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International experiences with innovative credit scoring: Lessons for Indonesia

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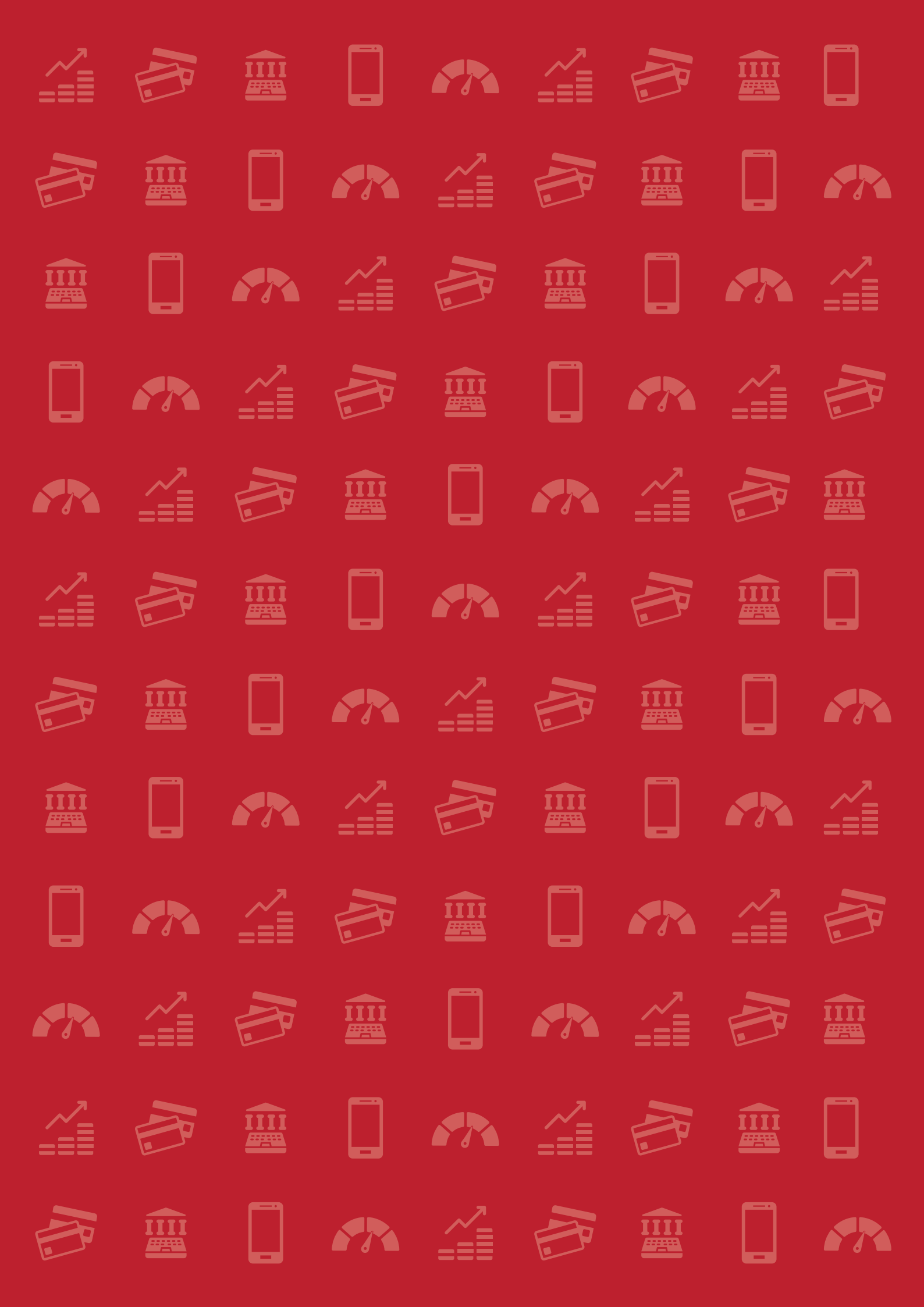
International Experiences with Innovative Credit Scoring

Lessons for Indonesia

by Dr. Trissia Wijaya & Muhammad Nidhal



Discussion Paper No. 14

International Experiences with Innovative Credit Scoring: Lessons for Indonesia

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GLOSSARY

ACS:
Alternative credit scoring, the U.S. term for ICS

ADS:
Automated decision system

AFTECH:
Asosiasi Fintech Indonesia (Indonesia's Fintech Association)

AI:
Artificial intelligence

AIBoR:
U.S./White House Blueprint for an AI Bill of Rights

API:
Application Programming Interface

BKIJ:
Biro Kredit Indonesia Jaya

CCPA:
California Consumer Privacy Act

CCRC:
People's Bank of China's Credit Reference Centre

CFPB:
Consumer Financial Protection Bureau

CRA:
Consumer reporting agencies

DFI:
Digital finance innovation

FCRA:
U.S. Fair Credit Reporting Act

Fintech:
Financial technology

ICS:
Innovative credit scoring

IDR:
Indonesian Rupiah

ML:
Machine learning

MSME:
Micro, small and medium-sized enterprise

NAIIA :
U.S. National AI Initiative Act

NCISP:
U.S. National Credit Information Sharing Platform

NDRC :
Chinese National Development and Reform Commission

OJK:
Indonesian *Otoritas Jasa Keuangan* (Financial Services Authority)

OJK INFINITY:
Indonesian OJK Innovation Centre for Digital Financial Technology

P2P:
Peer-to-Peer

P2SK:
Law No. 4/2023 on the Development and Strengthening of the Financial Sector, also called the Omnibus Law on Finance

PBOC:
People's Bank of China

PDP:
Data Protection Law

PEFINDO:
Pemeringkat Efek Indonesia

POJK 13:
OJK Regulation No. 13/POJK.02/2018

Q1:
First Quarter (January–March)

SoCS:
Chinese Social Credit System

U.S.:
The United States of America

EXECUTIVE SUMMARY

Approximately 51% of the adult population in Indonesia remains unbanked. They cannot fulfill formal requirements to prove their creditworthiness and are therefore not considered for services by conventional financial institutions. Addressing this barrier to their financial well-being, innovative credit scoring (ICS) has emerged as a solution for financial inclusion. Digital service providers have developed tools to gather alternative relevant data that enable them to service a much wider segment of society.

However, the promise of ICS to extend financial inclusivity to the underserved population is not without caveats. Key risks include data inaccuracy, a lack of data privacy, heightened exposure to cyber risks, and potential for increasing or entrenching discrimination. As with any emerging digital financial innovation, further clarity in regulation, technology use, and data protection is needed.

While Indonesia's ICS sector is still new and developing, it has been widely used for years in some developed markets including the United States and China. Following a CIPS policy paper on "The Rise of Innovative Credit Scoring Systems in Indonesia," this discussion paper unpacks the approaches to credit scoring in China and the United States to draw lessons for Indonesia.

Looking at the Chinese experience, it is fair to say that excessive use of data and transparency issues remain key constraints upon a robust rating system. The Social Credit System that has been put in place alongside ICS, with widespread data-sharing to third parties, indicates the need for a clear-cut accountability chain. The state is in a difficult, maybe an impossible position, in which its interest in gathering data and concealing how it is used is in conflict with its obligation to its citizens to regulate and control the associated risks to privacy, cyber security, and users' ability to control their own data.

Meanwhile, the experience with the ICS industry in the United States can inform the development of effective policies and practices in Indonesia. In the United States, the relevant policy discourse focuses not just on market power and data privacy, but also on algorithmic governance and socioeconomic biases. In particular, concerns about socioeconomic biases and algorithmic decision making has not yet gained traction in China and Indonesia, which both have substantial minorities that might find themselves subject to discriminatory access to financial services through AI and machine learning biases.

Observing these international experiences helps us better understand the risks and challenges associated with innovative digital solutions that appear and evolve at a rapid pace in Indonesia.

