Fintech and big tech credit: a new database

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*The views expressed here are those of the authors and not necessarily the Bank for International Settlements.
Roadmap

- Fintech and big tech credit: selected trends
- Research questions and contribution
- Data and empirical methodology
- Results
- Conclusions
Fintech and big tech credit: selected trends
Fintech and big tech credit: some definitions

<table>
<thead>
<tr>
<th>Definition</th>
<th>Fintech</th>
<th>Fintech credit</th>
<th>Big tech</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>Technology-enabled innovation in financial services that could result in new business models, applications, processes or products ... <em>(FSB, 2017)</em></td>
<td>Credit activity facilitated by electronic (online) platforms that are not operated by commercial banks, e.g. P2P / marketplace lending <em>(Claessens et al., 2018)</em></td>
<td>Large companies whose primary activity is digital services, rather than financial services <em>(Frost et al., 2019; BIS, 2019)</em></td>
</tr>
<tr>
<td><strong>Examples</strong></td>
<td><img src="image1" alt="Stripe" />, <img src="image2" alt="Toss" />, <img src="image3" alt="Adyen" />, <img src="image4" alt="Paytm" /></td>
<td><img src="image5" alt="ZOPO" />, <img src="image6" alt="Funding Circle" />, <img src="image7" alt="Lending Club" />, <img src="image8" alt="WeBank" /></td>
<td><img src="image9" alt="Ant Group" />, <img src="image10" alt="Amazon" />, <img src="image11" alt="Grab" />, <img src="image12" alt="m-pesa" />, <img src="image13" alt="Mercado Libre" /></td>
</tr>
</tbody>
</table>
Big tech credit is booming – reaching USD 572 bn in 2019

These alternative forms of lending are becoming a significant portion of total credit in a few economies

Figures include estimates. CN = China, US = United States, JP = Japan, KR = Korea, GB = Great Britain, ID = Indonesia, NL = Netherlands, RU = Russia, KE = Kenya, DE = Germany.

1 2019 fintech lending volume figures are estimated on AU, CN, EU, GB, NZ and US. 2 Data for 2019. 3 Domestic credit provided by the financial sector. Data for 2018. 4 Total alternative credit is defined as the sum of fintech and big tech credit. Data for 2019.
Fintech credit is growing fast in Europe and many other jurisdictions

Fintech lending volumes are diverging\(^1\)

<table>
<thead>
<tr>
<th>Year</th>
<th>CN</th>
<th>JP</th>
<th>KR</th>
<th>US</th>
<th>KE</th>
<th>ID</th>
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</thead>
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<td>2019</td>
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</table>

Index, Q1 2017 = 100

Big tech credit is booming in Asia, the US and Africa\(^2\)

USD mn, logarithmic scale

<table>
<thead>
<tr>
<th>Year</th>
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<th>JP</th>
<th>KR</th>
<th>US</th>
<th>KE</th>
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<td>2014</td>
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<td>2017</td>
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</tbody>
</table>

1 Data are based on five platforms for Australia and New Zealand, all platforms covered by WDZJ.com for China, 49 platforms for Europe, 34 for the United Kingdom and five for the United States. Volumes are reported in local currency.
2 Figures include estimates.
Fintech credit platforms continue to exit in China, as loans stocks and flows fall

Data based on all platforms covered by WDZJ.com for China.
Big tech firms are highly profitable, while fintech platforms have often struggled

Returns on fintech credit platforms have trended down

Big tech firms are more profitable than fintech platforms

1 Average interest rate. 2 Simple average of Black Knight Financial Services, Elevate, Enova International, Fellow Finance, Funding Circle, LendingClub, Lendingtree, Nelnet, OnDeck and Synchrony. 3 Simple average of Alibaba, Amazon, Apple, Baidu / Du Xiaoman, Facebook, Google, JD.com, Kakao, LINE, Microsoft, MTS bank, Orange, Rakuten, Samsung, Tencent, Uber, Vodacom, Vodafone and Yandex.
Research questions and contribution
Potential drivers of fintech and big tech credit

