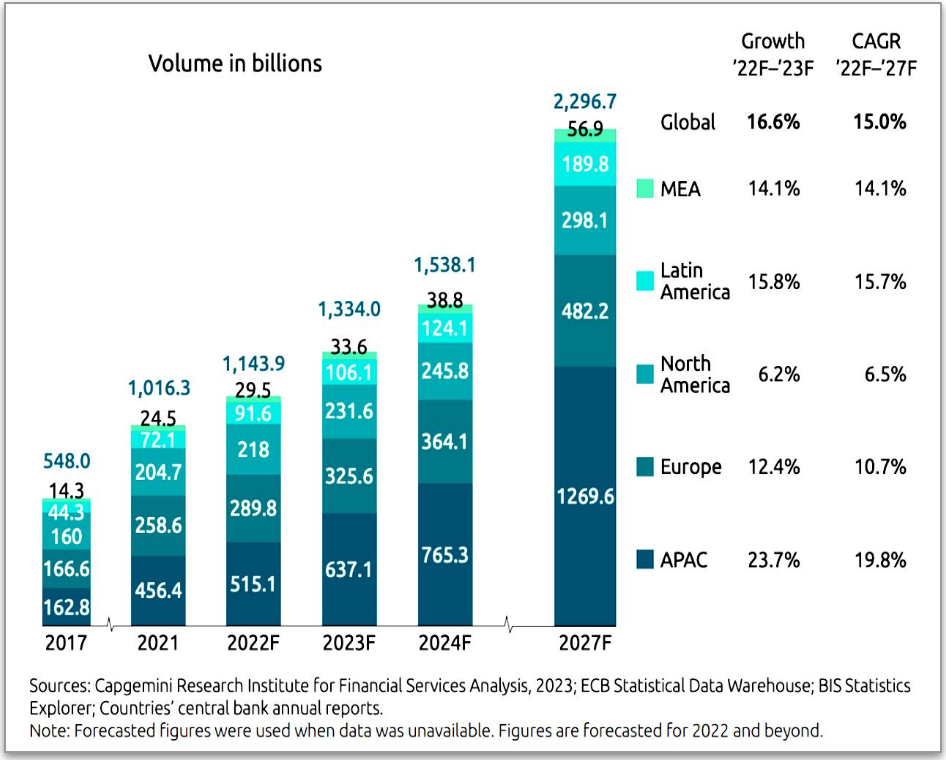
- **The Digital Banking Revolution: Effects on Competition and Stability**
  - **Naz Koont**, Stanford University

- **Financial Innovation and Risk: Evidence from Operational Losses at U.S. Banking Organizations**
  - W. Scott Frame, Structured Finance Association
  - Ping McLemore, Federal Reserve Bank of Richmond
  - **Atanas Mihov**, University of Kansas

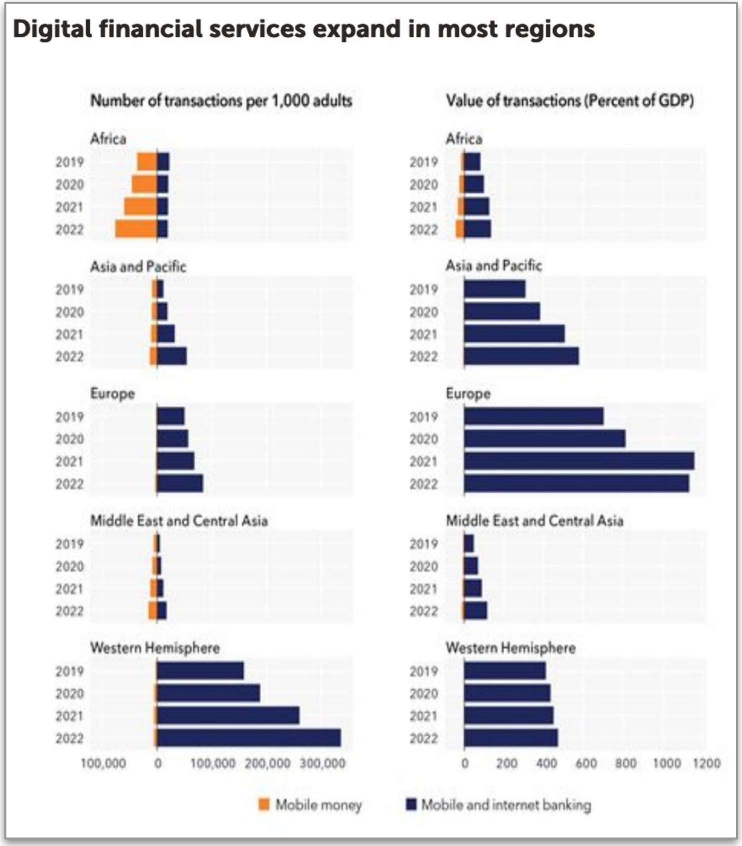
- **From Competitors to Partners: Banks' Venture Investments in Fintech**
  - Manju Puri, Duke University
  - **Yiming Qian**, University of Connecticut
  - Xiang Zheng, University of Connecticut

