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and financial stability

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.

Fintech and big tech credit: some definitions

	Fintech	Fintech credit	Big tech
Definition	Technology-enabled innovation in financial services that could result in new business models, applications, processes or products ... (FSB, 2017)	Credit activity facilitated by electronic (online) platforms that are not operated by commercial banks, e.g. P2P / marketplace lending (Claessens et al., 2018)	Large companies whose primary activity is digital services, rather than financial services (Frost et al., 2019; BIS, 2019)

Examples



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

Database construction

● **Fintech credit**

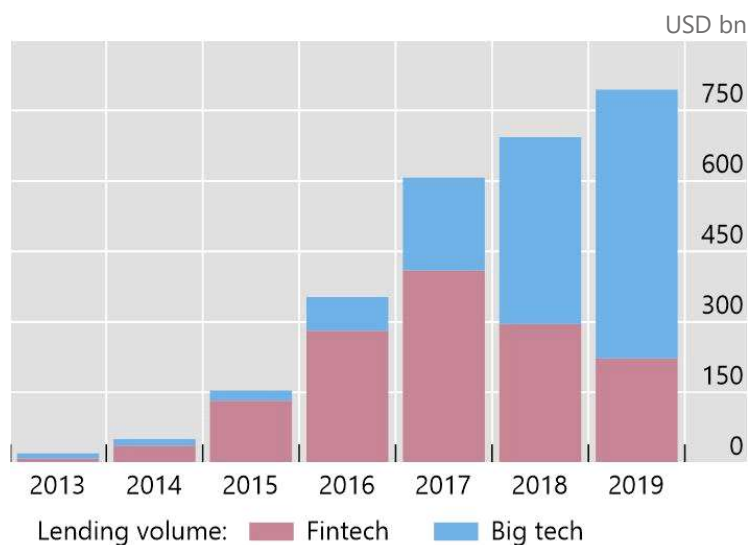
- Cambridge Centre for Alternative Finance (CCAF) Global Alternative Finance database (Wardrop et al., 2015; Ziegler et al., 2020)
- Annual online questionnaire of alternative finance volumes and characteristics
- Available for 2013-2018; 2019 volumes estimated based on other sources (Brismo, WDZJ, Korean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

● **Big tech credit**

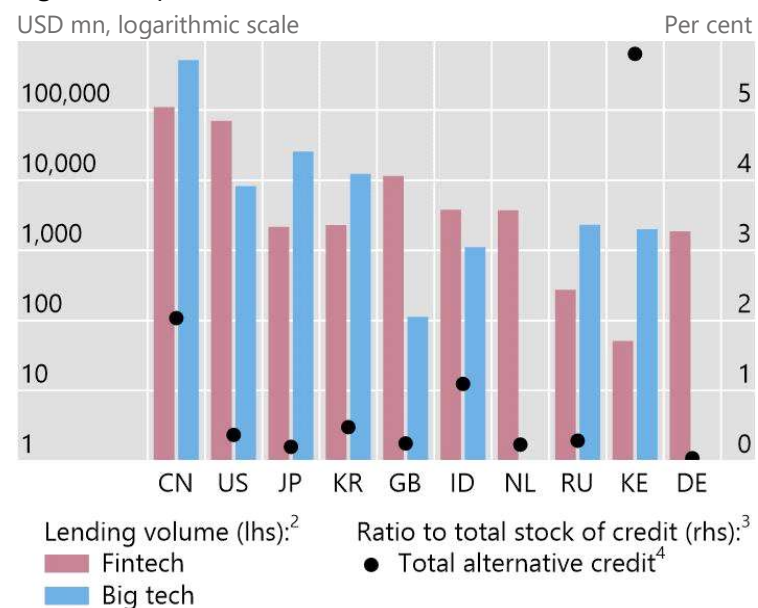
- Hand-collected from public sources, company contacts and central banks
- In some cases, conversion from lending stocks to flows (and vice versa)
- When unavailable, 2019 numbers extrapolated based on user numbers or revenues