- On the demand side:
  - Economic development (Claessens et al., 2018, for fintech credit)
  - Lack of competition (as alluded to in Philippon, 2015)
  - Unmet customer demand (Hau et al., 2018 for China; De Roure et al., 2016 for Germany; Tang, 2018 and Jagtiani and Lemieux, 2018 for the United States)

- On the supply side:
  - Access to data (Jagtiani and Lemieux, 2019; Fuster et al., 2018; Berg et al., 2018)
  - Technological advantage (van Liebergen, 2017; Gambacorta et al., 2020)
  - Regulatory stance (Buchak et al., 2017 and Barba Navaretti et al., 2017 for fintech)
  - Institutional characteristics (World Bank, 2020; Rau, 2020)
Research questions and contribution

● **Research questions**
  ▪ How large are fintech and big tech credit markets, in absolute terms and relative to overall credit markets?
  ▪ What economic and institutional factors are driving their growth and adoption?

● **This paper**
  ▪ Constructs a new database of fintech and big tech credit volumes for 79 countries around the world over 2013-2019
  ▪ Provides insights into economic and institutional drivers based on panel regressions
  ▪ Gives empirical grounding for discussion of future growth and policy implications
Data and empirical methodology
Database construction

- **Fintech credit**
  - Cambridge Centre for Alternative Finance (CCAF) Global Alternative Finance database (Wardrop et al., 2015; Ziegler et al., 2020)
  - Annual online questionnaire of alternative finance volumes and characteristics
  - Available for 2013-2018; 2019 volumes estimated based on other sources (Brismo, WDZJ, Korean P2P Lending Association, central banks’ input)

- **Big tech credit**
  - Hand-collected from public sources, company contacts and central banks
  - In some cases, conversion from lending stocks to flows (and vice versa)
  - When unavailable, 2019 numbers extrapolated based on user numbers or revenues
Empirical model

Panel regressions over 2013-2018 for fintech credit, big tech credit and total alternative credit:

\[ \ln(Credit_{it}) = \alpha + \beta_1 y_{i,t-1} + \beta_2 y_{i,t-1}^2 + \gamma LI_{i,t-1} + \delta RS_{i,t-1} + \mu BN_{i,t-1} + \sigma X_{i,t-1} + \vartheta D_k + \varepsilon_i \]

\(y_{i,t-1}:\) GDP per capita in economy \(i\) at year \(t-1\)

\(LI_{i,t-1}:\) Lerner index of banking sector mark-ups

\(RS_{i,t-1}:\) regulatory stringency for the banking sector

\(BN_{i,t}:\) the density of the bank branch network compared to the adult population

\(X_{i,t}:\) control variables, e.g. growth in GDP and total credit, real interest rate, mobile phone subscriptions / adult population, dummy for a financial crisis, dummy for AE

\(D_k: \) geographical area fixed effects

\(\varepsilon_{i,t}:\) error term
### Descriptive statistics – part I

#### Table 1: Descriptive statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita (in thousands of USD)</td>
<td>453</td>
<td>21.53</td>
<td>18.21</td>
<td>0.67</td>
<td>87.76</td>
</tr>
<tr>
<td>Lerner index(^1)</td>
<td>453</td>
<td>0.30</td>
<td>0.15</td>
<td>-0.05</td>
<td>1.00</td>
</tr>
<tr>
<td>Bank branches per 100,000 adults</td>
<td>453</td>
<td>17.65</td>
<td>14.03</td>
<td>1.43</td>
<td>83.75</td>
</tr>
<tr>
<td>Normalised index of bank regulatory stringency(^2)</td>
<td>453</td>
<td>0.72</td>
<td>0.10</td>
<td>0.38</td>
<td>0.96</td>
</tr>
<tr>
<td>Score-Starting a business (overall)</td>
<td>425</td>
<td>82.55</td>
<td>11.46</td>
<td>23.04</td>
<td>99.96</td>
</tr>
<tr>
<td>Score-Time (days)</td>
<td>425</td>
<td>81.96</td>
<td>17.33</td>
<td>0.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Score-Paid-in Minimum capital (% of income per capita)</td>
<td>425</td>
<td>94.85</td>
<td>15.45</td>
<td>0.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Score-Cost (% of income per capita)</td>
<td>425</td>
<td>84.92</td>
<td>26.95</td>
<td>0.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Extent of disclosure index (0-10)</td>
<td>425</td>
<td>64.44</td>
<td>23.80</td>
<td>0.00</td>
<td>100.00</td>
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<tr>
<td>Trial and judgment (days)</td>
<td>425</td>
<td>407.85</td>
<td>203.51</td>
<td>90.00</td>
<td>1095.00</td>
</tr>
<tr>
<td>Enforcement of judgment (days)</td>
<td>425</td>
<td>177.98</td>
<td>110.59</td>
<td>26.00</td>
<td>597.00</td>
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<tr>
<td>Enforcement fees (% of claim)</td>
<td>425</td>
<td>5.37</td>
<td>5.23</td>
<td>0.00</td>
<td>23.30</td>
</tr>
<tr>
<td>Bank credit to bank deposits (%)</td>
<td>212</td>
<td>105.39</td>
<td>80.48</td>
<td>27.73</td>
<td>702.09</td>
</tr>
<tr>
<td>Bank regulatory capital to risk-weighted assets (%)</td>
<td>197</td>
<td>17.20</td>
<td>3.81</td>
<td>10.59</td>
<td>35.65</td>
</tr>
<tr>
<td>Provisions to non-performing loans (%)</td>
<td>187</td>
<td>64.29</td>
<td>37.26</td>
<td>0.00</td>
<td>232.06</td>
</tr>
</tbody>
</table>