Digital Finance Transformed Financial Services Industry

Digital Banking Growth is Continuing

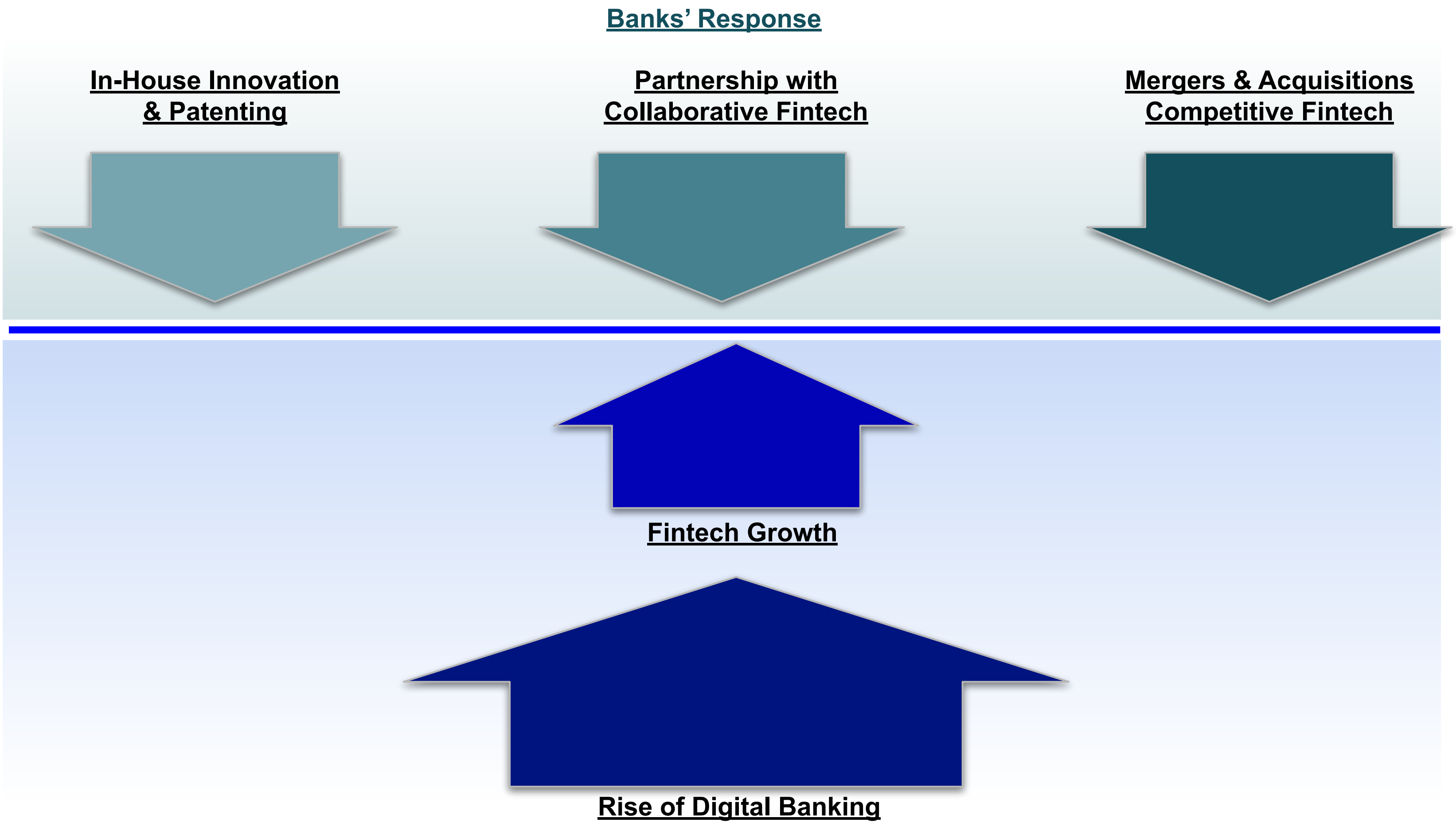


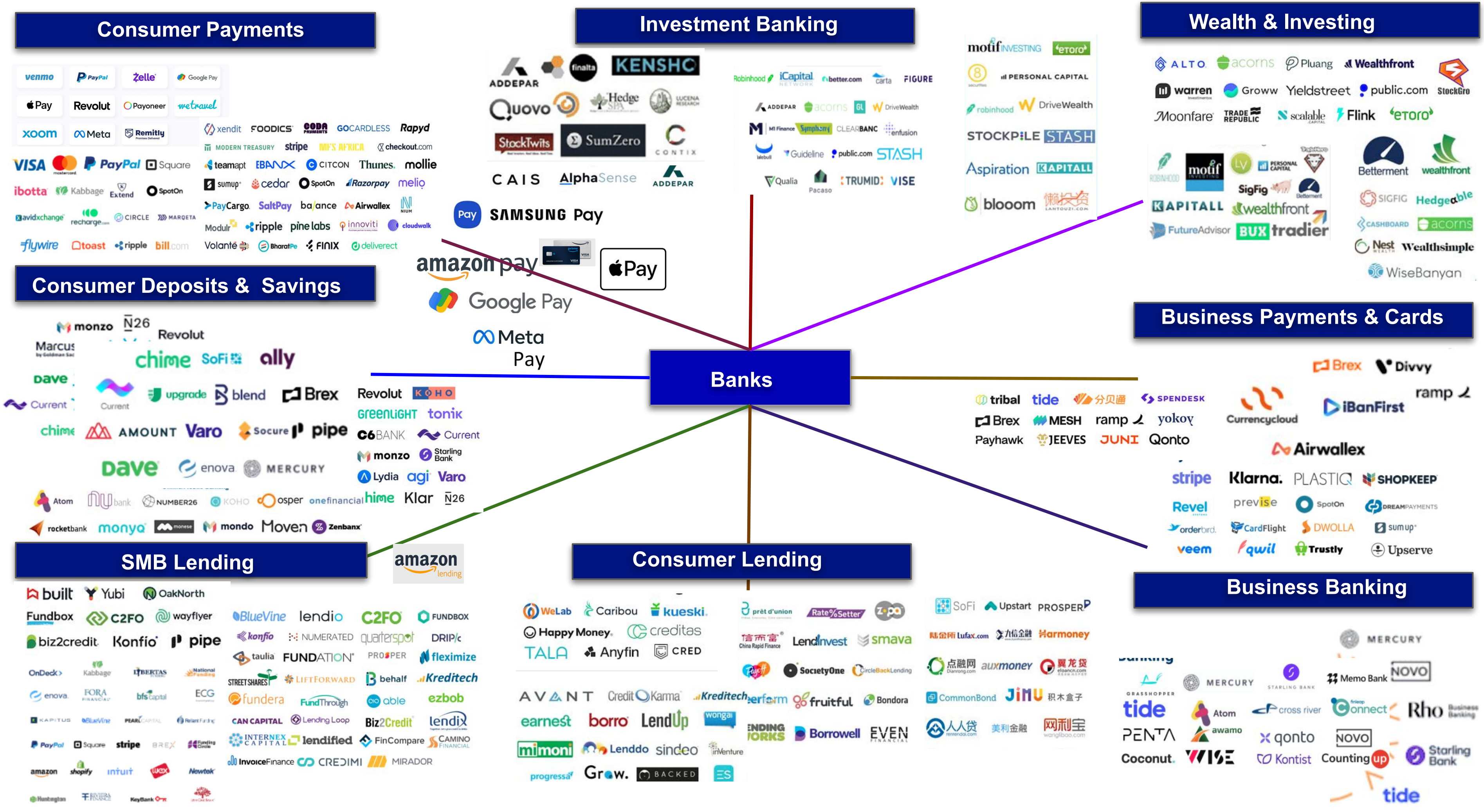
Source: Capgemini



Source: IMP

Digital Banking Implications




Consumer Payments
Investment Banking
Wealth & Investing
Consumer Deposits & Savings
Banks
Business Payments & Cards
SMB Lending
Consumer Lending
Business Banking

Digital Banking Revolution: Effects on Competition and Stability

Naz Koont, Stanford University

Increased Competition:

- Digital platforms allow banks to serve new markets digitally — leading to i**ncreased competition** and lower concentration in deposit and loan markets.