Big tech credit is booming – reaching USD 572 bn in 2019

Big tech credit is overtaking fintech credit¹



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

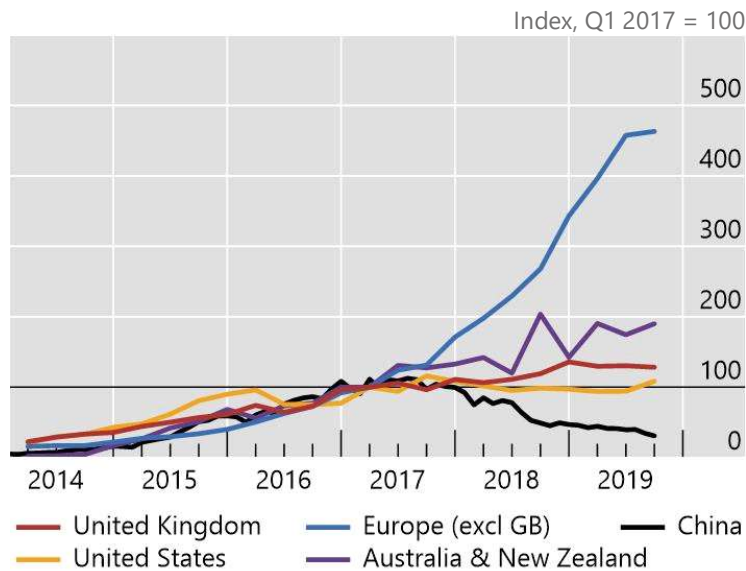


Figures include estimates. CN = China, US = United States, JP = Japan, KR = Korea, GB = Great Britain, ID = Indonesia, NL = Netherlands, RU = Russia, KE = Kenya, DE = Germany.

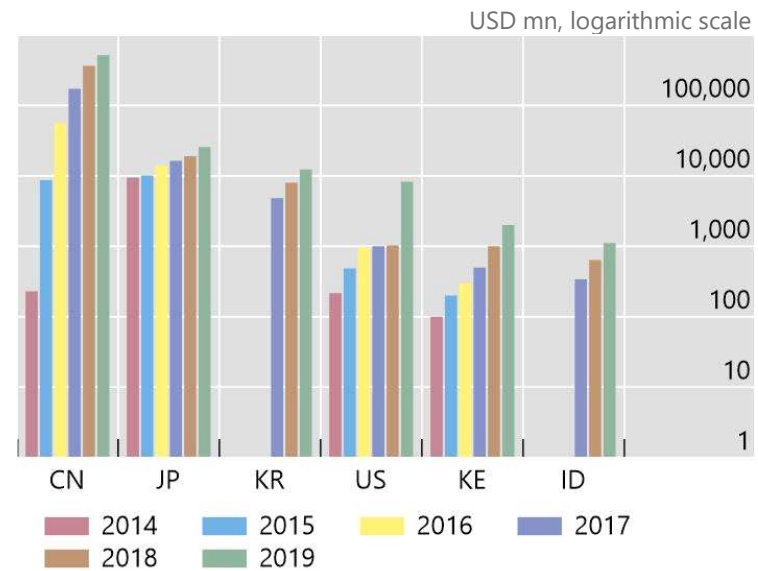
¹ 2019 fintech lending volume figures are estimated on AU, CN, EU, GB, NZ and US. ² Data for 2019. ³ Domestic credit provided by the financial sector. Data for 2018. ⁴ Total alternative credit is defined as the sum of fintech and big tech credit. Data for 2019.

