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Fintech for Good
Governance Mechanisms for Sustainable Development

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In addition to his academic career, Sep is currently a vice president at Morgan Stanley, where he leads global agile transformation initiatives. He is also the founder of AI for SDGs Canada, a cross-sector and multi-disciplinary research hub and advisory group.

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Acronyms and Abbreviations

AI	artificial intelligence
BoC	Bank of Canada
CO_2	carbon dioxide
COVID-19	coronavirus disease 2019
ESG	environmental, social and governance
fintech	financial technology
FSB	Financial Stability Board
G20	Group of Twenty
GFC	global financial crisis
GPFI	Global Partnership for Financial Inclusion
ICT	information and communications technology
IMF	International Monetary Fund
ITU	International Telecommunication Union
NGOs	non-governmental organizations
NLP	natural language processing
OECD	Organisation for Economic Co-operation and Development
SDGs	Sustainable Development Goals
SMEs	small and medium-sized enterprises
SRI	socially responsible investing

Executive Summary

> *Humanity is still in the foothills of the digital age. The peaks are yet uncharted, and their promise still untold.*
>
> —UN Secretary-General's High-level Panel on Digital Cooperation (2019)

Financial technology (fintech) for good has been increasingly employed over the past several years to address sustainable development. Two major approaches have emerged: institutional and societal fintech for good. Broadly described, institutional fintech for good is used for sustainable finance activities such as environmental, social and governance (ESG) investing, while societal fintech for good is used to support underbanked and unbanked individuals through financial inclusion initiatives. Despite the growing reliance on such digital tools, particularly during the coronavirus disease 2019 (COVID-19) pandemic, governance mechanisms and regulatory frameworks, both in Canada and abroad, remain fragmented, underutilized or inhibit progress toward the 17 UN Sustainable Development Goals (SDGs). While major proposals and reports were released by standard-setting and regulatory bodies leading up to 2020, the COVID-19 pandemic caused major setbacks to adoption and implementation, which, in turn, have resulted in inconclusive data and lessons learned. As the global community begins to navigate out of the pandemic, policy makers, through multilateral and cross-sector agreements, are looking to renew governance mechanisms that mitigate new and pre-existing risks, while cultivating sustainability and facilitating innovation.

Introduction

Fintech has become integrated into our global social fabric, particularly with the advent of the COVID-19 pandemic in 2020. While fintech applications have undoubtedly changed the way money is spent, borrowed, invested and saved — at various junctures of the financial system, they are increasingly being used to address sustainable development, which will be referred to in this paper as "fintech for good."

Fintech emerged after the 2008 global financial crisis (GFC) and has rapidly evolved into a commercial and mainstream service offering since 2018. The Financial Stability Board (FSB) defines fintech as "technologically enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on financial markets and institutions and the provision of financial services."[1] Put simply, fintech includes digital innovations used for financial services.

While the evolution of fintech began with start-ups addressing intermediation gaps left by the formal banking sector (Aaron, Rivadeneyra and Sohal 2017), today starts-ups, challenger digital banks, government agencies and incumbent banks use an array of emerging technologies to also address socially responsible investing (SRI) and financial inclusion — in hopes of making progress on the 17 SDGs approved by the United Nations.

Despite the growing governance action and literature regarding fintech and how it relates to formal financial systems (globally and regionally), governance mechanisms for fintech for good need to be urgently identified as studies are rare and the lack of agreed measures could contribute to fragmentation in future policy outcomes. To bring together a coherent conceptualization of fintech for good, this paper develops a definition: fintech for good embeds social and environmental inclusion, ethics and collaboration into its design, development and implementation to accelerate sustainable development.

Only in the past few years have cross-sector partnerships and multilateral discussions between central banks, standard-setting bodies and policy makers inspired governance frameworks and recommendations (for example, the Bali Fintech Agenda and the Maya Declaration on Financial Inclusion) that advance people and the planet, and not solely profit. On the one hand, fintech for good has been shown to unlock or enable efficiencies for various actors or industries, while on the other, it has been shown to inhibit progress toward sustainable development by presenting new or existing unintended consequences. Without governance and regulatory frameworks in place, such innovations may threaten the

1 See www.fsb.org/work-of-the-fsb/financial-innovation-and-structural-change/fintech.

viability of modern financial systems and the livelihoods of the actors that contribute to them (Castilla-Rubio, Zadek and Robins 2016).

With this in mind, the ongoing debate surrounding sustainable development challenges (for example, energy consumption, e-waste, privacy and predatory issues, gender bias and racialization) related to regulations, ethics and particularly governance are mounting. In response, intergovernmental organizations, central banks and regulatory bodies have had to carefully, yet expeditiously, adapt to the evolving ecosystem — mitigating risk through robust regulatory measures while cultivating sustainability and facilitating innovation. To unpack these implications, this policy paper addresses fintech for good using the following structure.

The first section examines the SDGs and how fintech for good can achieve them. Technology utilization to improve social and environmental outcomes during the Fourth Industrial Revolution are well under way. In only a few years, fintech for good has evolved from historical data analysis to real-time information and recently to predictive modelling.[2]

The second section considers two vantage points related to fintech for good. The first observes fintech for good at the institutional level, in the context of ESG investing. Specifically, in developed markets, firms use emerging technologies such as subsets of artificial intelligence (AI) and big data (for example, stock prices, ESG risk data, public sentiment) to provide investors with sustainability insights. The second vantage point relates to fintech for good at the societal level, in the context of digital financial inclusion. Emerging and frontier market actors have integrated adjacent industries to bridge the gap between unbanked (and underbanked) populations and the financial system, serving vulnerable individuals and small businesses that historically have not had equitable access to financial and/or technology resources and literacy (Cantú and Ulloa 2020).