A GLIMPSE OF INDONESIA'S EVOLVING INNOVATIVE CREDIT SCORING

Since the onset of the 2008 Global Financial Crisis, alternative and innovative credit scoring (ICS) has experienced significant growth—in frequency and value—across Europe and North America. This surge in popularity can be attributed to the increasing adoption of technology that enables access to financial and alternative data that allows lenders to predict creditworthiness using artificial intelligence (AI) and machine learning techniques, rather than traditional loss and default models using traditional financial data. In 2016, ICS started becoming prominent in Indonesia.

The adoption of ICS has been driven by non-traditional financial institutions, such as peer-to-peer (P2P) lending and digital banks, which have been on the rise since 2015. As in many developing countries, P2P lending and ICS emerged in Indonesia as a response to the country's high levels of unbanked (51%) and underbanked (26%) population, particularly in rural areas (Google, Temasek, Bain & Company, 2021). Closely related is the limited availability of traditional credit data.

"In 2016, ICS started becoming prominent in Indonesia. The adoption of ICS has been driven by non-traditional financial institutions, such as peer-to-peer (P2P) lending and digital banks, which have been on the rise since 2015."

ICS has helped lenders to better assess the loan needs of micro, small and medium-sized enterprises (MSMEs),[1] which account for more than 64 million businesses (23% of population), and for most of the borrowers that benefit from ICS. MSMEs contribute approximately 97% of domestic employment and make up 99% of businesses in Indonesia today (Indonesia Investment, 2022; Rizki, 2022). Expanding credit access to MSMEs allows these firms to grow their businesses, enter new markets, and take advantage of export opportunities, creating more jobs and contributing to overall economic growth.

The Indonesian government, through the Financial Services Authority (*Otoritas Jasa Keuangan*, or OJK), has recognized the importance of ICS in promoting financial inclusion and has taken steps to ensure its responsible development. In 2016, the OJK issued Regulation No. 77/POJK.01/2016[2] on Information Technology-Based Borrowing-Lending Services, which forms the bedrock of Indonesia's P2P lending industry by outlining its operations requirements. In 2018, Regulation No. 13/POJK.02/2018 on Digital Finance Innovation in the Financial Services Sector (POJK 13) was passed to regulate the ICS sector. POJK 13[3] creates the legal basis for OJK to regulate digital

[1] MSMEs are businesses with an annual turnover of up to IDR 50 billion, as defined by Indonesia's Government Regulation No. 7/2021 and Law No. 11/2020 on Job Creation.
[2] This regulation was updated to Regulation No. 10/POJK.05/2022 (POJK 10), which seeks to ensure the protection of consumers and the stability of the IT-based lending industry in Indonesia.
[3] POJK 13 comes with two implementing regulations: OJK Circular Letter No. 20/SEOJK.02/2019 on Recording Mechanism or Digital Financial Innovation Organizers and OJK Circular Letter No. 21/SEOJK.02/2019 on Regulatory Sandbox.

finance innovation (DFI) in the financial services sector and to identify DFI clusters, including ICS. In August 2018, OJK launched the OJK Innovation Centre for Digital Financial Technology (OJK INFINITY), which aims to build a financial ecosystem conducive to DFI. As of the first quarter of 2023, OJK recorded 97 DFI companies which are classified into 15 clusters with aggregator (34 companies) and credit scoring (20 companies) clusters being the most popular (OJK, 2023).

The Covid-19 pandemic has also affected Indonesia's financial technology (fintech) market and subsequently the ICS industry. The pandemic accelerated digitalization across various sectors, especially in the payment system and online lending sectors. In 2021, e-money transactions in Indonesia surged to approximately IDR 305 trillion (US$20.7 billion), an increase of 110% compared to 2019 (Statista, 2022). As more consumers engage in online activities, they generate data about their preferences, behaviors, and financial activities. Consumer digital footprints—including social media, search, mobile money, bills, shopping history, and rent—are a treasure trove for data processors like ICS providers (see also Berg et al., 2019).

At a macro level, the pandemic dealt a severe blow to Indonesia's overall economic growth, with a record drop: –5.32% and –3.49% growth in the second and third quarters of 2020, respectively (BPS, 2021). Despite the pandemic's severe economic impact, ICS platforms managed to maintain a significant portion of venture capital funding, as evidenced by successful funding rounds by several ICS players. For instance, in the second half of 2020, CredoLab, an early ICS player, raised a remarkable Series A funding round worth US$7 million (IDR 103 billion) to further enhance its credit scoring technology (Eka, 2020). In late 2022, SkorLife, an AI-led credit scoring provider which also specializes in credit report dispute mechanisms, secured a pre-seed funding of US$2.2 million, equivalent to IDR 32.8 billion (Fidinillah, 2022). Another AI-based ICS player, Trusting Social, secured US$65 million (IDR 957 billion) in series C funding during Q1 2022, one of the most significant deals of that period (Sri, 2022).

THE POWER OF DATA IN CREDIT SCORING

Data forms the backbone of ICS services, and so ICS has become more common as more companies providing data enter the market and digital technology is adopted. Table 1 provides an overview of some of the types of data and how they are used. Not all alternative data sources are equally useful for credit scoring, and some can lead to consumer harm.

Table 1.
Data Used for Credit Scoring

Data category	Data type	Credit scoring application
Traditional	Bank transactional data	Records of late payments on current and past credit, loan amounts and loan purpose, credit history
	Credit bureau checks	Number of credit inquiries
	Commercial data	Financial statements, number of working capital loans, and others
Alternative	Utilities data	Records of on-time payments as an indicator of creditworthiness
	Social media	Social media data with possible insights into consumer lifestyle
	Mobile applications	Mobile payment systems with possible insights into consumer behavior
	Online transactions	Granular transactional data with possible detailed insights into spending patterns
	Behavioral data	Psychometrics, form filling

Source: World Bank Group (2020).

Many borrowers in emerging markets where ICS is most prevalent[4] lack both formal credit histories and access to traditional credit bureaus. In Indonesia, credit bureaus reach only 20–25% of the population (Aggarwal, 2021). This makes alternative data sources crucial for credit assessment. Alternative data gives lenders a more comprehensive view of a borrower's behavior, allowing them to make more accurate estimation of borrowers' financial profile and to make more accurate lending decisions.

"In Indonesia, credit bureaus reach only 20–25% of the population. This makes alternative data sources crucial for credit assessment."

[4] Such as India, Indonesia, Brazil, South Africa.

Personal Data Protection[5]

ICS harnesses big data through data sharing and assessment. This creates a risk of privacy breaches. Indonesia's existing data protection strategy largely involves deploying security measures such as real-time anomaly detection, user authentication, and API[6] throttling[7]. Despite these safeguards, security concerns about consumer data use, collection, and storage remain (Prove, 2021). This is especially true in the case of ICS, which depends largely on the entire system, including but not limited to data controllers. Because ICS depends on the whole system, a small vulnerability can lead to massive data breach (Aggarwal, 2020). Data breaches exposing information such as location histories, online behavior, and mobile phone activities represent significant potential harm to the users whose data is accessed.

"Indonesia's existing data protection strategy largely involves deploying security measures such as real-time anomaly detection, user authentication, and API throttling . Despite these safeguards, security concerns about consumer data use, collection, and storage remain."

These risks are not specific to Indonesia. A single data heist in 2022 exposed this when data of one billion Chinese residents were allegedly siphoned from a Shanghai police database stored in Alibaba's cloud and a data leak from Alibaba's Taobao shopping platform in 2021 (Lahiri 2021). Taobao is one of the data controllers from which Ant Group—Alibaba's credit scoring firm—pulls data to assess a customer's creditworthiness. Meanwhile, Indonesians experienced five data breaches in August 2022 alone, two of which were linked with state-owned electricity firm, PLN, and telecom firm, PT Telkom Indonesia, which hold the data of millions of customers, which have been widely used in ICS.

Implementing effective data protection regulation is itself quite tricky. In China, for example, data controllers' relationship with the Chinese state put data privacy at risk. Claims are often made that poor data privacy rules are "a tool for totalitarian surveillance" and "an invention of the digital totalitarian state" (Ohlberg et al., 2017, p. 12; Mac Síthigh & Siems, 2019, p. 21). Yet, this is not necessarily a problem particular to authoritarian governance, but one that can affect any country. It is a result of insufficient clarity about or commitment to who will be held responsible for data privacy violations. For example, no sanction was imposed on the Indonesian state-affiliated entities involved in the August 2022 data breaches, which the Indonesian government is still investigating (MOCI, 2022).