Fintech credit is growing fast in Europe and many other jurisdictions

Fintech lending volumes are diverging¹



Big tech credit is booming in Asia, the US and Africa²

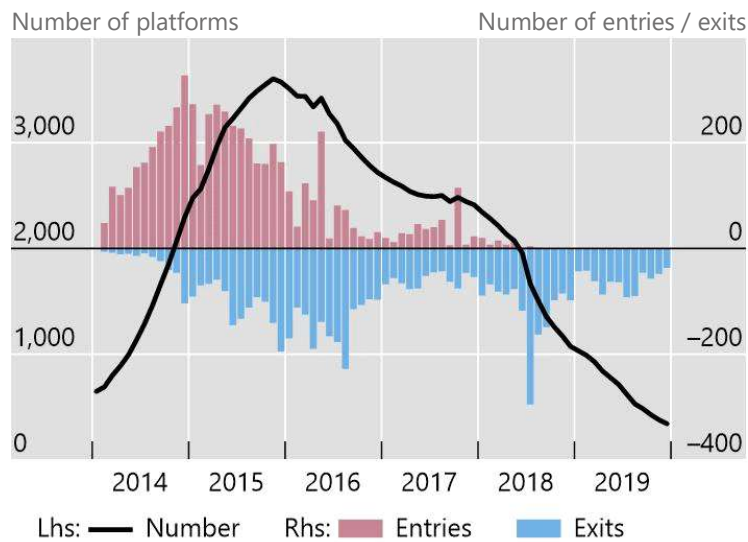


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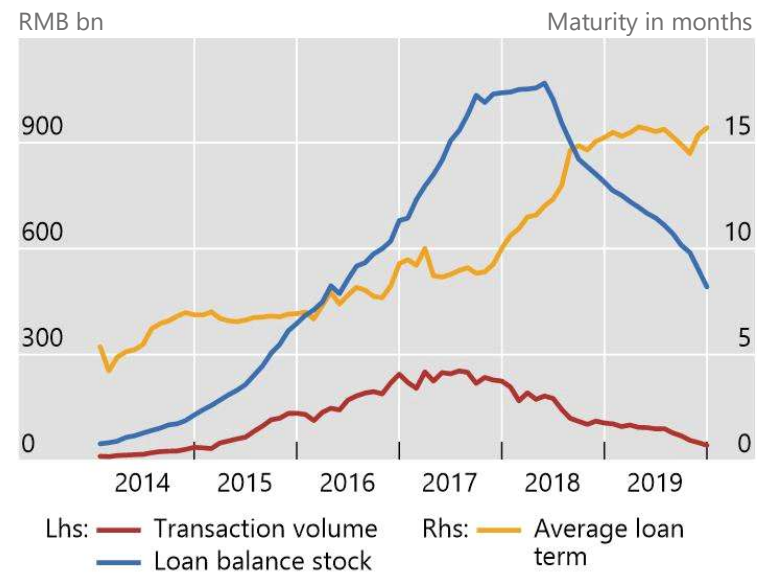
¹ Data are based on five platforms for Australia and New Zealand, all platforms covered by WDJ.com for China, 49 platforms for Europe, 34 for the United Kingdom and five for the United States. Volumes are reported in local currency. ² Figures include estimates.

Fintech credit platforms continue to exit in China, as loans stocks and flows fall

Number of fintech credit platforms in China



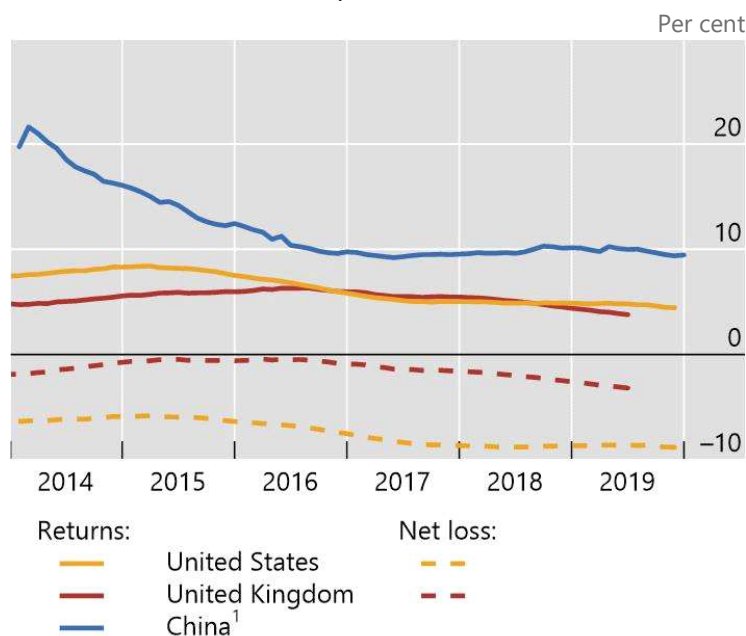
Stock and flow of loans is falling as average tenors rise



