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HOW DIGITAL INNOVATION CAN INCREASE SMALL BUSINESS ACCESS TO FINANCE IN ASIA

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Small- and medium-sized enterprises (SMEs) are a key contributor to economic activity around the world as an important source of jobs, growth, and innovation.[1] Despite their essential role, SMEs receive a disproportionately small share of credit from the financial system, a trend that persists across developed and developing countries, including in Asia.[2] This paper summarizes the SME credit gap in Asia and assesses ways emerging technologies and innovative business models—commonly known as "fintech"[3]—can improve SME access to financial services in Asia and boost long-term economic growth in the process.

I. Asia's SME Credit Gap Is Particularly Large

SMEs are crucial to Asia's economic vitality. They represent 42 percent of Asia's GDP and are responsible for well over half of all jobs (see *Table 1*).[4] In addition, research on SMEs highlights their important role in innovation, with a significant minority of highly innovative firms matching the profile of start-ups typically associated with places like Silicon Valley. Despite their important role, a significant mismatch exists between SMEs' economic impact and their access to finance—Asian SMEs receive just 18.7 percent of total bank credit.[5] With nearly one million new jobs needed each month to absorb Asia's growing workforce, expanding access to credit for SMEs is a pressing policy priority.[6]

***Table 1*: Small Businesses Play a Large Role in Asian Economies**

Country	SME Share of Employment (%)	SME Contribution to GDP (%)	Data Year
China	64.7	60	2011, 2013
Hong Kong	47	--	2012
India	40	37.5	2015, 2013
Indonesia	97	60.3	2009, 2013
Japan	69.7	43.7	2012
Korea	87.7	47.6	2012
Malaysia	65.0	35.9	2014
Philippines	63.7	35.7	2013, 2009
Singapore	68.0	45.0	2012
Taiwan	78	30	2011
Thailand	80.3	39.6	2014
Vietnam	46.8	40	2012, 2011

Source: ADB[7], APEC[8], IMF[9]

A joint study by the Organization for Economic Cooperation and Development (OECD) and the Asian Development Bank (ADB) found that SMEs in Asia lag behind global peers in access to financial services, specifically credit. Notably, Asian SMEs were less likely than global peers to have made recent investments, and more likely to have relied on retained earnings over external financing if they did so. The direction of causality between Asian SME investment and borrowing behaviors is not easily determined, but Asian SMEs were roughly half as likely to apply for loans as global peers according to OECD-ADB surveys.[10] Their reluctance to borrow may be due to stricter bank requirements: they are roughly 50 percent more likely to be required to provide collateral in borrowing.[11]

Why the Credit Gap Exists

Providing financial services to SMEs generally involves greater costs and higher risks compared to serving other types of enterprises. Small businesses have fewer assets to use for collateral, less stable sources of revenue, and limited liquidity, factors that increase credit risk. From a cost perspective, providing a commercial loan involves significant operational costs prior to loan origination, such as customer acquisition, due diligence, regulatory compliance, credit risk analysis, and document processing. Loan servicing, particularly for higher-risk customers like SMEs, brings additional costs. Because SMEs typically borrow small amounts of money, lenders may find such loans less profitable, even if they charge higher interest to account for greater credit risk. Instead, banks and other financial institutions generally rely on economies of scale to lend efficiently, directing credit to larger customers.

This problem is compounded for so-called “thin file” customers with limited to no credit histories. By nature, many SMEs have never received funding from the formal financial system, either because of their early speculative stage (when they may rely on money from the entrepreneur’s savings or personal network) or limited collateral to back bank loans. Many developing countries lack robust credit rating systems and even firms with some credit history may not qualify for loans. The limited availability of traditional data for credit risk assessment impacts banks’ lending decisions, driving higher interest rates for SMEs or limiting financing outright.

II. Asia’s Digitizing Economy Can Leverage Technology to Fill the Gap

Emerging financial technology and innovations in traditional business models can take advantage of Asia’s rapidly digitizing economy to expand SME access to credit in Asia through a number of complementary improvements. The use of alternative data can enhance credit analysis of small businesses previously disadvantaged by limited credit history, a problem in Asian countries without comprehensive credit bureau coverage. Technology-driven changes to business models can also expand access to financial services with growth potential for Asia’s SMEs: trade finance, by modernizing inefficient processes and reducing the role of costly intermediaries; and invoice financing, by leveraging the digitization of commerce to make accounts receivables more easily priced and traded.