[5] This section is taken from Wijaya, Trissa (2023) "The Rise of Innovative Credit Scoring System in Indonesia: Assessing Risks and Policy Challenges".
[6] Application programing interface, which allows multiple programs to interact with one another.
[7] Real-time anomaly detection involves identifying anomalies or deviations from the normal or expected pattern in data streaming (e.g. identifying fraudulent credit card transactions). User authentication is a process of verifying a user's identity before they are granted access to a network or device to prevent unauthorized access and potential harm. API throttling is a process of limiting the amount of API requests a user can make within a specific time frame—an important tool for business to prevent malicious attacks in which an individual sends excessive requests to disrupt the operation of a website or application.

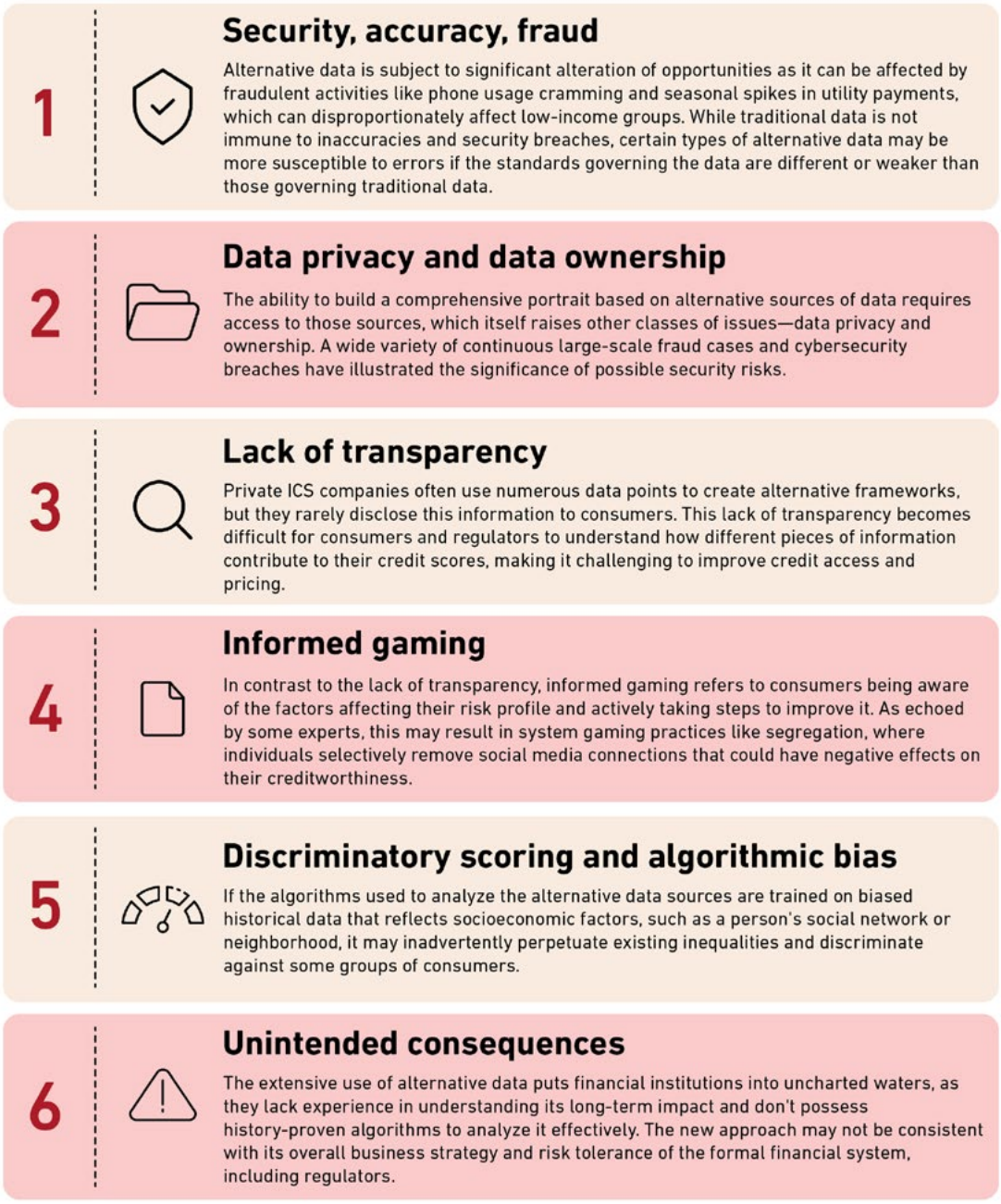
DEBATE SURROUNDING CREDIT SCORING

Indonesia's credit scoring system, which uses both traditional and non-traditional methods, has been a topic of debate in recent years. Central is the question of whether credit scores accurately reflect an individual's creditworthiness and whether they should be used as the sole factor in determining access to credit. As with all new technologies, regardless of good intentions there are risks and challenges to overcome.

Figure 1 presents some of the problems associated with alternative data in credit scoring, highlighting issues such as security and fraud, data privacy, lack of transparency, and the potential of amplifying biased decision-making processes against certain populations.

"Indonesia's credit scoring system, which uses both traditional and non-traditional methods, has been a topic of debate in recent years. Central is the question of whether credit scores accurately reflect an individual's creditworthiness and whether they should be used as the sole factor in determining access to credit."

Figure 1.
Associated Problems with Alternative Data



Source: Prove (2021), modified by authors.

This paper elaborates on the debate surrounding ICS using the industries in China and the United States as case studies. These are two big markets with mature ICS industries. Their experiences illustrate potential problems and regulatory hurdles that lie ahead for the still-new Indonesian ICS industry.

Case Study: China

In China, the term "credit scoring" applies to two different concepts: determination of financial creditworthiness, but also "social" creditworthiness.

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Traditional credit scoring is undertaken by the People's Bank of China's Credit Reference Centre (CCRC) and Baihang Credit, the central bank-backed licensed personal credit agency. These agencies gather data and provide advice on the performance, solvency, or quality of the data subjects (de Wet, 2018). As with Indonesia's Financial Information Services System, the Chinese credit scoring infrastructure is a largely incomplete, centralized database that holds records only from traditional banks. The requirement for traditional bank data results in financial exclusion for unbanked or underbanked individuals. In 2021, 20% of China's population was unbanked, a rate 12 times higher than in the United States. Unbanked individuals come mostly from rural households with lower income streams (Ventura, 2021) and 75% do not have a credit score (Feng, 2017). And so China has become part of a broader trend as it has seen the development of alternative credit scoring systems.

China did not make a clean transition from traditional banking to fintech operations. Beginning in the late 1990s, the Chinese government took a piecemeal approach to develop an alternative credit score system alongside the outdated banking system. The Chinese government developed the Enterprise and Personal Credit Information Database, a credit information database that was mainly aimed at improving the financial performance of Chinese firms (Yu, 2016).