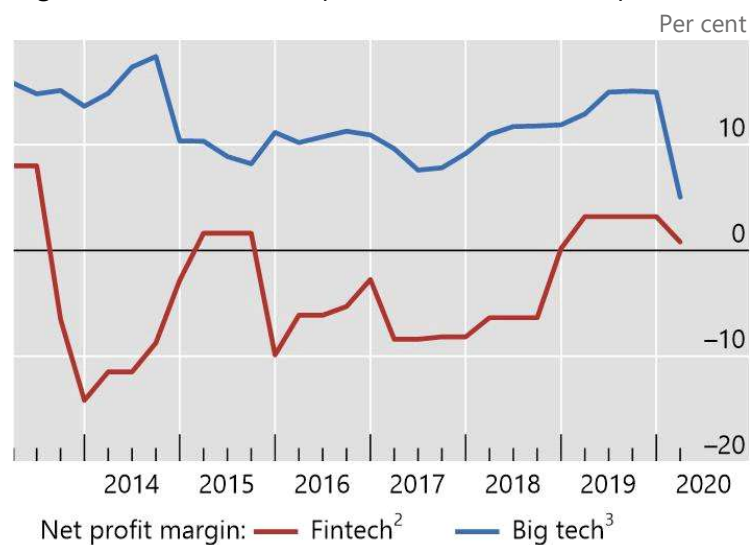
Data based on all platforms covered by WDZJ.com for China.