Even in a conservative scenario, innovation in SME financing can unlock liquidity and working capital that allows SMEs to survive the volatile early stages of growth and development. Having greater access to finance might also create a benevolent cycle as access helps build credit history that financial institutions can use to better price SME loans, amplifying the benefits and supporting long-term economic growth.[12] Some of these improvements would undoubtedly be disruptive to incumbents. Still, while new SME-

focused fintech firms might take some market share from traditional firms, they are most likely to serve a large number of borrowers that are currently rejected by traditional firms. Market share lost to newcomers will likely be offset by an increase in the overall size of the market.[13]

Using Alternative Data to Expand Credit Scoring

In much of Asia, credit scoring is still limited despite many countries' efforts to develop national credit bureaus over the past several decades.[14] In China, for example, an estimated two-thirds of people were not scored by a credit bureau as recently as 2015,[15] while in India, 80 percent of people lacked coverage according to 2014 Reserve Bank of India surveys.[16] Limits to such credit scoring of individual borrowers typically extend to small businesses, particularly those established by individual proprietors. Without prior credit history, small business owners find it more difficult to qualify for loans and access other financial products.

The increasing availability of online data is changing the landscape. A number of innovative Asian firms are leveraging alternative data generated by the growing level of social and economic activity taking place online to help fill this credit scoring gap. Asia represents a natural place for such innovation given the region's growing share of e-commerce. In 2016, China became the world leader in e-commerce with sales of nearly $400 billion according to data from Euromonitor. Other countries like Japan, South Korea, and India are among the top 10.[17] Meanwhile, Asia was the home to an estimated $6 trillion in business-to-business (B2B) e-commerce sales in 2017, roughly three-quarters of the global total.[18]

A lender may analyze an SME borrower's online sales and payments activity to assess their ability to repay a loan without a credit score, or use utilities and telecommunications company data to confirm if a borrower has a history of paying bills on time. A lender can also use various data to corroborate basic elements of a loan application more quickly and cheaply, such as verifying a small business' place of operations through geolocation data obtained from the entrepreneur's telecommunications company.[19] One start-up, Tala Mobile, is experimenting in India with a variety of social data shared by borrowers that use its mobile app—the company claims that indicators as basic as how frequently someone calls a loved one can help inform a credit decision.

Among Asian countries, the Chinese government sees clear potential for the use of alternative data. In 2015, the People's Bank of China (PBOC) issued provisional licenses to eight firms—including leading fintech firms associated with Alibaba, Tencent, and Ping An—to establish credit scoring services that leverage such alternative data to increase access. The firms have continued to operate despite the expiration of these provisional licenses, with Alibaba's Sesame Score serving 260 million users as of July 2017.[20] The PBOC has reportedly expressed some concern that credit scores across firms are inconsistent, and more likely to be correlated to a customer's use of a given commercial platform (e.g. Alibaba's retail products or Tencent's social media networks) than actual creditworthiness.[21] In February 2018, the PBOC approved China's first personal credit platform, Baihang Credit Scoring, which was jointly founded by eight credit firms including Tencent Credit and Sesame Credit. The National Internet Finance Association of China is Baihang's largest shareholder with a 36-percent stake. Such a national-level consolidation will likely assure a uniform methodology for credit scoring that includes non-financial data while also preventing the emergence of closed, proprietary credit scoring systems that do not share data within the financial system.

The increasing availability of data on SME borrowers could also be utilized in national-level credit databases that do not contain individual ratings but instead generalize credit risk for a variety of SME borrower types. Japan's Credit Risk Database, established in 2001, is a potential model for emerging uses of alternative data in SME credit analysis. Its members voluntarily share anonymized financial data on SME borrowers' financial history to help the broader system better assess credit risk.[22] Similarly, the traditional and start-up firms using new sources of data to track SME credit risk in places like China could share information to improve overall credit analysis. Both public and private sector efforts could compel such information sharing. The benefits could include more precise estimates of default risk and a resulting decline in SME risk premiums. Improving accuracy of SME credit risk assessments could also affect regulatory views of the riskiness of the sector should enhanced data analysis reveal significant bias in the measurement of SME credit risk not previously recognized by analysts. This could lead to further improvements in SME financial access if, for example, regulators reduced capital risk weightings for SME loans over time if SME loans showed sustained performance improvements. Public credit guarantee programs could also use new forms of data to expand their coverage (see textbox below).