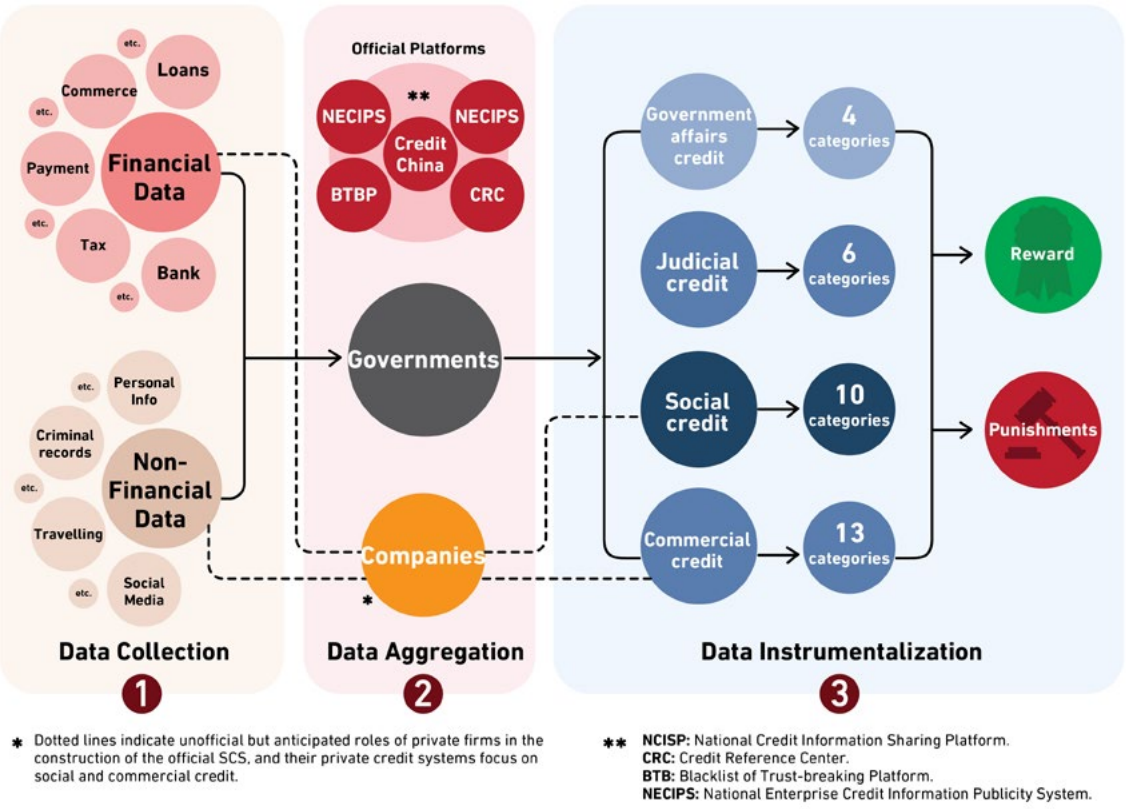
Nor was China's introduction of ICS the only change made as fintech was introduced. In 2007, the Ministerial-Joint Meeting System was set up to construct a national Social Credit System, connecting 18 central government institutions, including the National Development and Reform Commission (NDRC), the People's Bank of China (PBoC), and Ministry of Commerce. Some provincial governments (Shanghai, Jiangsu, and Zhejiang) and state-owned credit investigation firms were also included (Creemers, 2018).

Since 2011, the evaluation by the Social Credit System of economic reforms and individual creditworthiness has been increasingly blurred with vague ideas of "trustworthiness" (Drinhausen & Brussee, 2022; Donelly, 2022). The Social Credit System was unveiled in 2011, first referred to as an attempt to address "matters of social and political morality" and followed by the State Council's Notice concerning Issuance of the Planning Outline for the Construction of a Social Credit System (2014–2020). It mentions promoting integrity in government affairs and states is goal as building "commercial sincerity," "social integrity," and "judicial public trust" using a uniform reward-and-punishment-based social credit system (Creemers, 2014).

> The Social Credit System operates three different models: a blacklisting system, compliance scores by pilot cities, and social credit scores by financial institutions.

The Social Credit System operates three different models: a blacklisting system, compliance scores by pilot cities, and social credit scores by financial institutions. The Chinese government claims that this system is required because its original piecemeal reforms of data platforms for credit systems in the early 2000s did not capture enough data.

Figure 2.
Organizational and Process Chart of China's Social Credit System



Source: Liang et al., 2018 cited from State Council (2014), processed by authors.

Figure 2 provides an overview of the Chinese Social Credit System. It may give the impression that the Social Credit System is based in a centralized system, or what Liang et al. (2018) called "emerging state surveillance infrastructure." In fact, the Social Credit System is based on fragmented implementation and lacks consistent standards. Boundaries between commercial scoring systems and compliance scores remain unclear.

The Social Credit System has three levels not only collecting, but controlling and using data: one supervised by the National Development and Reform Commission (NDRC), one created by the central bank, and one used by private credit institutions that have been approved to monitor personal credit rating (such as Alipay's Sesame Credit).

The NDRC has been developing a National Credit Information Sharing Platform to pool as much data as possible into a single database since 2015, connecting 42 central agencies, 32 local governments, and 50 market actors. Meanwhile, some high tech firms including and Alibaba and Baidu are sharing data with National Credit Information Sharing Platform. This system allows NDRC to score citizens and enterprises based on repayment, purchase capacities, and personal characteristics. Companies or individuals with low scores face disciplinary measures including restricted financing or restricted physical movement. In 2019, the NDRC-led National Public Credit Information Center blacklisted 23 million people from traveling by plane or train due to low social credit ratings. Removal from the list takes two to five years (Reilly et al., 2021). Blacklisted entities may not even be able to use the funds on their current accounts in order to purchase cars, or luxury items. Individuals with positive scores are rewarded with enormous state benefits, such as school and transportation benefits. For small businesses, benefits include streamlined administrative procedures like tax returns being processed faster, fewer audits, and fast-tracked approvals for things such as credit or loans (Reilly et al., 2021).

While the National Credit Information Sharing Platform is the best-known portion of the Social Credit System, the People's Bank of China, as part of the Social Credit System, is working via eight private credit institutions to develop pilot consumer credit scoring programs. Superficially, this mechanism resembles a regulatory sandbox, since the institutions in the pilot program are given six months to work on their own credit scoring system before being licensed. In fact, the licenses were never granted, but existing services—which share data with state institutions—are not nullified, but instead linked to government reward-or-punish trials. These private institutions, such as Alibaba, are also at the frontline of implementing government-imposed blacklists, for instance by blocking certain transactions using e-wallets like Alipay.

Local governments have also been ambitious with their innovative regulations and are authorized to blacklist individuals using data within their jurisdictions. Local governments have developed their own trial programs which seem to have mixed up financial and social credit scoring.

Two of the most notable examples of these local systems are from Suining in Jiangsu and Rongcheng in Shandong province. In both of these pilots, each citizen started with 1000 points (Sithigh & Siems, 2019; Donnelly, 2023). Failing to uphold moral standards and societal values, such as by having a child without prior administrative permission or by driving drunk, results in deducted points. Points can be regained by doing 'good deeds,' such as caring for elderly family members, winning national sports, and following traffic rules. "Well-behaved" citizens with higher credit ratings enjoy privileges (Reilly et al., 2021) such as streamlined administrative procedures like tax returns being processed faster, fewer audits, and fast-tracked approvals for things such as credit or loans. Local governments also indiscriminately collect data from (private) financial institutions and contract with smaller companies such as database firms to build tech infrastructure. Details of the algorithms they use on this data are not transparent.

The government-controlled portion of the social credit system is thus made up of several separate systems intended to amalgamate surveillance tools, local patron-client relationships, and credit access. Both the complexity of the system and the lack of transparency make it impossible to evaluate data protection issues such as data minimization[8], data security, and whether data are used ethically.

> Adding to the complexity of the Social Credit System is the emergence of financial institutions which operate independently for commercial purposes—though their operation is often assumed to be part of the government's plans.

Adding to the complexity of the Social Credit System is the emergence of financial institutions which operate independently for commercial purposes—though their operation is often assumed to be part of the government's plans. These companies see massive opportunities in providing alternative credit scores to the 75% of the Chinese population without traditional credit scores (Feng, 2017). As is typical with ICS companies, their key strategies are (1) targeting the right potential borrowers and (2) developing the best data model for customizing loan options for each applicant (Feng, 2017).

In the Social Credit System ecosystem, the Chinese tech giants—often called "BAT" (Baidu, Alibaba, Tencent)—are key players, capitalizing on their multi-industry reach and rapid accumulation of consumer data to expand their existing financial products by evaluating the creditworthiness of an entity with a model of "smart business" (Borak, 2019). One notable example is Alibaba's Zhima Credit, known in English as Sesame Credit, which uses five categories of user data: (i) financial credit records, (ii) behavioral trends in commercial transactions, (iii) assets and personal information, (iv) behavior and preferences, and (v) social relationships. Relationship factors such as befriending someone with high Sesame Credit ratings and polite behavior on social media are considered in categories (iv) and (v). Sesame Credit's competitor, Tencent's WeChat Pay Score, also rolled out a credit scoring system by accumulating information via the WeChat app and tracking users' personal consumption, compliance, and other behavior. Users with higher scores can get perks, such as faster check-in at hotels, priority access in hospitals, and better access to credit.