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



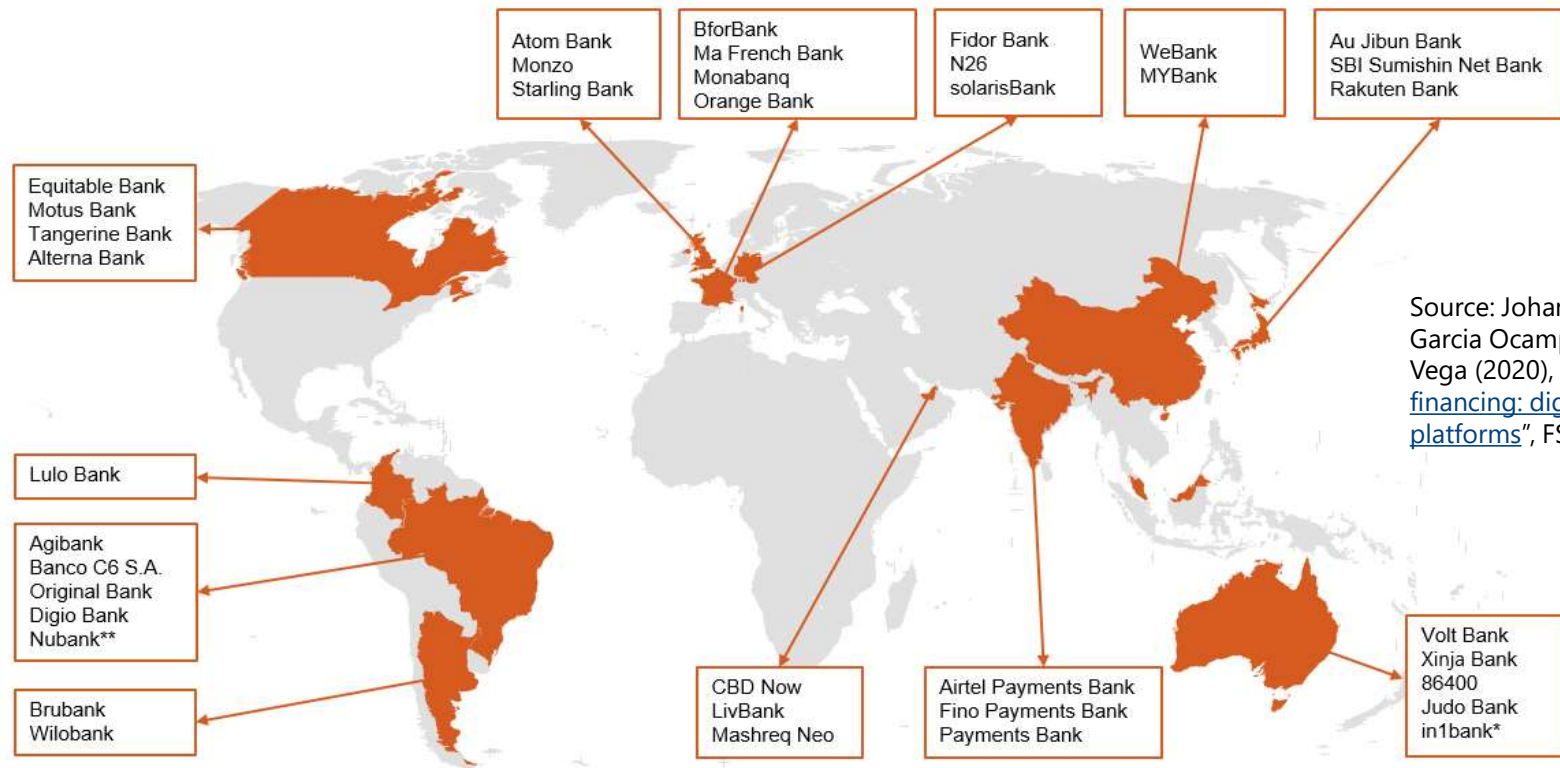
¹ Average interest rate. ² Simple average of Black Knight Financial Services, Elevate, Enova International, Fellow Finance, Funding Circle, LendingClub, Lendingtree, Nelnet, OnDeck and Synchrony. ³ Simple average of Alibaba, Amazon, Apple, Baidu / Du Xiaoman, Facebook, Google, JD.com, Kakao, LINE, Microsoft,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