\(^1\) Defined as the sum of big tech and fintech credit.  
\(^2\) The index is normalised between 0 (no regulation) and 1 (max regulation). The index is calculated from a survey conducted by the World Bank; Cambridge Centre for Alternative Finance and research partners; company statements; authors' estimates.
Descriptive statistics – part II

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans from non-resident banks to GDP (%)</td>
<td>194</td>
<td>27.53</td>
<td>28.33</td>
<td>1.24</td>
<td>158.53</td>
</tr>
<tr>
<td>Corporate bond average maturity (years)</td>
<td>135</td>
<td>10.26</td>
<td>5.75</td>
<td>3.54</td>
<td>34.09</td>
</tr>
<tr>
<td>Corporate bond issuance volume to GDP (%)</td>
<td>137</td>
<td>2.14</td>
<td>1.81</td>
<td>0.05</td>
<td>3.81</td>
</tr>
<tr>
<td>Total factoring volume to GDP (%)</td>
<td>145</td>
<td>5.16</td>
<td>4.90</td>
<td>0.07</td>
<td>13.23</td>
</tr>
<tr>
<td>Global leasing volume to GDP (%)</td>
<td>78</td>
<td>1.32</td>
<td>0.95</td>
<td>0.01</td>
<td>4.55</td>
</tr>
<tr>
<td>Stock market total value traded to GDP (%)</td>
<td>167</td>
<td>50.64</td>
<td>89.08</td>
<td>0.00</td>
<td>562.92</td>
</tr>
<tr>
<td>Stock market turnover ratio (%)</td>
<td>161</td>
<td>53.61</td>
<td>67.37</td>
<td>0.84</td>
<td>556.91</td>
</tr>
<tr>
<td>Ln(Total alternative credit per capita (in USD))</td>
<td>453</td>
<td>0.93</td>
<td>1.43</td>
<td>-1.97</td>
<td>5.11</td>
</tr>
<tr>
<td>Ln(Big tech credit per capita (in USD))</td>
<td>453</td>
<td>0.09</td>
<td>0.99</td>
<td>-3.57</td>
<td>4.55</td>
</tr>
<tr>
<td>Ln(Fintech credit per capita (in USD))</td>
<td>453</td>
<td>-1.14</td>
<td>2.76</td>
<td>-7.20</td>
<td>4.81</td>
</tr>
</tbody>
</table>

Ln = natural logarithm. The dependent variables have been winsorised at the 1% and 99% level.

1 The Lerner index of banking sector mark-ups in economy $i$ reflects market power by incumbent banks. World Bank data. For 2015-2017 data are estimated based on Igan et al (2020).
2 The index is normalised between 0 (no regulation) and 1 (max regulation). The index is calculated from a survey conducted by the World Bank in given years, and therefore data are not available over the whole sample period, but proceed in steps. See https://datacatalog.worldbank.org/.
3 Defined as the sum of big tech and fintech credit.