Enhancing Credit Guarantee Programs

Efforts to share and aggregate alternative data could also enhance existing credit guarantee programs, which have historically been a favored policy tool of governments hoping to stimulate small business lending. South Korea is one the most successful examples of credit guarantees in Asia. SME loans represent nearly 40 percent of the country's GDP as of the International Finance Corporation's Financial Access Survey in 2012. These loans are largely supported by the Korean government through its Credit Guarantee Agency, and government credit guarantees of SME loans exceeded 4 percent of GDP as of 2014, the third-highest measure among OECD countries. Credit guarantees make private financial institutions more willing to lend, although moral hazard may undermine due diligence practices. Indeed, most successful credit guarantee programs make sure that private lenders retain significant risk on their own balance sheets while also assuring the guarantees are only paid out after adequate efforts are made to recover and resolve bad debts.

The creation of national credit databases that includes both financial and alternative data might improve the effectiveness of existing credit guarantee programs or stimulate new initiatives. In countries where private firms are slow to adopt alternative data to expand SME lending, public sector entities could increase lending through technology-enhanced credit guarantee programs.

Source: Oya Pinar Ardic, Kathryn Imboden, and Alexia Latortue. *Financial Access 2012*. Consultative Group to Assist the Poor and International Finance Corporation; Simon Bell. "Learning from Korea: The Story of Korea's Credit Guarantee Agency." The World Bank. October 16, 2016. Accessed February 15, 2018.

Despite the potential benefits to credit scoring, the rising use of alternative data raises a number of potential legal and regulatory concerns. Perhaps most prominently, regulators worry that the use of algorithms could create discriminatory outcomes in lending decisions, biasing credit allocation away from disadvantaged groups. Further, while users may consent to the broad use of data generated by mobile phone activity, for example, privacy protections may limit use. In India, where policy makers have promoted a national biometric identification system that has potential uses across the financial system,

courts are weighing the social and economic benefits of such a system against an individual's right to privacy. More broadly, the creation of a digital financial identity raises questions about an individual's right to understand how personal data can drive credit scores, their ability to share data generated on proprietary platforms, and their recourse to challenge or correct scoring should it be based on inaccurate information. These are all active issues that Asian policymakers and regulators will confront as a broader array of social and economic data impacts their citizens' financial lives.

Modernizing Trade Finance with Distributed Ledgers

The growing importance of Asia in world trade makes expanded access to trade finance a potential game changer for its small businesses, which contribute over 40 percent of exports of major economies like China and India (see *Table 2*). The region is now responsible for roughly one-third of global trade, lagging only Europe, while Asian firms already account for roughly half of the world's supply chain exports, which involve the trade in parts and components.[23, 24] Further economic growth combined with potential for progress in regional trade deals makes Asia likely to become the largest contributor to overall trade in the near future.

***Table 2*: Small Businesses Contribution to Exports in Select Economies**

Country	SME Shares of Exports (%)	Data Year (%)
China	41.5	2011
India	42.4	2013
Indonesia	15.7	2013
Korea	18.8	2012
Thailand	26.3	2014

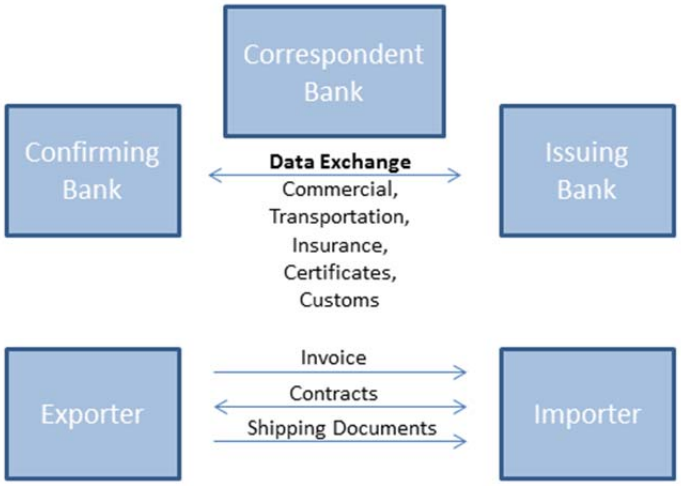
Source: ADB[25]