- **Digitalization decreases local and national market concentration**, and **average markups fall in deposit and loan markets,** holding fixed the size of the banking sector.

Uneven Effects:

The benefits of digitalization are not evenly distributed.

- Increases the average market share of lightly-regulated **mid-sized banks by 29%**
- Increases the **uninsured deposits ratio of the banking sector by 9%** while resorting uninsured deposits towards larger digital banks,
- **Doubles credit risks associated with lending** in market segments that are less-well served by digital technologies."

- "Digitalization costs and differentiation can hurt the profitability and business models of **small community banks with below $10B in assets."**

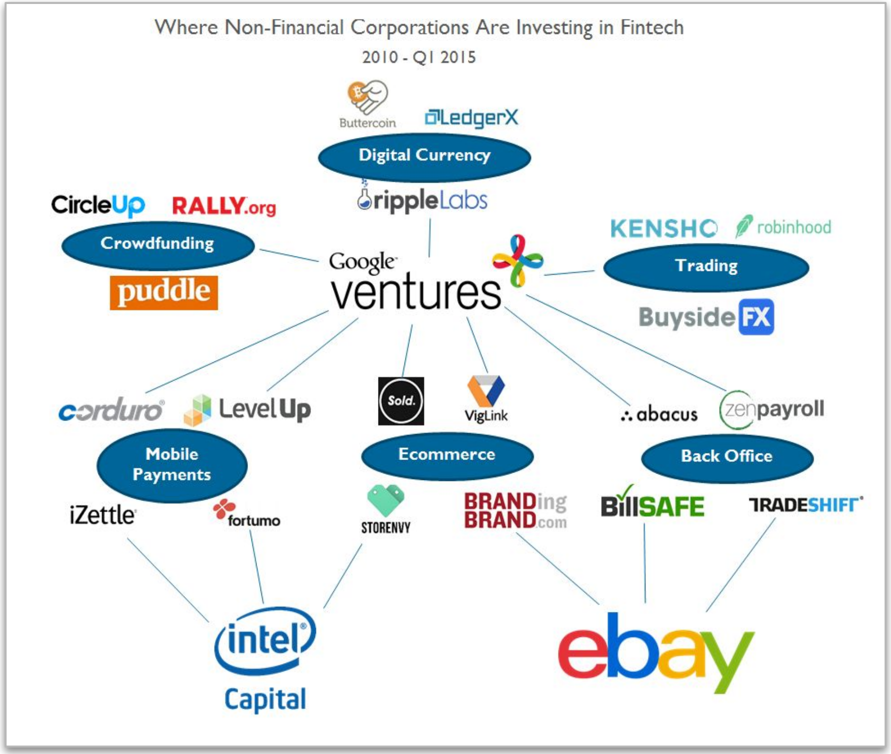
Financial Stability Risks:

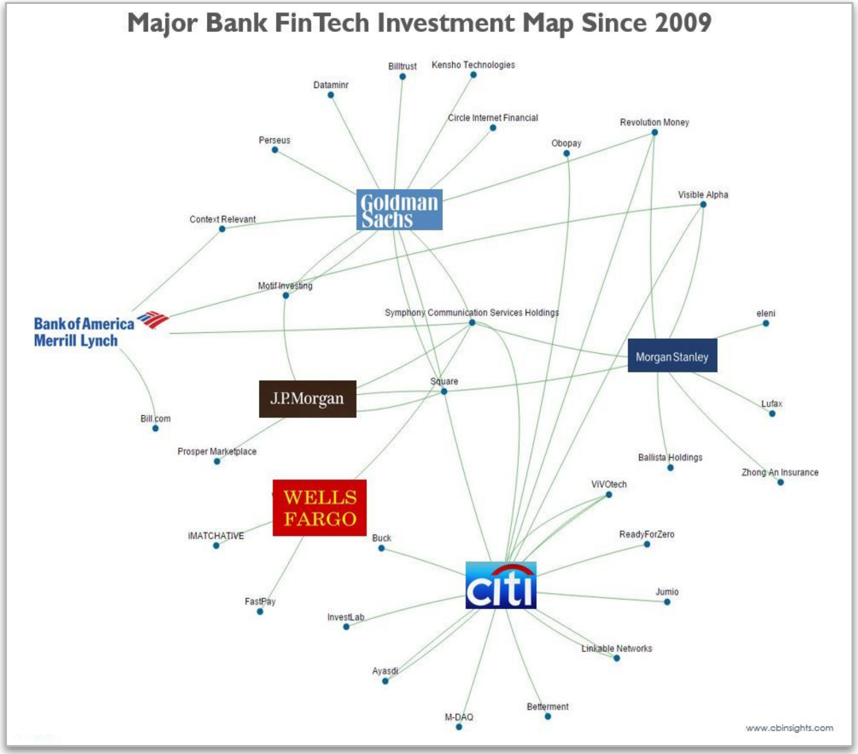
- While overall banking profits remain unchanged, t**he rise of mid-sized digital banks raises concerns.**
- These banks may have a larger geographic reach and r**ely more on uninsured deposits,** potentially increasing systemic risk if they fail.
- Additionally, the digitalization of lending may reduce banks' ability to assess loan risks for some borrowers.

More Pervasive Shocks During Failures

- Branchless integration of local banking markets due to digital platform technologies is likely to affect the propagation of bank health shocks to more geographic regions, while also dampening the reliance of regions on any one specific institution.
- Digitalization makes things more centralized and homogenized. Hence, smaller regional variations.

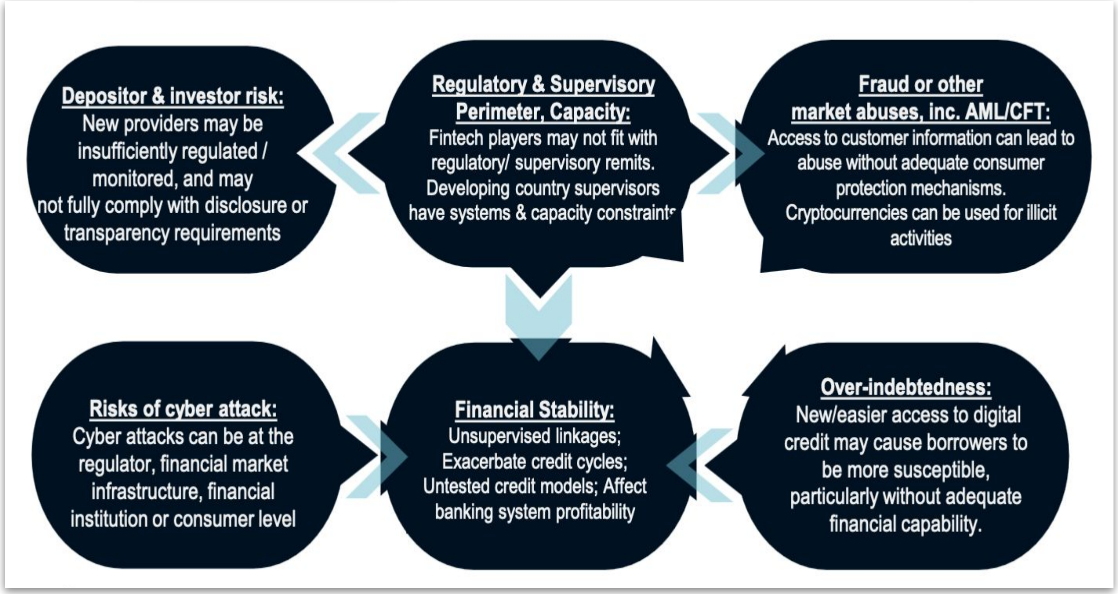
Shared Fintech Infrastructure & Complex Tech-Bank Relationships: A New Map for Risk





- Many financial firms and banks invest in the same fintechs.
- Unanalyzed dependencies and feedback loops emerge, raising overall risk.
- The market becomes more homogenized and flat with interdependencies.

Fast-Moving FinTech Poses Challenge for Regulators



- Emerging technology firms are quickly making inroads into critical financial services, and often taking on more risk than traditional banks.
  Pascual et.al.

- Digital banks are growing in systemic importance in their local markets. Vulnerabilities
  (1) Higher risk-taking in retail loan originations without appropriate provisioning and underpricing of credit risk;
  (2) Higher risk-taking in the securities portfolio;
  (3) Inadequate liquidity management framework.

- Fintech firms not only take on risks themselves but also exert pressure on incumbents. The case study of the US mortgage market presents evidence of a significant negative impact of competitive pressure from fintechs on the income of traditional banks.

[Source: The Rapid Growth Of Fintech: Vulnerabilities and Challenges For Financial Stability]

Digital Banking Revolution: Effects on Competition and Stability

Naz Koont, Stanford University

Different Customer Screening and Monitoring Practices

- Digital banking alters banks' ability to screen or monitor customers across different market segments.
- This may lead to risk build up in market segments that are less well served via digital technologies.
- The amount of customer monitoring directly or third party help is unprecedented. This is a very prominent factor esp in digital banking and fintech may not be clear externally.

Fintech Data Usage & Reliance on Alternative Data Sources

- A shift towards digital loan origination increases the banking system's reliance on hard information, such as credit scores, and thus mistakes or mechanical changes in these metrics can lead to larger consequences.
- **Digital footprint usage is not highly regulated in fintech. There are ethical risks as well. Limited science behind the use of markers.**
- Increased use of alternative data in lending decisions could alter the correlation among banks' risks if for instance all banks are using the same data in credit decisions, which would have implications for stability. **Fintech considers all data as credit data.** Globally, in fintech, credit decisioning based on phone charge levels, use of capital letters, typing speed, scores of your social media contacts, anything on mobile phone,

What Fintech Considers as Credit Data

Your Face is Your Credit Score

What Your Face May Tell Lenders About Whether You're Creditworthy - WSJ

All Mobile Phone Data is Fair Game for Credit?