Although the BAT firms are notionally private, the politically inextricable relationships between these companies and the Chinese state put data privacy at risk. While regulations exist regarding social credit information, credit incentives and restrictions, protection of the data subject's rights and interests, and legal responsibilities, the government's ethical obligation to protect its citizens' data privacy is in conflict with its connections to the entities gathering the data and its own use of that data. The accountability chain is not clear enough to determine who is responsible for data privacy violations or who would hold those responsible accountable, and the government, facing a conflict of interest—since it is accumulating this data for its own purposes—is unlikely to remedy the situation.

[8] In which only as much data as is needed is collected.

There are few official arrangements with uniform standards between the different levels of government and companies participating in the Social Credit System about data exchanges, protection, and data use, especially in assessing citizens, and so it is difficult to assess what data are being collected, how data is being used, and when data is being abused. Observers have concluded that Alibaba's Ant Financing generated 39% of their revenue from a combination of predatory lending, monopolistic coercion, and originate-to-distribute (OTD) lending, in which the originator of a loan sells it to third parties through a securitization process (Yu & McMorrow, 2021; NikkeiAsia, 2023). Some cities follow provincial and municipal legislation. For example, the Shanghai Social Credit Regulations have 56 articles aimed at providing legal certainty to anyone affected by the Social Credit System.

When leaks have taken place, the Chinese government has not responded with comprehensive data protection reforms. Two recent high-profile leaks that drew attention were the breach of Alibaba's Taobao shopping platform in 2021 and when data of one billion Chinese residents was allegedly siphoned from a Shanghai police database stored in Alibaba's cloud in 2022 (Hope, 2021; Cheung, 2022). Although after these incidents Alibaba has been subject to greater scrutiny and sanctions, no significant changes have been made to increase accountability in the design and operation of the Social Credit System.

Apart from these data privacy issues, a fair credit assessment also requires in a robust credit scoring governance system to prevent putting truly creditworthy customers at a disadvantage, or increasing the risks faced by financial and lending institutions.

“Apart from these data privacy issues, a fair credit assessment also requires in a robust credit scoring governance system to prevent putting truly creditworthy customers at a disadvantage, or increasing the risks faced by financial and lending institutions.”

Established in 2015, Alibaba's Ant Financial uses Alibaba's platforms across multiple industries to collect and control data. Alibaba's platforms handled about one-sixth of the loan volume generated by China's commercial banking sector, equivalent to 60% of the real economy's total financing. In order to collect more data, Alibaba rewards users for loyalty to the Alibaba platform, linking their Sesame rating to the number of platforms they use and transactions they take part in from which Alibaba can benefit. This, along with the lack of transparency about Sesame's tools and algorithms, inserts data that is likely irrelevant to a potential borrower's default risk into their credit assessment. Because brand loyalty is an easier standard to meet than other behaviors that build credit, Alibaba's lending practices appeal particularly to young and less financially literate customers.

Since the Ant-generated credit score can also be fed into other lending platforms via business-to-business agreements, it becomes easier for an individual or business to accumulate debts across multiple platforms. The availability of credit has led to an annual increase of around 20% in unsecured consumer lending over the past decade, and household debt has reached over 50% of GDP (Hamlin, 2019). This has been accompanied by a dramatic rise in the number of individuals deemed "untrustworthy" by the Chinese government, doubling since 2015 to reach 7.5 million blacklisted individuals by 2022 (Jiang, 2022).

The Chinese government imposed an antitrust probe into Alibaba to address the company's irresponsible data use and control and in July 2021 the government ordered restructuring involving state-backed partners Hangzhou Finance and Investment Group and Zhejiang Electronic

Port, which each hold slightly more than 5% of Ant's shares. The result has been a centralizing of data storage and control, but not an improvement in accountability or transparency, either of which may impede the government's ability to continue accumulating and using data for its social credit system. The conflict of interest makes it more difficult to address both issues with the accuracy of credit assessments and the personal data protection issues facing Alibaba. All three levels of the Chinese system are therefore plagued by a lack of accountability and transparency to data subjects.

Lessons for Indonesia

In order to protect consumer data in an environment where data is collected, potentially shared, and used by second or third parties there must be a clear-cut accountability chain. The Indonesian ICS environment is not comparable to the Chinese Social Credit System. In the Chinese system, the government is collecting, controlling, sharing, and using consumer data and its collection, use, analysis of the data is not transparent. The Chinese government faces a conflict of interest when regulating and legislating in the ICS space in the way that the Indonesian government when protecting consumers.

> "The situation in which China finds itself by acting as both the regulator and the entity requiring regulation is one that Indonesia should avoid if it is to be expected to fulfill its obligation to prevent abuse or to intervene when data privacy violations occur."

However, there is a lesson that can be drawn for Indonesia from the Chinese case: the situation in which China finds itself by acting as both the regulator and the entity requiring regulation is one that Indonesia should avoid if it is to be expected to fulfill its obligation to prevent abuse or to intervene when data privacy violations occur.

Although the Indonesian government does not have the sweeping involvement in data collection, storage, and use of the Chinese government, Indonesia's state-owned enterprises are heavily involved in a wide range of sectors and as a result they hold the sensitive data of hundreds of millions of subjects.[9] In August 2022, Indonesia experienced five significant data breaches, two of which were linked to state-owned firms[10] that hold the data of millions of customers. As in China, the Indonesian government faces a clear conflict of interest if it's expected to hold the data controllers accountable. It's possible that this conflict can be overcomed with a not-yet-established independent data protection agency, but this agency will also be established by the government, and both perceived and actual independence must be established and maintained. Conflicts of interests can easily emerge especially when complaints against state-linked institutions are being filed with a regulator whose neutrality is contested.

[9] For example, telecommunications, individual banking, and electricity accounts.
[10] The electricity firm PLN and the telecommunications firm PT Telkom Indonesia.

Case Study: United States

The United States has long had a well-established nationwide consumer credit scoring system that can be traced back more than a century. Unlike Chinese credit scoring companies, which are mostly state affiliated, the U.S. system is dominated by private interests. Three national agencies (Equifax, Experian, and Transunion) provide most credit reporting services and thus manage large scale information centers. To readers familiar with the Indonesian sector, these large American agencies may seem to resemble Indonesian private credit bureaus such as PT Pemeringkat Efek Indonesia and PT Biro Kredit Indonesia Jaya. However, the major American credit rating companies have a much larger database, with more than 200 million U.S. citizens.

> Unlike Chinese credit scoring companies, which are mostly state affiliated, the U.S. system is dominated by private interests. Three national agencies (Equifax, Experian, and Transunion) provide most credit reporting services and thus manage large scale information centers.

In addition to traditional financial data, such as bank account balances and cash flows, credit rating agencies in the United States have begun acquiring alternative data including phone bills, tax data, and rent payments by bringing small credit bureaus into their systems to access their data and by purchasing data from independent agencies (Kiviat, 2019; Rosenblatt, 2020). Because these credit agencies are so large, there is evidence that their credit reports may have macroeconomic impacts (Ramcharan et al., 2014; Bernanke 2018).

Alternative data in credit scoring became more common in the 2010s, allowing new players in credit scoring to enter the market. As in Indonesia, these ICS[11] newcomers provide a new approach to offering more inclusive and efficient financial services. The United States has a sizable unbanked population—approximately 5.9 million (4.5%) of US households (FDIC, 2022). Without credit histories or traditional payment records, these individuals are often excluded from the traditional credit scoring market. As in other ICS markets, alternative data from outside the financial system can be used by newer ICS firms to predict the creditworthiness of potential borrowers in the unbanked population.

Table 2 lists some of the new ICS firms in the United States and the data that they use to undertake alternative credit scoring.

[11] Often referred to as alternative credit scoring (ACS) in the United States.