Despite SMEs' existing participation in Asia's trade, their presence is restricted by access to finance, as surveys of SMEs report limited funding as a common reason they refrain from trade in the global supply chain. The ADB estimates that firms in Asia face an annual trade financing gap of $600 billion, with roughly one-quarter, or $150 billion, of the gap faced by SMEs (mid-cap firms represent another $300 billion).[26] Among firms rejected for trade finance, 60 percent said they did not proceed with the trade because of the lack of finance.[27] The ADB estimates that a 10 percent increase in trade finance is associated with a 1 percent increase in employment.

Trade finance remains a highly old-fashioned business, with a preponderance of paper-based processes and a complicated chain of intermediaries in between buyers and sellers of goods. These parties coordinate transactions across a number of axes, including languages, currencies, accounting systems, customs regimes, laws, and regulations. A common trade finance transaction, represented in *Figure 1* below, may involve extensive paperwork across multiple ledgers, due diligence and compliance processes, and three financial institutions, not to mention third parties involved in verifying progress of goods through various stages in the transaction.[28] Further, a typical transaction is arguably more complex in Asia than other major trading regions like Europe, where business takes place across more developed economies, under a common currency, and within a free trade union with many harmonized laws,

regulations, and commercial standards. As with other forms of lending to SMEs, the more inefficient a process, the less likely it can sustain the service of smaller customers, but also the greater the opportunity for innovation.

***Figure 1*: Typical Information Exchanges in Trade Finance Transactions**



Source: Author's illustration, Boston Consulting Group[29]

Asia's existing inefficiencies in trade finance may particularly benefit from the use of blockchains, also known as distributed ledger technology, one of the most hyped new financial technologies to emerge in recent years. Traditionally, banks have served as a trusted intermediary between importers and exporters by providing assurance that goods will be delivered and bills paid assuming each party complies with various commercial terms. Still, the complex sequence of steps in international trade means a range of documentation—often in paper form—must be tracked across multiple ledgers, with a number of other third parties required for verification and coordination with banks. This tends to add time and cost to transactions while also increasing the risk of documentation errors.

By providing a single mechanism for tracking a variety of steps in the trade finance process—orders, contracts, documentation, insurance, multimodal shipments, customs, delivery—a blockchain could enhance interoperability among previously incompatible systems, improve accuracy and eliminate redundancy in record keeping, reduce end-to-end transaction time, and increase transparency. For example, a blockchain letter of credit could be scheduled to execute upon delivery of goods to the port of entry. In the past, the good's arrival may have required verification, which itself could be held up by other customs approvals. By embedding the contract with a geolocation trigger, the letter of credit could execute immediately upon the good's arrival in port or clearance through customs. Barclays claims to have issued the first blockchain-based letter of credit in 2016, executing a transaction that normally takes up to 10 days in under four hours.[30] With the power of such innovation in mind, the Hong Kong Monetary Authority and Monetary Authority of Singapore are each developing distributed ledger technologies in collaboration with major banks, with plans to link the systems eventually.[31]

The use of blockchain in foreign currency transactions also has the potential to reduce the role of correspondent banks that add time and cost to trade finance transactions. Traditionally, if an exporter's

local bank has no access to international financial markets, it will seek a correspondent bank that can provide cross-border services, linking the customer to another country's financial system. While cross-border payments using traditional correspondent banking networks visualized above can take a full business week, new blockchain networks may allow banks to establish bilateral relationships for quicker transfers and at lower cost.[32] Notably, the initial use of such technology has typically involved the collaboration between fintech start-ups deploying the technology for traditional institutions. This new competition has even spurred on the Society for Worldwide International Financial Telecommunication, commonly known as SWIFT, which has traditionally served a central role in international correspondent banking. SWIFT is now experimenting with blockchain to increase the speed and transparency of its own services.