Main takeaways from the paper

- 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

Regulation of digital banks

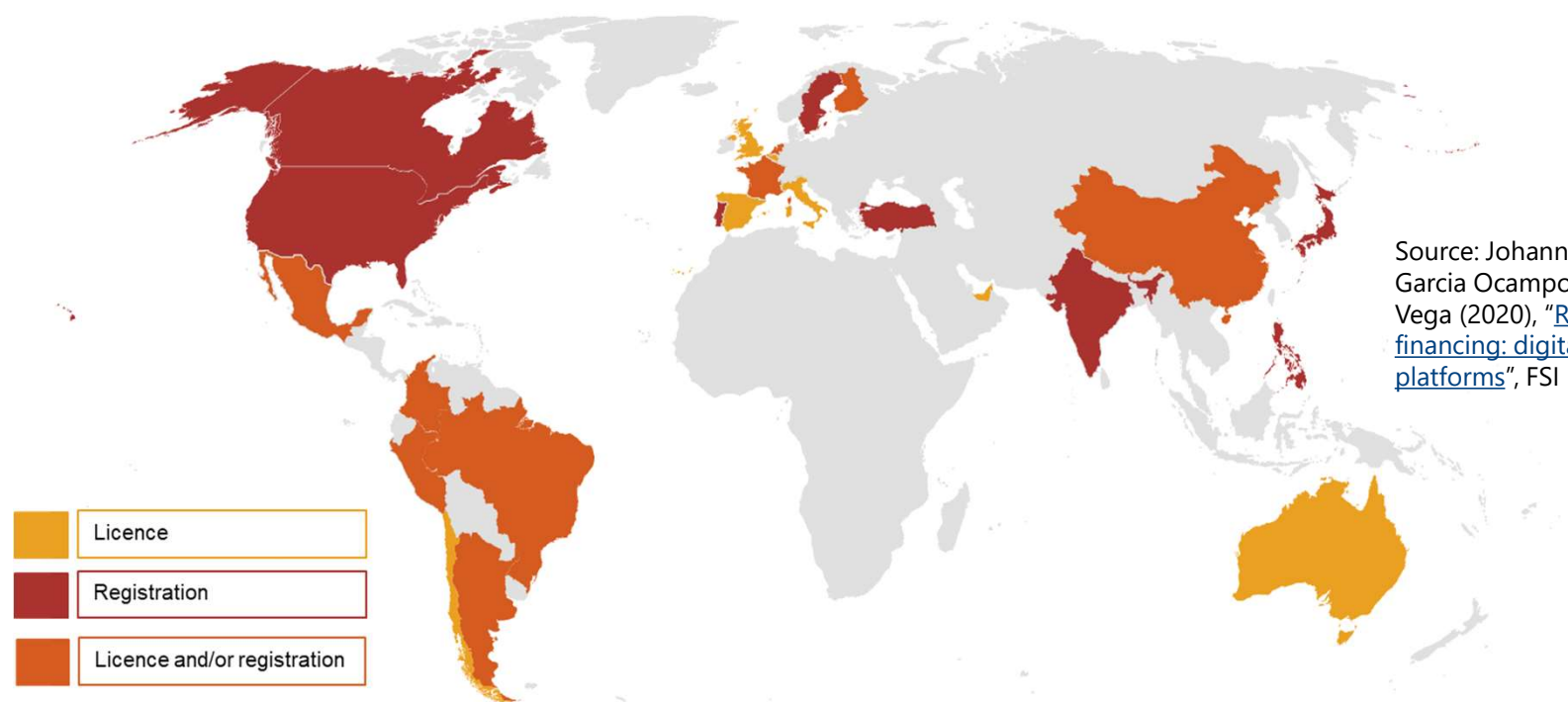
Examples of digital banks licensed under existing (ie non-specific) banking regulations



Source: Johannes Ehrentraud, Denise Garcia Ocampo and Camila Quevedo Vega (2020), "[Regulating fintech financing: digital banks and fintech platforms](#)", FSI Insight no 27.

Regulation of fintech platform financing

Crowdfunding platforms are typically subject to registration or authorisation requirements



Source: Johannes Ehrentraud, Denise Garcia Ocampo and Camila Quevedo Vega (2020), "[Regulating fintech financing: digital banks and fintech platforms](#)", FSI Insight no 27.

#questions?

Annex

Regulation of digital banks

Regulatory requirements

- Main licencing requirements for digital banks are similar to those for traditional banks
- But digital banks may have
 - accentuated requirements in relation to technology-related elements
 - additional requirement to foster financial inclusion
 - specific requirements on ownership and control

Licensing requirements for digital banks							Table 2
	AE	HK	KR	MY	SG	TW	
General licensing requirements							
Legal form and place of incorporation	✓	✓	✓	✓	✓	✓	
Ownership structure/control	✓	✓	✓*	✓*	✓	✓*	
Long term sustainability of the business plan	✓	✓	✓	✓	✓	✓	
Fitness and propriety test	✓	✓	✓	✓	✓	✓	
Minimum paid-up capital	✓	✓	✓**	☑	☑	✓	
Sound risk culture: risk governance frameworks	✓	✓	✓	✓	✓	✓	
Exit plan	✓	✓	✓	✓	✓	✓	
Technology-related licensing requirements							
Fitness and propriety test on technology fields	-	✓	✓	✓	✓	✓	
Track record in technology	-	✓	-	✓	✓	-	
Third-party assessment of IT systems	✓	✓	-	✓	-	-	
Financial inclusion	✓	✓	✓	✓	✓	-	

(*) Requirements on who is allowed to own and/or control digital banks differ from those applicable to traditional banks. In Malaysia, while not a mandatory requirement, preference is given to applicants where the controlling equity interest resides with Malaysians.