≡ Bloomberg

Markets

No Credit History? No Problem. Lenders Are Looking at Your Phone Data

- FICO, Equifax stike partnerships to expand access to loans
- 'The way you use the phone is a proxy for the way you live'

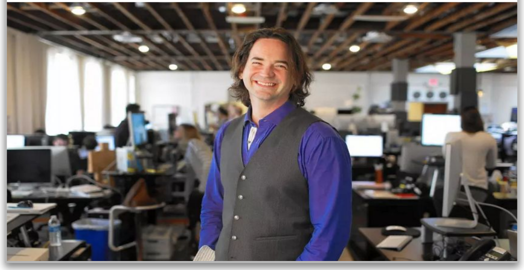
Phone Charge Level for Creditworthiness?

Want a Loan in China? Keep Your Phone Charged - WSJ

All Caps means Less Creditworthiness

Los Angeles Times LOG IN

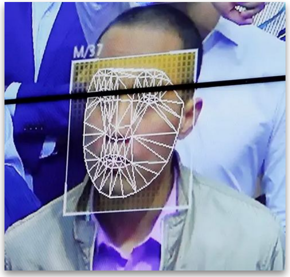
Some lenders are judging you on much more than finances



All Data is Credit Data?

- *“Among thousands of factors is whether you type your name with proper capitalization or in all capital letters. “If you fill in your name in all caps, you’re a much higher risk,”” LA Times*
- *From Network Credit score which is your social media contacts credit scores as a proxy to yours, to using all personal data including dating status, all data is considered credit data for fintechs.*
- *Your facial gestures, blinks, voice, everything can be used be emerging lending firms.*

Loan Video Analytics



From financial institutions to credit unions, everyone is recognizing the value of analyzing video content related to loan applications, customer interactions, and risk assessment. Faster Capital

Risk Externalities of Financial Innovation: Evidence from Operational Losses at Large U.S. Bank Holding Companies

W. Scott Frame, Structured Finance Association, Ping McLemore, Federal Reserve Bank of Richmond, Atanas Mihov, University of Kansas

Observations

- *Financial innovation is associated with adverse operational risk externalities.*
- ***Firms with more financial patent innovation suffered higher operational losses per dollar or assets and more tail risk events.***
- *Banking organizations engaging in more financial innovation prior to or during the global financial crisis have more operational losses during the crisis. 2007-2009 crisis.*

With the Rise of Digital Banking, Banks are Becoming Hybrid Technology Firms. Banks now have

(i) Large digital infrastructures (cloud deployments, mobile apps, cyber infrastructures, digital investment services etc).
(ii) Banks are increasing competing with technology providers like IBM, Microsoft, Amazon, etc.
(iii) Banks realized need to file patents to operate in digital banking (also new emphasis in AI/ML/data science use cases)

What Drove Finance's Patenting?
America Invents Act - Expiration and Litigation Boom

- *"Historically, patent litigation activity in the financial services sector was largely initiated by non-practicing entities against banks.*
- *This trend was a major reason for the inclusion of the covered b**usiness method review program in the 2012 America Invents Act.***
- *But that program recently expired, and Bloomberg News found a t**hreefold increase in lawsuits against financial institutions following its expiration."***

Competitor Lawsuits

- USAA suing Wells Fargo, then PNC and others.
- Patent Trolls Increasing lawsuits

Risk Externalities of Financial Innovation: Evidence from Operational Losses at Large U.S. Bank Holding Companies

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Are Patents a Proxy for Financial Innovation? Is it the *Wild West*?

- Patents as proxy for innovation is a challenging assumption in financial services.
- Banks largely miss Intellectual Property infrastructure and know-how compared to the technology sector.
- History of patenting is very recent and few companies have accumulated a reasonable amount of patents for analysis.
  (3-4 large banks lead in financial patents).

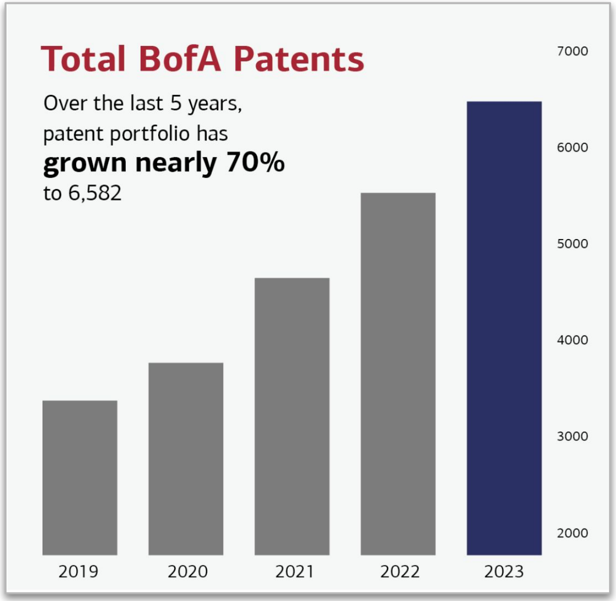
Financial Services Exploration of Intellectual Property

- In most banks patents are approved through management lines and Lines-of-Business instead of firm-wide funding.
- There is limited firm-wide process or push for IP development.
- The result is a localized, personalized pockets. Also strong issues in IP hygiene. Serious enforceability problems.
  - ***Lack of IP Expertise:***
    - Large majority of financial service staff do not understand patent processes or patentability.
  - ***Cultural Clash (Intellectual Property Culture vs. Wall Street Culture)***
    - Managers who fund the group get their name on the patent. Invalidates the patent completely.
  - ***Frequent Invalidation of Patents:***
    - Firms change filings and disclosures add names after primary inventors leave the firm. Invalidates the patent.