Automation Makes Lending to Small Firms Viable

Automation of previously labor-intensive tasks like contracting and compliance can make lower value loans to SMEs more viable. To some extent, the use of technology to automate basic functions is ubiquitous across the economy—any rational business owner uses technology to enhance productivity and lower costs. Still, some emerging technology is well suited to automate specialized legal finance tasks previously considered the realm of high-skilled labor, while the digitization of economic activity can reduce the cost of previously labor-intensive compliance functions. Automated legal functions can reduce the time and budget required to process new loan paperwork and draft loan agreements, making smaller-value loans profitable. The use of machine learning has reduced legal costs for JP Morgan, for example, automating what previously required 360,000 hours of annual work by lawyers and loan officers. New digital Know Your Customer compliance systems can take advantage of increasingly robust national databases promoted in countries like Singapore, Thailand, and India to reduce the time and cost of small customer acquisition and due diligence.

Source: Hugh Son. "JPMorgan Software Does in Seconds What Took Lawyers 360,000 Hours." Bloomberg. February 27, 2017.

Technology driving change in other financial services can also make a difference for SMEs rejected for trade financing because of low profitability or limited information on its own bona fides or that of its counterparty. More granular analysis of SME financial profiles (for example, using alternative data analysis envisioned earlier) could provide insight into a borrower's profitability. In parallel, ubiquitous tools to conduct digital Know Your Customer (KYC) compliance could reduce the time and cost of such due diligence for financial providers and make it easier to verify the bona fides of a customer's counterparty (see textbox above). Even assuming the persistence of cumbersome paper processes and handwritten data inputs at certain stages of the process, the use of optical character recognition combined with machine learning could drastically improve operational efficiencies and lower costs.[33]

With continued growth in regional trade, the need to finance SMEs in the trade sector will only increase in the years to come. Altogether, innovations that improve the efficiency of trade finance transactions could open the sector to SMEs who have long been underserved.

Leveraging Online Commerce to Expand Invoice Financing

The rapid digitization of commerce in Asia also has the potential to expand the role of invoice financing—also known as factoring—for the region's SMEs. Factoring is one of the oldest forms of lending: financial institutions purchase invoices owed to a business, assuming the risk that a bill is not paid in return for a discount on the notional value of the invoice.[34] Factoring is particularly attractive to smaller firms that might otherwise lack collateral to obtain loans or face other liquidity constraints. These firms can rely on the creditworthiness of larger customers to facilitate borrowing for investment or, more typically, working capital. Factoring also lets SMEs make up for their limited expertise and bargaining power when collecting late payments from big customers by outsourcing these activities to a third party.

The Asia-Pacific is already the second largest factoring market in the world according to statistics from FCI, an industry trade association, representing under one-quarter of the global total (Europe dominates at 67.1 percent). Given Asia's broader economic potential and substantial and growing online B2B market (three-quarters of the world total), the region is poised for further growth in factoring. As more and more Asian businesses conduct their activities digitally—for example, selling goods online or using accounting software—their accounts receivables become standardized documents more easily priced, financed, and traded by factoring firms.

As with trade finance, technology can offer a number of improvements to expand the factoring market to more SMEs. The use of blockchain contracts or centralized digital platforms could standardize the format of invoices, making them easier to verify, trade, and finance. Several start-ups are already experimenting with the technology globally.[35] Alternative data that supports credit analysis in other sectors (for example, the use of payments data discussed earlier) could also be used to assess the creditworthiness of an SME's customers, allowing for more accurate analysis of the credit risk in funding the accounts receivables. Indeed, online retailers like Alibaba and Amazon already use such data in their own affiliates' lending activities.

Blockchain Could Expand SMEs' Collateral for Borrowing

Blockchains may make it easier to attach movable assets like vehicles, machinery, and even inventory to a loan. Historically, such assets have frequently been disqualified because the borrower could not physically transfer them to the lender given their importance in business operations. A number of Asian countries like China and Thailand have implemented legal frameworks to make it easier for borrowers and lenders to include movable assets as collateral, but technology could make the use of such assets more practical, improving credit access and affordability. Combined with geolocation technologies, an SME could offer what limited assets it may have as collateral. A lender might more readily lend against the fleet of a small business's vehicles, for example, if it could more easily collect the collateral in the event of default. These techniques could also be used to reduce the risk and resulting cost of leasing equipment to small businesses.

Source: ADB Institute. "SMEs in Developing Asia: New Approaches to Overcoming Market Failures." 2016.