(**) Internet-only banks have a minimum capital requirement of KRW 25 billion; other banks KRW 100 billion.

✓ Requirement applies in full from the start. ☑ Compliance not required in full in the initial phase of transitioning schemes. – Not explicit.

Source: National regulations.

Source: Johannes Ehrentraud, Denise Garcia Ocampo and Camila Quevedo Vega (2020), "[Regulating fintech financing: digital banks and fintech platforms](#)", FSI Insight no 27.

Regulation of fintech platform financing

Requirements on crowdfunding platforms

- Most CF platforms are not allowed to invest in the financial instruments they intermediate
- Where allowed, requirements around risk retention apply

Requirements around risk retention		Table 6					
	Equity CF	Loan and equity CF					
	IT	BE	CL*	ES	EU*	MX	SG
Adopt suitable measures to manage potential conflicts of interest	✓	✓	-	✓	✓	✓	✓
Outsource due diligence procedures to an independent party	✓	-	-	-	-	-	-
Inform investors on the platform's participation	-	-	✓	✓	✓	✓	-
Cap on the amount invested	-	-	-	✓	✓	-	-
Restrictions to invest in projects hosted by other platforms	-	-	-	✓	-	✓	-

Sources: National regulation; FSI. *Draft regulation.

Source: Johannes Ehrentraud, Denise Garcia Ocampo and Camila Quevedo Vega (2020), "[Regulating fintech financing: digital banks and fintech platforms](#)", FSI Insight no 27.

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)

Empirical model

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

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

$y_{i,t-1}$: 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

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

Descriptive statistics – part II

Descriptive statistics					Table 1
Variable	Observations	Mean	Standard deviation	Min	Max
Loans from non-resident banks to GDP (%)	194	27.53	28.33	1.24	158.53
Corporate bond average maturity (years)	135	10.26	5.75	3.54	34.09
Corporate bond issuance volume to GDP (%)	137	2.14	1.81	0.05	13.83
Total factoring volume to GDP (%)	145	5.16	4.90	0.07	16.29
Global leasing volume to GDP (%)	78	1.32	0.95	0.01	4.81
Stock market total value traded to GDP (%)	167	50.64	89.08	0.00	562.92
Stock market turnover ratio (%)	161	53.61	67.37	0.84	556.91
Ln(Total alternative credit per capita (in USD) ³)	453	0.93	1.43	-1.97	5.11
Ln(Big tech credit per capita (in USD))	453	0.09	0.99	-3.57	4.55
Ln(Fintech credit per capita (in USD))	453	-1.14	2.76	-7.20	4.81

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.

Drivers of fintech and big tech credit volumes

	Ln(total alternative credit per capita)	Ln(big tech credit per capita)	Ln(fintech credit per capita)	Difference b-a
		(a)	(b)	H ₀ : b-a < 0
GDP per capita	0.123*** (0.022)	0.069*** (0.020)	0.171*** (0.038)	0.102*** (0.043)
GDP per capita^2	-0.002*** (0.000)	-0.001*** (0.000)	-0.002*** (0.001)	0.001 (0.001)
Lerner index	1.438*** (0.401)	0.867** (0.365)	2.436*** (0.732)	1.569** (0.818)
Bank branches per 100,000 adult population	-0.017*** (0.005)	0.005 (0.005)	-0.028*** (0.009)	0.033*** (0.010)
Normalised regulation index	-4.665*** (0.560)	-1.735*** (0.544)	-8.427*** (1.068)	6.692*** (1.199)
Other controls	Yes	Yes	Yes	
Geographic area fixed effects	Yes	Yes	Yes	
No. of observations	453	453	453	
Estimation method	OLS	OLS	OLS	
R ²	0.469	0.112	0.516	

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.