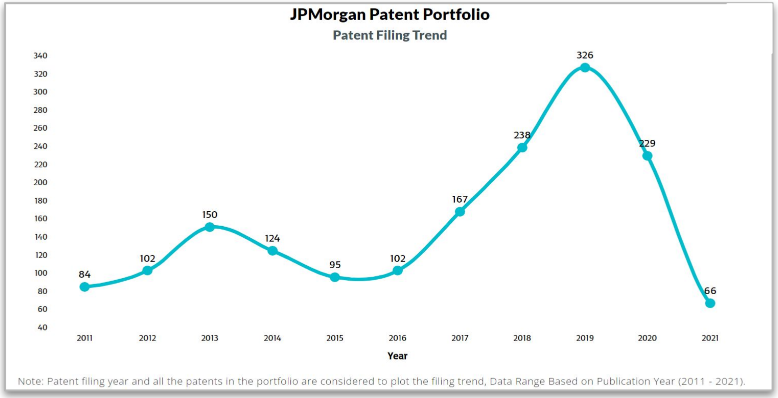
Extension of Analysis and Recent Trends

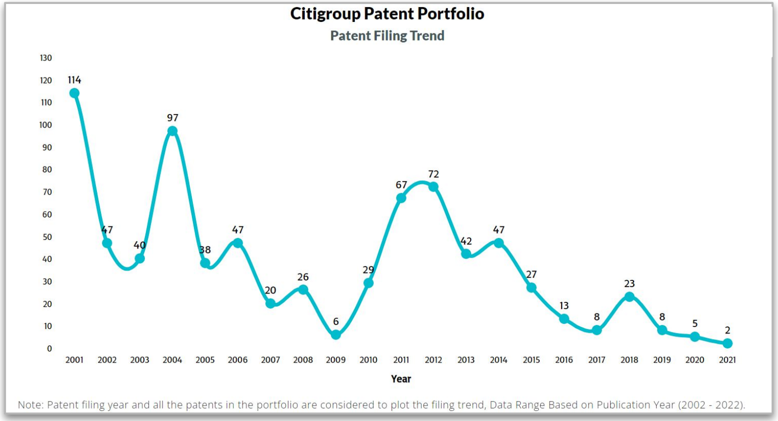
- Extending IP data to more recent periods will benefit *(esp. after 2015)*
  - Over 30% year-to-year increase has been reported in the past decade.
- 2014 Alice Decision (electronic escrow patent) put a damper on business method filings.
  - USPTO allowance of finance patents dropped after Alice decioning by 10%.
- **There 2 camps now. One group aggressively filing more, the other group uninterested.**

Bank Patents and Innovations are Still In Early Phases



Some firms have special emphasis on patents (Bofa, Capone, JPM etc).



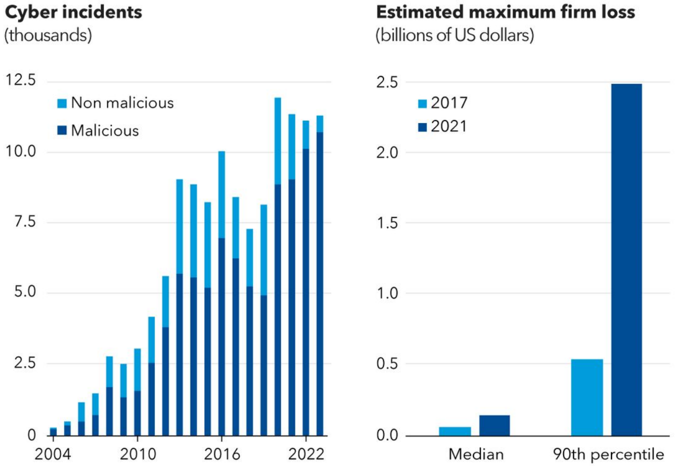


Number of patent filings are small and localized for most firms.

Cyber-threats are Increasingly Bigger Threats to Banking

Cyber-threats have reached a level that can pose major risk to the overall financial and economic stability

The risk of suffering a cyberattack and extreme losses from it has increased.



Sources: Advisen Cyber Loss Data; Capital IQ; and IMF staff calculations.
Note: Panel 1 cyber events are classified according to Advisen. Delayed reporting may lead to the underestimation of cyber events in more recent periods. Panel 2 is based on the estimated posterior density function of the highest loss of all firms within a year.

IMF

Incidents in the financial sector could threaten financial and economic stability if they erode confidence in the financial system, disrupt critical services, or cause spillovers to other institutions.

Source: IMF Global Financial Stability Report 2024

From Competitors to Partners: Banks' Venture Investments in Fintech

Manju Puri, Duke University, Yiming Qian, University of Connecticut , Xiang Zheng, University of Connecticut

Authors hypothesize and find evidence that banks use venture investments in fintech startups as a strategic approach to navigate fintech competition

Fintech is Taking Over: Fintech Growth 3x the Banking Sector

- Revenues in the fintech industry are **expected to grow almost three times faster** than those in the traditional banking sector between **2023 and 2028** *(Source McKinsey Research)*
- Financial services firms started seeing fintechs as opportunities in the recent years (*Source: Accenture Research)*
- In 2015 the level of **investment into**
  - **Collaborative** companies increased **by 138%**
  - Competitive companies the growth **was only 23%**
- Rise of fintech is motivating the rise of patents in banking