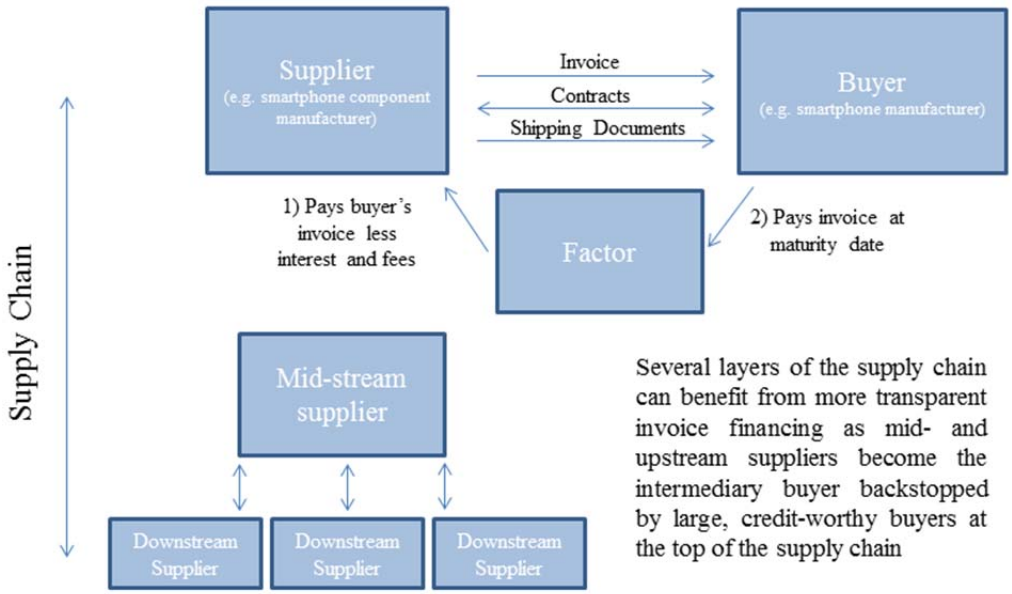
Factoring could also leverage the rise of e-commerce platforms to bundle invoices and perhaps lengthen the term of lending. More accessible commercial data—for example, on the typical lag experienced in the

settlement of invoices—provided over open APIs could enable pooling of payment risk for a portfolio of bundled invoices from lesser-known buyers.[36] For a company with a sufficiently long transaction history on a platform, a longer-term loan based on projected future sales might even make sense, particularly if the lender negotiated a right to secure interest and principal payments to borrower cash flows generated on the platform.[37] This might make factoring suitable not just for short-term liquidity and working capital (its typical use), but also a potential alternative source of investment capital. Bundling could also capture invoices owed by retail customers, broadening the base of tradable invoices beyond the business-to-business sector, traditionally the focus of factoring firms given their preference for larger, more credit-worthy counterparties.

Such financing need not be restricted to sales generated online, either. Square, a U.S. fintech firm focused on payments, now offers loans to customers based on accounts receivables generated via the company's physical point-of-sale terminals. In theory, a number of retail platforms, whether online or physical, could enable SME borrowers to provide collateral for invoice financing through existing or even expected sales on the platform.[38]

The broader supply of tradable invoices and more granular insight into commercial relationships between businesses could also make factoring possible across multiple layers of a major buyer's supply chain. Factoring firms typically manage credit risk by purchasing the invoice owed by a known, credit-worthy borrower, but technology could let buyer invoices finance more indirect supplier relationships in an SME cluster.[39] For example, a factoring firm might more willingly lend to a small supplier that provides inputs for a larger supplier if it knew both firms' revenues were supported by purchases of a large, credit-worthy buyer upstream (see *Figure 2*). This could create reinforcing network effects for the broader SME economy. By reducing the lag between production and payment, technology-enhanced factoring for SMEs could reduce financial stress and drive SME growth.

***Figure 2*: Broadening Invoice Finance**



Source: Author's illustration

As with any form of finance, growing access can create risks. While invoice financing by nature transfers credit risk from the SME to its larger buyer, growth in this kind of credit may increase the risk of fraud and excess leverage. Technology should help reduce fraud through improved KYC verifications and the use of immutable digital contracts, but prudential regulation will also be required.