Sources: IMF, World Economic Outlook; World Bank; Cambridge Centre for Alternative Finance and research partners; company statements; authors’ estimates.
Results
Drivers of fintech and big tech credit volumes

<table>
<thead>
<tr>
<th></th>
<th>Ln(total alternative credit per capita)</th>
<th>Ln(big tech credit per capita)</th>
<th>Ln(fintech credit per capita)</th>
<th>Difference</th>
<th>b-a</th>
<th>H0:</th>
<th>b-a</th>
<th>&lt;0</th>
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<tbody>
<tr>
<td>GDP per capita</td>
<td>0.123***</td>
<td>0.069***</td>
<td>0.171***</td>
<td>0.102***</td>
<td>0.043</td>
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<td></td>
<td>(0.022)</td>
<td>(0.020)</td>
<td>(0.038)</td>
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<tr>
<td>GDP per capita^2</td>
<td>-0.002***</td>
<td>-0.001***</td>
<td>-0.002***</td>
<td>0.001</td>
<td>0.043</td>
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<td>(0.000)</td>
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<td>(0.001)</td>
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<tr>
<td>Lerner index</td>
<td>1.438***</td>
<td>0.867**</td>
<td>2.436***</td>
<td>1.569**</td>
<td>0.818</td>
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<td></td>
<td>(0.401)</td>
<td>(0.365)</td>
<td>(0.732)</td>
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<tr>
<td>Bank branches per 100,000 adult population</td>
<td>-0.017***</td>
<td>0.005</td>
<td>-0.028***</td>
<td>0.033***</td>
<td>0.010</td>
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<td></td>
<td>(0.005)</td>
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<td>(0.009)</td>
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<td>(0.560)</td>
<td>(0.544)</td>
<td>(1.068)</td>
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<td>R²</td>
<td>0.469</td>
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</table>

Estimation period 2013-2018. Robust standard errors in parentheses. ***/** denotes results significant at the 1/5/10% level. Ln = natural logarithm. The dependent variables have been winsorised at the 1% and 99% level.
Robustness checks

- **Simple cross section**: 79 observations, but important to mitigate endogeneity concerns

- **Inclusion of a complete set of time dummies**: fixed effects tend to capture the common global trends in the evolution of these forms of credit, but overall results similar

- **Log of the stock of bank credit**: relationship between bank credit per capita and GDP per capita remains positive up to a level of GDP per capita of around USD 48,700. Negative correlation with the Lerner index and a more stringent bank regulation.

- **Impact of explicit fintech regulation**: dummy variable that takes a value of 1 if an explicit regulation of fintech credit was in place in a given country and year, and 0 elsewhere. Positive effects but endogeneity prevents to infer causality. All results remain the same.
Results for country-specific institutional characteristics

- **Ease of doing business**: overall score (**), days to start a business (**), minimum paid-in capital (*), cost to start a business (*)
- **Investor protection and judicial system**: extent of disclosure (*), duration of trials and judgments (-***), duration of enforcement of judgments (-***), enforcement fees (-*)
- **Banking characteristics**: loan-to-deposit ratio (-**), regulatory capital to risk-weighted assets (**), provisions to non-performing loans (**), loans from non-resident banks (-**), firms with a transaction account (**)
- **Financial market development**: corporate bond average maturity (**), corporate bond issuance volume to GDP (**), global leasing volume to GDP (**), stock market total value traded to GDP (**), stock market turnover ratio (**)

***/**/* denotes results significant at the 1/5/10% level.
Conclusions
Main takeaways

- Fintech and big tech credit have grown fast – to an estimated USD 223 and 572 bn in 2019
- Both are higher: (i) with higher GDP per capita, but at a declining rate; (ii) where banking mark-ups are higher and (iii) where banking regulation is less stringent
- Fintech credit is more prevalent where there are fewer bank branches per capita
- Total alternative credit is higher where ease of doing business is higher, with greater investor protection and judicial system quality, where bank capital, provisions and deposit funding are higher and where financial markets are more developed
- Overall, alternative forms of credit seems to complement more traditional credit markets, not to substitute for them