Table 2.
Top Alternative Credit Scoring Providers Based in the United States

Company	Product	Product Example Data Input
LexisNexis	RiskView™	Residential stability, asset ownership, life-stage analysis, property deeds and mortgages, tax records, criminal history, employment and address history, liens and judgments, ID verification, and professional licensure.
FICO	FICO® Score XD	Purchase payment plans, property asset information, public records, cell and landline utility bill information, bankruptcies and liens, frequency of residential moves, eviction, recent visibility into payment history, new connect requests and current and historical account status.
Tri-Bureau - Experian, Equifax, TransUnion	VantageScore® 4.0	Trends (up to two years) in payment data, including rental history, utilities, and telco payments.
Experian	Experian Boost™	Includes recurring payments such as utility bills and monthly subscription payments on Experian credit report.
	Income Insight℠	Rental payment data, public record data.
Equifax	Decision 360™	Telco utility payments, verified employment, modeled income, verified Decision 360 income, spending capacity, property/asset information, scheduled monthly payments, current debt payments, debt-to-income ratio, bankruptcy scores.
	NeuroDecision®	Auto, communications, utilities and mortgage risk model.
TransUnion	CreditVision®	Address history, balances on trade lines, credit limit, amounts past due, CreditVision actual payment amount.
Zest AI	Zest Model Management System	Major bureau credit reports and thousands of other variables, such as ZestFinance financial information, technology usage, and how quickly a user scrolls through terms of service.
Demyst	Demyst Data-as-a-Service Platform	Credit scores, occupation verification, fraud checks, employment stability, work history, and online social footprint.
Nova Credit	Credit Passport®	Translate international credit data into local-equivalent (U.S.) score, founded by immigrants for immigrants.
Applied Data Finance	Personify Financial	Knowledge of consumer behavior across the full credit spectrum and integrates risk, prescreen, conversion, fraud, and lifetime probability models.
Cortera	Cortera Decisions™	Purchase behavior, payment history, and business events.
Esusu	Esusu	Captures on-time rental payment data of renters who opt-in to its platform and reports to the three major credit bureaus.

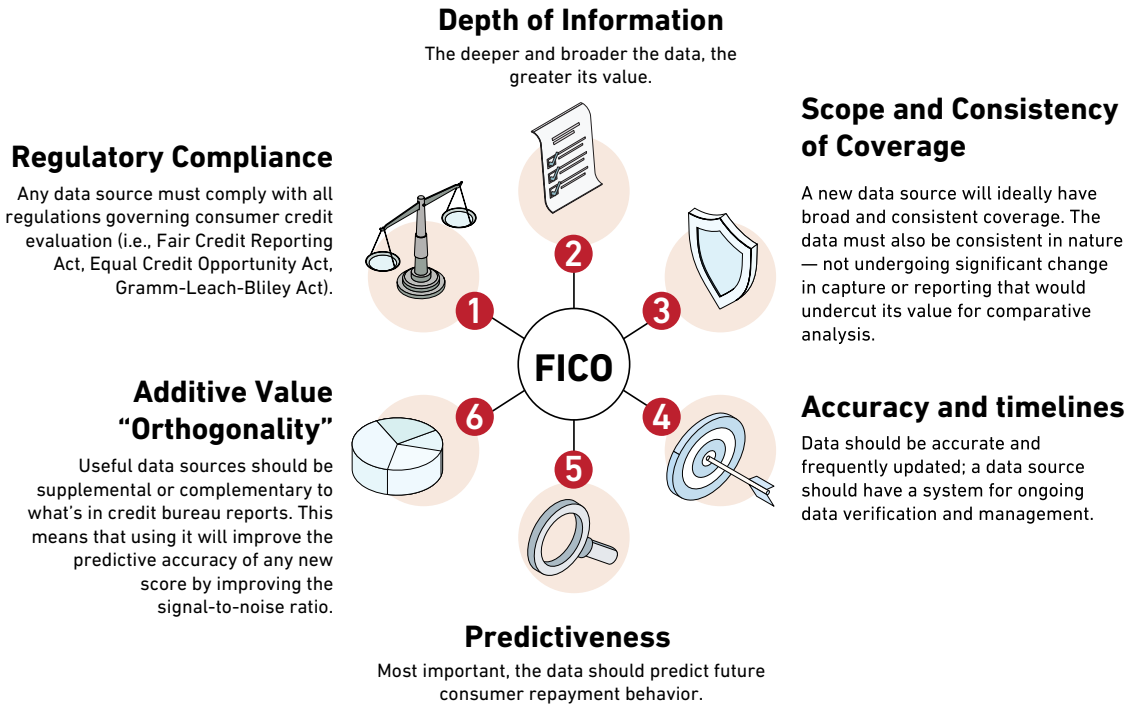
Source: Compiled from Hurley and Adebayo (2016), FMS Consumer Law Firm, Tracxn (2023) as well as respective corporate websites, modified by authors.

There is no standardized approach to data mining and assessment in the U.S. ICS industry, but FICO, one of the earliest ICS players in the U.S. market, can offer an example of how the data can be used for credit scoring.

FICO segregates data into three tiers with different basic points. The first tier comprises financial account data, the second tier consists of bill payment data, and the third tier is made up of non-financial data, which can include public records of property ownership, retail purchases, and data gathered through social networks. FICO applies the Six-Point Test (outlined in Figure 3) to determine whether the data can be included in a FICO score model.

“FICO segregates data into three tiers with different basic points. The first tier comprises financial account data, the second tier consists of bill payment data, and the third tier is made up of non-financial data, which can include public records of property ownership, retail purchases, and data gathered through social networks.”

Figure 3.
FICO Six-Point Test



Source: Dornhelm (2015), processed by authors.

The proliferation of newcomers in ICS does not necessarily mean that traditional credit scoring agencies lose their market dominance. Traditional credit scoring companies jointly developed VantageScore, one of FICO's major competitors, which uses both traditional and alternative data. Its latest model, VantageScore 4.0, was released in 2017 and runs on the same 300 to 850 scale as FICO, illustrating that they are in direct competition. VantageScore 4.0 uses machine learning and "more granular and trended credit data" in its scoring method (Schwahn, 2022).[12]

The U.S. market has diversity not only in credit scoring models but also in what they deem to be sufficiently good credit. A 650 FICO score can be high enough to qualify for a credit card with a given bank or an auto lender, but the applicant might need higher VantageScore for a similar creditor to approve his/her application.

The United States has an ex-ante legal mechanism that requires ICS operators to test their scoring model before it can be used for lending purposes. It is regulated under the federal Equal Credit Opportunity Act, which mandates that lenders provide explanations to rejected applicants within 30 days of receiving their completed applications. Creditors that fail to comply are subject to punitive damages. Creditors must also use an empirically derived, demonstrably and statistically sound credit system (Kreiswirth, 2016). All forms of credit that fail this validity test are classified as judgmental systems. The purpose of this regulation is to avoid discriminatory assessment and to create equal, unbiased credit opportunities.

Despite these regulatory attempts, discriminatory lending persists. There is a danger that ICS may reinforce inequality by capturing in its data disadvantages already faced by potential borrowers. For example, mainstream financing is more available to white applicants and minority borrowers are more likely to be charged higher interest rates (Rice & Swesnik, 2012) because past lending practices continue to affect the calculation credit scores at a structural level. In 2016, a research conducted by the U.S. Federal Trade Commission found that the use of big data analytics has resulted in discriminatory credit opportunities, especially for low income, underserved populations and African American communities (WBG, 2020). This took shape in part due to the use of algorithms in the analytic tools that tend to associate and prioritize certain attributes such as the consumer's network of acquaintances, relatives, and ethnicity more frequently than other attributes (Ahmed, 2020). Because of the structural nature of the differential outcomes for these communities that data might draw upon, even if explicitly discriminatory variables are not used in the credit scoring models those variables may nonetheless have predictive power in those models.

"There is a danger that ICS may reinforce inequality by capturing in its data disadvantages already faced by potential borrowers. For example, mainstream financing is more available to white applicants and minority borrowers are more likely to be charged higher interest rates."

[12] The three major credit scoring companies—Equifax, Experian, and Transunion—have also launched their own alternative scoring models: CreditVision (2013) by TransUnion, NeuroDecision (2018) by Equifax, and Experian Boost (2019) by Experian.