III. A Potential Structural Shift in the Economic Impact of Asia's SMEs

Financial technology has the potential to expand financial access for small businesses around the world, but several factors may make innovations particularly powerful for Asia's SMEs. The region's still-limited credit scoring begs for an alternative to traditional credit rating bureaus, while the increasing amount of economic and social activity taking place online in Asia provides potential data to bolster SMEs' limited financial history. Meanwhile, the region's rapidly growing, but still complicated trade networks mean innovations in trade finance could have an outsized impact, important for the large number of SMEs involved in exports but without access to trade finance. Finally, Asia's already substantial market for invoice financing, a key source of liquidity and capital for small businesses, can leverage the region's digitization of commerce, particularly the rapid rise of online B2B sales, to expand access.

If technological innovations combine to shrink Asia's SME credit gap, the economic impact of small businesses could increase substantially. Already a major source of economic activity, employment, and innovation, SMEs with increased access to working and investment capital will be healthier and more resilient. Particularly for younger start-ups, which are often the most innovative businesses, access to finance at an early stage of development could be the difference between bankruptcy and survival. Given the interrelationships among SMEs in many economies, the network effect of increasing SME health could be significant, while improving the sector's financial access and resilience would also boost the entire economy's long-term growth potential.

Endnotes

[1] The definition of SMEs varies by country and according to indicators like head count or key financials. It typically applies to firms of 200-250 employees or fewer across developed and developing countries. In developing Asia, firms of assets sizes roughly $5 million and under are typically considered SMEs, though this can also vary by industry type. Revenue-based definitions tend to vary more widely by country, as firms with revenues exceeding $50 million might still be considered SMEs in China, while the threshold is below $5 million in countries like Indonesia or Vietnam. See ADB Institute. "SMEs in Developing Asia: New Approaches to Overcoming Market Failures." 2016. Accessed February 15, 2018.
[2] Asian Development Bank. "Asia's SMEs Need Growth Capital to Become More Competitive." September 2, 2015. Accessed February 15, 2018.
[3] This paper defines "fintech" broadly as the use of new technology or innovative business models in the delivery of financial services by both traditional, regulated firms and emerging start-ups.
[4] 2014 estimate. *Op. cit.* Asian Development Bank. "Asia's SMEs Need Growth Capital to Become More Competitive."
[5] 2014 estimate.
[6] The World Bank. "Jobs." *World Development Report 2013*. 2012. Accessed February 15, 2018.
[7] Shigehiro Shinozaki. "A New Regime of SME Finance in Emerging Asia: Empowering Growth-Oriented SMEs to Build Resilient National Economies." ADB Working Paper Series on Regional Economic Integration. Accessed February 15, 2018; *Op. cit.* ADB Institute.
[8] "SMES in the APEC Region." APEC Policy Support Unit Policy Brief No. 8. December 2013. Accessed February 15, 2018.
[9] Naoyuki Yoshino and Ganeshan Wignaraja. "SMEs Internationalization and Finance in Asia." IMF-JICA Conference. Tokyo. February 18, 2015. Accessed February 15, 2018.
[10] 21.2 percent of Asian SMEs were likely to apply for a loan compared 38.2 percent of their global peers. Asian Development Bank. "ADB–OECD Study on Enhancing Financial Accessibility for SMEs: Lessons from Recent Crises." 2014. Accessed February 15, 2018.