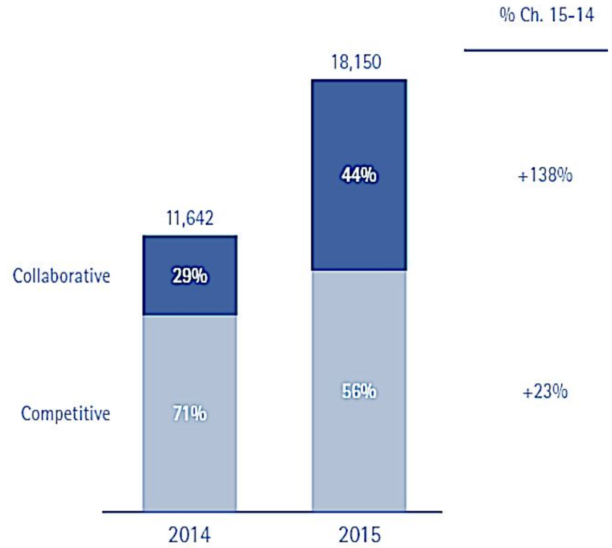
Collaboration vs. Competition: U.S. vs APAC

- In Asia Pacific fintech ecosystem have the power to challenge large financial institutions and reach their level in a collaborative fashion.
- In the US. Fintechs operate as more collaboratively than competitively. In the U.S. challenger fintechs are rare.
- Possible causes: VC relationships and partnerships with large banks
- Bank VC functions, Close relationships between VC firms and Banks, Patent law protections and other factors.

Asia Pacific Fintech Market is Growing Faster

- APAC has a projected compound annual growth rate (CAGR) of 27%, whereas the US has an estimated CAGR of just 17%. *(Source: BCG)*
- "Attractive demographics, native technology and engineering capabilities, and prudent regulations combined with the sheer necessity to innovate for accelerating the upliftment of a large mass of humanity make APAC the center of gravity for fintechs," *(Source: BCG Report)*

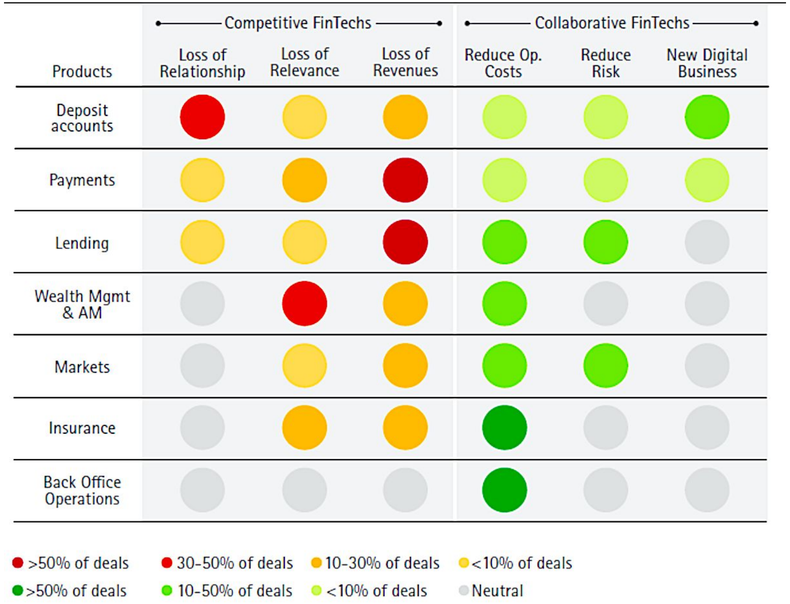
Collaborative Fintech has been Rising Faster



Note: total excludes Other segment
Source: Accenture analysis on CB Insights data

[3]https://innovate.fca.org.uk/
[4]"UK Mobile-Only Atom Bank Picks Up $128M Led By BBVA, Owner Of Simple In The U.S.", Techcrunch.com, November 24, 2015. Factiva, Inc. All Rights Reserved.

Fintech Activity from Competitive vs. Collaborative Perspective
(Number of Deals)



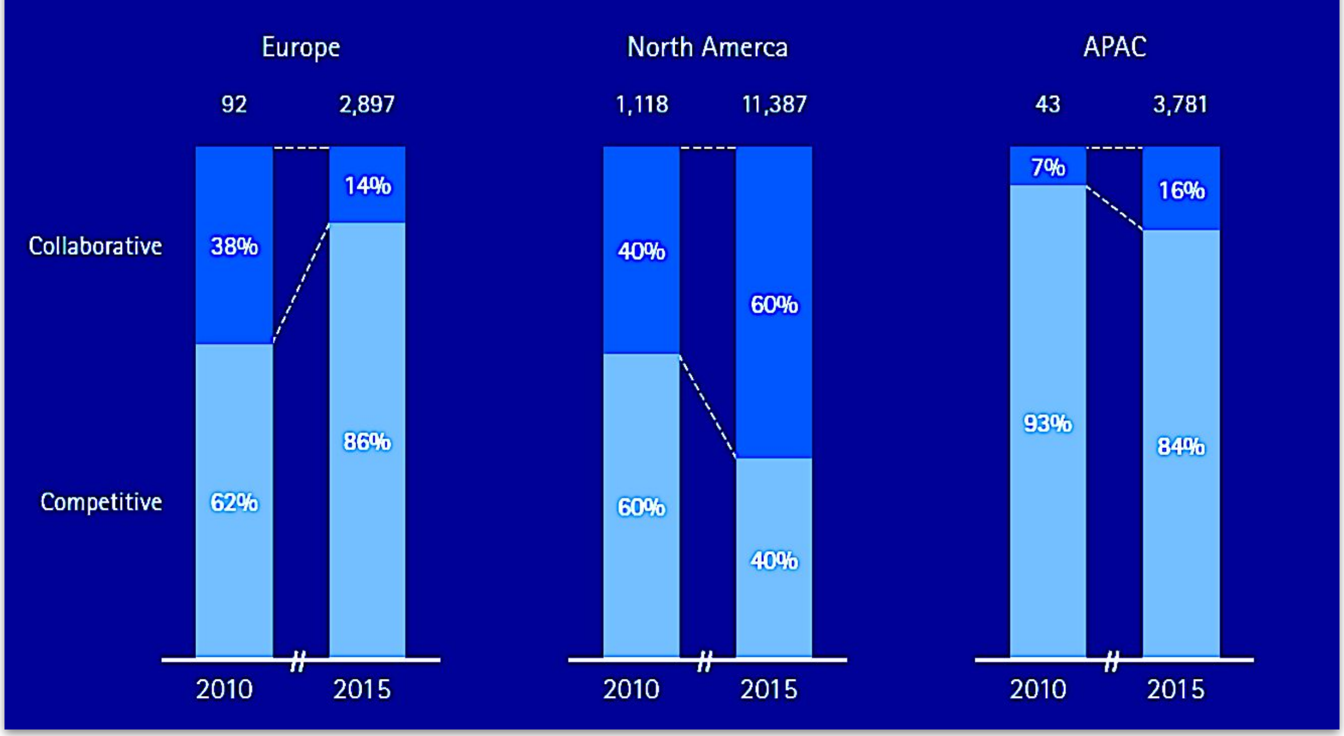
Note: represents percentages of deals across product segment
Source: Accenture analysis on CB Insights data