The U.S. Fair Credit Reporting Act (FCRA) was passed in the 1970s to ensure fairness in consumer credit reporting and to safeguard consumer privacy through limitations on how credit information can be disclosed or used (Robinson & Yu, 2014) and to legally define consumer reporting agencies, consumer reports, and credit scores (Yu et al., 2014). Unlike the Equal Credit Opportunity Act, the FCRA put more emphasis on the responsibility and accountability of credit scoring platforms in ensuring consumer data protection and a fair and transparent assessment of data. Consumers are also guaranteed the right to access information about how their personal and credit data are being used by third parties (FTC, 2023).

The U.S. Comprehensive Credit Reporting Enhancement, Disclosure, Innovation, and Transparency Act of 2021 (Comprehensive CREDIT Act of 2021) updated the FCRA (U.S. Congress, 2021). One of its major provisions is to strengthen the supervisory role of the Consumer Financial Protection Bureau in monitoring credit scoring models, especially in the use of certain nontraditional data. This establishes a public credit reporting agency, something that Indonesia already has, in order to treat consumer credit information as a public infrastructure and to balance the power of private credit bureaus (Traub, 2019).

Trade secrets in algorithms and credit scoring models is an issue that faces most credit scoring systems (the remainder are vulnerable to informed gaming of the system). The United States is not an exception to the conflict between trade secrets and transparency (Foss-Solbrekk, 2021). The White House recognized this challenge when it issued a "Blueprint for an AI Bill of Rights" to guide the use and design of automated systems in financial services and other industries (The White House, 2022) and includes the right for data subjects to request meaningful, plain language information about the logic involved in automated decision making.

> "The United States is not an exception to the conflict between trade secrets and transparency."

The National AI Initiative Act of 2020, which became law in 2021, created the U.S. National AI Initiative, which focuses on strengthening AI infrastructure ecosystem as well as advancing trustworthy AI by modernizing governance practices, developing appropriate technical standards, and creating a framework for managing risks associated with AI-powered technologies—including AI-generated credit scoring models (National AI Initiative, 2021). A year later, the U.S. Algorithmic Accountability Act of 2022 was introduced as a legislative effort to regulate automated decision systems across various industries. This bill aimed to provide much-needed clarity and structure for both consumers and regulators. However, the Algorithmic Accountability Act failed to pass before the 117th Congress adjourned in January 2023 (Digital Policy Alert, 2023).

[13] Consumer reporting agencies are companies or nonprofits that provide consumer reports to third parties for the purposes of determining eligibility for credit, insurance, employment, or other business transactions.
[14] The definition of a consumer report is fairly broad. It is a written, oral, or other communication of any information by a CRA bearing on one of seven factors: a consumer's creditworthiness, credit standing, credit capacity, character, general reputation, personal characteristics, or mode of living.
[15] The FCRA also has a special definition for a credit score. However, credit scores also fall within the general definition of a consumer report.

Act of 2022 was introduced as a legislative effort to regulate automated decision systems across various industries. This bill aimed to provide much-needed clarity and structure for both consumers and regulators. However, the Algorithmic Accountability Act failed to pass before the 117th Congress adjourned in January 2023 (Digital Policy Alert, 2023).

Despite this flurry of activity, federal legislation in the United States barely keeps pace with the ever-evolving ICS landscape (Li, 2021). For example, there are clear standards for data minimization and the FCRA limits the use of information in consumer reports and provides procedural safeguards to correct mistakes, but it does not limit the types of information that can be used to score credit, aside from prohibited data such as criminal records (U.S. Code, 2022; van Wezel & Horn, 2022). To collect data, companies need only provide notice that it will be collected and an opportunity for consumers to opt out (BIS, 2021; Hiller & Jones, 2022). Additionally, many alternative sources of credit data are not transparent to consumers, such as proprietary databases and third-party data aggregators. These sources are often unclear and credit scoring providers may not provide information on how the data is acquired (Hiller & Jones, 2022). Thus, U.S. legislation and regulation in the ICS space have not overcome challenges facing the contestability facing ICS schemes. This challenge is intensified when real problems with firms' scoring decisions are revealed, such as when Equifax sent incorrect credit scores to millions of consumers due to coding errors (Equifax, 2022).

Lessons for Indonesia

Despite the differences in the legal environments for ICS in China and the United States, there is a similarity: a major risk of the system stems from insufficient consent management and uncertain security controls for consumer data use, collection, and storage (Prove, 2021). Nontraditional data makes this more challenging because the information in question, such as location history or phone activity, could risk consumer privacy and personal safety. As in Indonesia and China, the United States has been the site of massive consumer data breaches, recently affecting Equifax[16] and TransUnion[17].

Although no country has completely addressed the risks associated with ICS lending, Indonesia's newer policy environment can learn from the challenges that continue to plague a market like the United States, which is unable to overcome the conflicting needs for trade secrets and transparency. The regulatory sandbox, which is meant to help the policy environment grow up with new models and technologies, may help Indonesia find more effective ways to mitigate these risks.

[16] In 2017, Equifax encountered a cybersecurity incident that led to the exposure of personal information of 147 million consumers (FTC, 2022).
[17] In November of 2022, TransUnion disclosed a data breach that exposed customer names, social security numbers, financial account numbers, and driver's license information (Hernandez, 2022). The number of people affected by the TransUnion data breach remains unclear, but the company maintains more than 200 million active consumer files in the United States alone.

Indonesia should also pay close attention to the controversy surrounding the further entrenching of discriminatory lending practices when AI decision making is influenced by historic and structural discrimination. Lending patterns could be proactively monitored for similar reinforcement of biases against minority and discriminated against groups in Indonesia and algorithms revisited to better address these challenges.

“Indonesia should also pay close attention to the controversy surrounding the further entrenching of discriminatory lending practices when AI decision making is influenced by historic and structural discrimination.”

CONCLUSIONS

Innovative credit scoring (ICS), which leverages non-traditional data sources and advanced analytics techniques, has emerged as a disruptive force in the traditional credit assessment landscape. Indonesia's ICS industry is newer than in either China or the United States and a higher proportion of Indonesia's population is unbanked than in either of these countries. Indonesia therefore has neither China's strongly entrenched state apparatus designed to perform data collection and analysis, nor the mature private market dominated by large data collecting firms that exists in the United States.

Like most developing countries, Indonesia's rapid growth of online lending platforms and digital banks since 2016 has been instrumental in the development of its ICS industry. While ICS may be crucial to improving financial inclusion and broadening credit access, there is delicate balance between its advantages in financial inclusion and its inherent risks. With the new technology required for collecting and assessing the quality of alternative data, regulatory oversight has struggled to keep up in Indonesia. In contrast, in major economies with more mature markets, governments have cultivated an environment conducive to the growth of ICS, and taking advantage of factors such as vibrant and innovative fintech landscapes, the presence of well-established ICS firms, a regulatory framework that fosters innovation, widespread adoption of smartphones and internet connectivity, and collaboration among various stakeholders.

Although Indonesia has an opportunity to learn from more mature ICS sectors, with weak institutions and relatively low financial literacy in the population, progress via ICS in financial inclusion comes with a substantial trade-off in consumer protection. There is no silver bullet. While this algorithmic "solution" to economic inequality can be effective, it necessitates society's readiness to pay a price in terms of privacy and consumer protection and to carefully consider whether, where, and how this price might be reduced.

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APPENDIX: ICS REGULATION IN MATURE ECONOMIES

ICS is still new in Indonesia. Policy decisions have focused on greater financial inclusion while overlooking the accompanying risks. In spite of this, the number of ICS providers in Indonesia has quadrupled from five in 2016 to 20 companies at the time of writing. However, the absence of specific regulatory oversight has hindered the industry's ability to scale up. A study by the Center for Indonesian Policy Studies revealed that regulatory uncertainty surrounding the exit process for participating digital financial innovation (DFI) firms in OJK's fintech regulatory sandbox further impede's the industry's maturity (Wijaya, 2023). Law No. 4/2023 (Law on Finance or P2SK) on the Development and Strengthening of the Financial Sector is an omnibus law that aims to streamline and harmonize all financial sector regulations, but does not provide adequate clarification.