[11] 74.4 percent for Asian SMEs compared to 51.1 percent for global peers.
[12] Asian Development Bank. "Low-cost Loans to Small and Medium-sized Companies in Asia." February 25, 2014. Accessed February 15, 2018.
[13] For example, the ADB estimates that at least 36 percent of rejected financing for SMEs engaged in trade could be fundable by other financial institutions. See Alisa Di Caprio, Kijin Kim, and Steven Beck. "2017 Trade Finance Gaps, Growth, and Jobs Survey." ADB Briefs No. 83. September 2017. Accessed February 15, 2018.
[14] James Kwan. "Credit Bureaus in Asia." *Asia Focus*. Federal Reserve Bank of San Francisco. October 2011. Accessed February 15, 2018.
[15] Cliff Sheng, Jasper Yip, and James Cheng. "Fintech in China: Hitting the Moving Target." Oliver Wyman. 2017. Accessed February 15, 2018.
[16] Reserve Bank of India. "Report of the Committee to Recommend Data Format for Furnishing of Credit Information to Credit Information Companies." January 2014. Accessed February 22, 2018.
[17] "The New Bazaar: E-Commerce Takes off." *The Economist*. October 26, 2017. Accessed February 15, 2018.
[18] Statista. "Global B2B e-commerce gross merchandise volume." Accessed February 15, 2018.
[19] *Sources:* Asian Development Bank. "Let's scale up, vary access to SME finance to boost Asia's growth, cross-border trade." September 21, 2015; Morgan Stanley. "Global Marketplace Lending: Disruptive Innovation in Financials." May 19, 2015.
[20] *Reuters*. "No more loan rangers? Beijing's waning support for private credit scores." July 3, 2017. Accessed February 15, 2018.
[21] Martin Chorzempa. "China Needs Better Credit Data to Help Consumers." Peterson Institute for International Economics. Policy Brief. January 2018. Accessed February 15, 2018.
[22] Satoshi Kuwahara, Naoyuki Yoshino, Megumi Sagara, and Farhad Taghizadeh-Hesary. "Role of the Credit Risk Database in Developing SMEs in Japan: Lessons for the Rest of Asia." ADB Institute Working Paper No. 547. October 2015. Accessed February 15, 2018.
[23] *World Trade Statistical Review: 2016*. World Trade Organization. 2016. Accessed February 15, 2018.
[24] Supply chain exports data *Op. cit.* Yoshino and Wignaraja.
[25] *Op. cit.* Shinozaki. *Op. cit.* ADB Institute. "SMEs in Developing Asia: New Approaches to Overcoming Market Failures."
[26] *Op. cit.* Di Caprio, Kim, and Beck.
[27] Includes firms across all countries surveyed by the ADB.
[28] Trade finance is similar to factoring in that a commercial transaction depends on bridge financing to proceed. With trade finance, financial intermediaries help assure payments that cross borders and change currencies, mitigating risks inherent in international trade. With factoring, the intermediary is helping to accelerate payment, not mitigate risk that the buyer may not pay.
[29] Stefan Dab, Sukand Ramachandran, Rajiv Chandna, Ravi Hanspal, Alenka Grealish, and Maarten Peeters. "Digital Revolution in Trade Finance." Boston Consulting Group. August 30, 2016. Accessed February 15, 2018.
[30] Jemima Kelly. "Barclays says conducts first blockchain-based trade-finance deal." *Reuters*. September 7, 2016. Accessed February 15, 2018.
[31] Elzio Barreto. "Hong Kong, Singapore to link up trade finance blockchain platforms." *Reuters.* October 24, 2017. Accessed February 15, 2018.
[32] Matt Higginson. "How Blockchain Could Disrupt Cross-Border Payments." The Clearing House. 2016. Accessed February 15, 2018.
[33] *Op. cit.* Dab, Ramachandran, Chandna, Hanspal, Grealish, and Peeters.
[34] Supply chain finance, also known as reverse factoring, is similar in concept to traditional factoring, but the buyer initiates the financing for the supplier, again backed by the buyer's credit worthiness in fulfilling the accounts receivable. Note that supply chain financing does not necessarily involve international trade finance, discussed earlier.
[35] See, for example: Sanne Wass. "Fintech startup brings blockchain and cryptocurrencies to invoice finance." *Global Trade Review*. September 8, 2017. Accessed March 19, 2018.
[36] APIs, or automated programming interfaces, establish standards, protocols, and tools that allow software programs to communicate and interact with each other. The increasing potential for such commercial data may also necessitate regulation of the customer's right to use this data across the financial system through APIs. In the absence of regulation, data monopolists might restrict use of data to their own financial partners.
[37] This invoice-based loan could be analogous to revenue bonds issued by municipal governments. Such bonds are guaranteed for repayment by specific revenue-generating activities of the government. Some businesses might shirk at the restrictions implied by such an arrangement, and laws and regulations would need to ensure adequate protection for small businesses to prevent large e-commerce platforms from restricting competition by offering such cross-cutting services.
[38] Firms like Square Capital typically cap a loan at the equivalent of a borrower's one-month sales, though in theory, fintech firms could offer larger loans to borrowers with an extended history of robust sales growth.
[39] An SME cluster represents a supply chain of complementary small businesses engaged in manufacturing, services, and sales. See *Op. cit.* Shinozaki.