Accenture Fintech and Evolving Landscape 2016

Globally Collaboration - Competition Breakdown Diverges

- *In APAC and Europe Competitive Fintechs dominate*
- *In North America Collaboration is dominant*

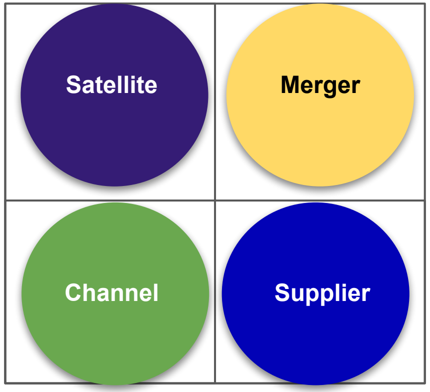
Exhibit 6: Collaborative Fintech Investments vs. Competitive Fintech Investments, 2010/15 ($M)



Banks Leverage Fintechs for Number of Purposes

SIMPLE
BBVA

Financial Commitment

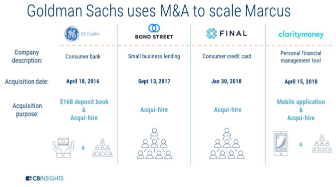


RBS Low

Funding Circle Low

Brand Commitment

Marcus: BY GOLDMAN SACHS



ABN·AMRO
tink

Fintech Mergers are Still Relatively Small

Payments, Lending, Wealth/Capital Markets, Fin Management among the biggest investment areas

- **Banks made less than 1% of all fintech acquisitions from 2013 through 2023.**
- Top 50 US and top 15 Canadian and International Banks only 94 fintech acquisitions were completed in the past 10 years.

All global transactions, 2013–2023

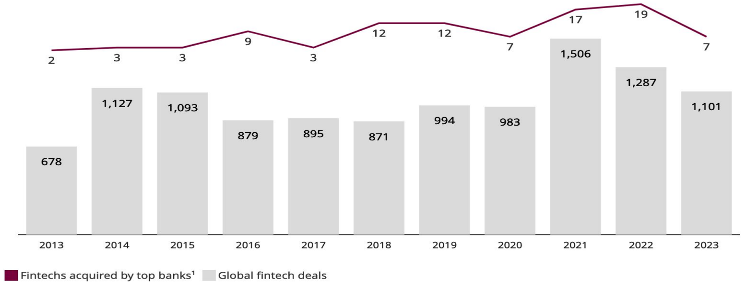


Exhibit 3: In the last decade, top banks[1] acquired fintech capabilities in five main categories

Acquisitions in the last decade	33	21	18	17	5
Category	**Payments**	**Banking / Lending Tech**	**Financial Management Solutions**	**Wealth and Capital Markets Tech**	**Healthcare Fintech**
Percentage	35%	22%	19%	18%	5%

Dangers of Fintech: Too Much Innovation?

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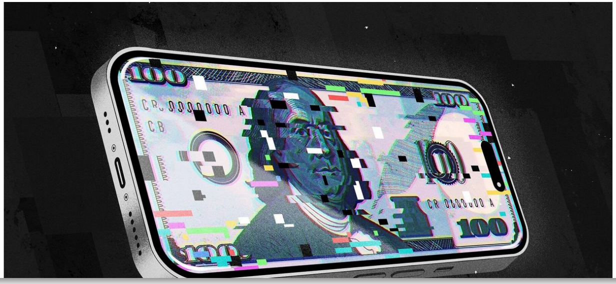
Markets Magazine

A Fintech's Collapse Raises Questions About a Hot Business Model

Tech companies found a way to sell FDIC-backed accounts without being banks—then one firm lost track of customers' money.



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Over the past decade, dozens of financial-technology companies have linked up with small and midsize banks across the country.

The idea: The fintechs would create slick smartphone apps and offer useful new services to lure customers, and banks would hold on to the deposits, generating lucrative fees from transactions.

Importantly, the arrangement allowed the fintechs to tout protection from the Federal Deposit Insurance Corp.

The most popular finance apps in the country, including Block's Cash App, PayPal and Chime, partner with banks instead of owning them. They account for 60% of all new fintech account openings, according to data provider Curinos. Block and PayPal are publicly traded; Chime is expected to launch an IPO next year.

Backup

From Mortgages to Lending Fintechs Continue Their Growth