Meanwhile, ICS development is more mature in markets such as the United States, China, the United Kingdom, and South Korea. Over the past few years, these countries have seen a boom in ICS, which disrupted the existing credit scoring regimes to varying degrees. In the United States, the growth of ICS has not only been part of a broader trend in the growth of fintech lenders, reportedly improving credit access for MSMEs, but also increasingly integrated to established credit assessment, such as the mortgage market and student loans. In China, credit profiling has been entrenched into the larger social credit system. As in newer ICS environments, the use of alternative data and machine learning comes with risks including but not limited to data privacy and costly defaults due to inaccurate assessment.

Mature economies also benefit from access to advanced digital infrastructure—including high-speed broadband Internet, big data centers, and secure payment systems—enabling growth of fintech companies and ICS providers. Moreover, these mature economies have established a supportive climate for the use of AI-enabled ICS methods and have fostered collaboration between fintech and regulators.

Similarly, South Korea has taken proactive measures to address the rise of AI-powered ICS. In July 2021, Korea's top financial authority—the Financial Services Commission ("FSC")—issued the AI Guideline for Financial Services. This was followed by the introduction of the Plan to Promote the Use of AI in Finance and Build Trust in AI Services in August 2022, along with ongoing projects to support its implementation (Lee, 2023). In April 2023, the FSC also implemented a verification system and AI security guideline specifically tailored to AI-driven credit scoring models. More recently, the upcoming Act on Promotion of AI Industry and Framework for Establishing Trustworthy AI (the "AI Act") serves as a comprehensive plan incorporating seven, previously fragmented legislations on AI (Roh & Nam, 2023; FSC, 2023).

Unlike the previous three instances, the UK Government has taken a different approach regarding the regulation of AI. Rather than introducing new legislation or establishing a dedicated regulator for AI, the government has opted to assign the responsibility of overseeing responsible AI practices to existing regulatory bodies in accordance to their respective sectors, such as the UK

Financial Conduct Authority ("FCA") for financial services (UK Department for Science, Innovation and Technology, 2023). The FCA has gained recognition globally as a leading destination for fintech innovation and pioneering regulatory breakthroughs. In developing its ICS ecosystem, the FCA has played a pivotal role in fostering innovation through initiatives like Regulatory Sandboxes (both cohort-based sandbox and digital sandbox), Innovation Pathways, Emerging Technology Hub, and Early and High Growth Oversight schemes (FCA, 2023). In general, the FCA places a strong emphasis on consumer protection while also ensuring market integrity and fair competition in the ever-evolving financial services industry.

Apart from the regulatory support and multi-stakeholder collaborations, digitization in the financial industry has been instrumental in accelerating the growth of ICS models in mature economies. This has resulted in a thriving network of firms offering inclusive and alternative credit scoring models, comprising both startups and established players. Some of the most notable ICS players in the UK include Friendly Score, Credit Kudos, Aire, CoreMetrix, ClearScore, CreditLadder, TotallyMoney have emerged in the market with a mission to provide more inclusive and accurate credit scoring models (Browne, 2022). As for South Korea, Lendit is considered to be one of the most prominent ICS players in the country. Lendit evaluates borrowers' creditworthiness using alternative data sources, with 250 different data points provided by Korea's first credit bureau—National Information & Credit Evaluation—as well as user trends from Lendit's website, which will then be analyzed using machine learning algorithms to generate a credit score. Other ICS providers that are thriving in South Korea include PeopleFund, Terafunding, Crepass, and Funding Societies. These companies use various data sources, such as bank account information, business performance data, and social media activity, to evaluate the creditworthiness of borrowers.

Hence, the ICS industry's steady growth in both South Korea and the UK can be attributed to several factors. These include the presence of an innovative fintech landscape and well-established ICS players, a supportive regulatory environment, a high penetration rate of smartphones and internet connectivity, and a meaningful collaboration among stakeholders. South Korea's strengths lie in its robust digital infrastructure and government support, while the UK's advantage comes from its flexible regulatory framework and powerful consumer protection laws. Drawing on the experiences of mature economies, emerging markets like Indonesia can develop credit scoring models that are well-suited to the distinctive risks and challenges encountered within their credit ecosystem.

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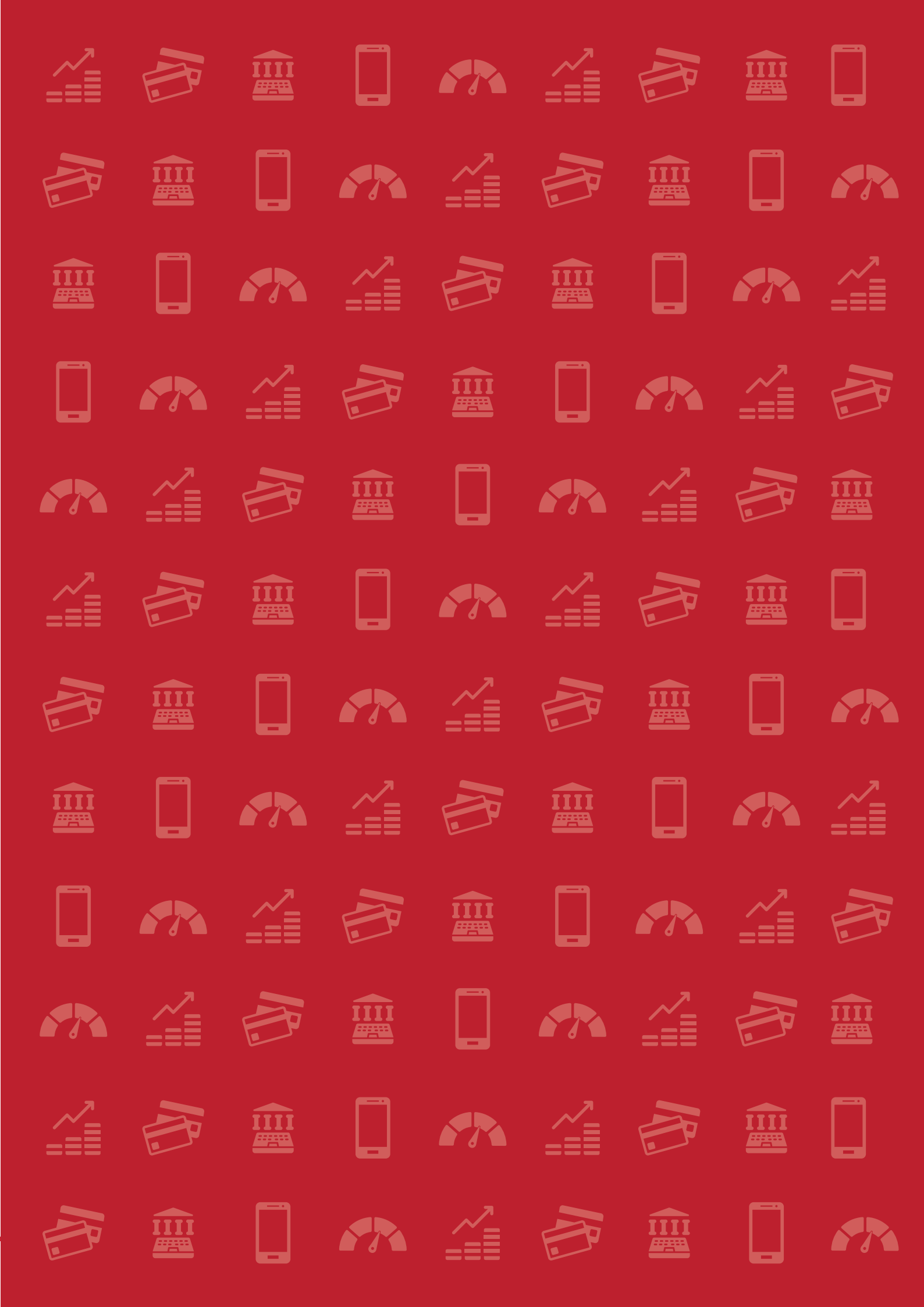

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