The third section discusses the COVID-19 pandemic and the unique challenges and opportunities it has presented in the context of fintech for good. For instance, in late March 2020, the Bank of Canada (BoC) suggested that "during this time of heightened public health measures intended to limit the transmission of COVID-19, some consumers and businesses are choosing not to use cash to limit potential exposure" (Carmichael 2020, para. 6). Current trends indicate an increased acceptance of digital tools and digital identity, and consideration of digital currencies (Carmichael 2020; Cheung, n.d.). As nations and institutions look to fintech for good to address pandemic-related circumstances, the SDGs could serve as a guidepost to accelerate innovation while confronting practices that may be exclusionary or pose unintentional consequences.

Fintech and the SDGs

This paper adopts the following definition of sustainable development by David Griggs et al. (2013, 2): "Development that meets the needs of the present while safeguarding earth's life-support system, on which the welfare of current and future generations depends." In 2015, the United Nations introduced 17 SDGs as a framework to address global challenges such as poverty, climate change[3] and numerous inequities by 2030. When the SDGs were agreed to, it was stated that data and technology could unlock the potential to not only monitor progress toward sustainable development as once traditionally used but, more importantly, to actively contribute through evidence-based policies and programs (UN Global Pulse and GSMA 2017). This was followed in 2016 by the likes of the Group of Twenty (G20), which included sustainable digital finance as one of its 2030 workstreams, and the United Nations Environment Programme, which published recommendations in its *Fintech and Sustainable Development: Assessing the Implications* report (Macchiavello and Siri 2020; Blakstad and Allen 2018).

Meeting the SDGs will require action on several technological fronts, including better understanding the potential of digital innovations. For fintech for good to support sustainable development, it must focus not only on the perceived benefits as imagined by those who develop them but also how the technologies (and associated benefits) are accessible, useful and can be integrated

2 See www.itu.int/en/ITU-T/AI/2018/Pages/default.aspx?source=jaai.de.

3 See https://sustainabledevelopment.un.org/topics/climatechange.

Box 1: The Fintech Landscape

To better understand fintech for good, it is helpful to briefly examine the development of fintech itself. Despite its popularity and accessibility since 2018, fintech is not a new phenomenon. Traditional financial innovations, which today we take for granted, have existed for decades; notably including credit cards (1960s), debit cards and automated teller machines (1970s and 1980s), various financial institutional products (1990s) and online banking (2000s) (FSB 2017). However, over the past 10 years, "modern" fintech has experienced dramatic evolutionary shifts resulting broadly from hyper-globalization, changing financial regulations and shifting stakeholder preferences (for example, high-frequency trading, growth in mobile phone ownership and wireless connectivity), and specifically from evolving technology (for example, fifth-generation technology, advancements in AI, blockchain and big data) (Deng, Huang and Cheng 2019; FSB 2017).

The fintech sector today has matured since the GFC, moving past start-up challengers to include central banks, big tech and big banks. In 2019, investment in fintech grew by 16 percent to $140 billion,[4] and there were more than 450 *unicorn* fintech firms (those valued at more than $1 billion) (Cantú and Ulloa 2020). Much of this activity (80 percent) occurred in the United States and Europe, where investment grew by 60 percent and 90 percent, respectively. China, India and Russia have become global leaders in consumer adoption as their markets continue to expand (EY 2019). Three major technological developments have established the maturity of fintech today: big data creation, powerful processing and advanced algorithms. These and other developments have elevated the potential for high-speed internet, cloud computing, AI and blockchain to serve fintech solutions.

(especially by the poorest or most vulnerable)[4] into local contexts that vary economically, politically and culturally (Arthur 2009). On the one hand, fintech for good has been utilized to improve the quality of life for developing nations and enable greater access to basic human amenities for their populations. On the other hand, fintech for good is often not regulated by conventional financial regulators and might have negative effects on financial markets or exclude those without access.

Historically, innovation has been promoted through public and private mechanisms, operated only by a few developed countries and international bodies (Nelson 1993). These efforts have succeeded, to some degree, in fulfilling global sustainability needs but have fallen short of advancing sustainable development (Juma and Yee-Cheong 2005; InterAcademy Council 2004).[5] Addressing these gaps requires effective cross-sector partnerships between municipal, federal and international actors and input from end users (recipients and local stakeholders) contributing to the process. Within the global innovation system, the difficulties of utilizing technological innovation for sustainable development have been addressed in a variety of ways, such as through financing, the formation of research networks, setting priorities, international aid and trade agreements, and action research feedback loops connecting end users and innovators.[6] To some degree, these interventions have altered institutional norms and configurations over the past few years, yet they are poorly described in the literature. Little is known beyond their respective fields, making it difficult to contribute to enhancing fintech for good in practice and scholarly discourse.

4 All dollar figures in US dollars.

5 See www.hks.harvard.edu/centers/mrcbg/programs/sustsci/activities/program-initiatives/innovation/projects/innovation-and-access-to-technologies-for-sustainable-development.

6 Ibid.

The Promise of Fintech for Good

A Brief History

The GFC of 2008 and its aftermath caused enormous turmoil and led to an extended period of low growth and instability across the international political economy (Castilla-Rubio, Zadek and Robins 2016). This crisis originated from exorbitant risk-taking by US banks on subprime mortgages, which burst the housing bubble, triggered the collapse of the banking sector and led to an unprecedented "credit crunch" around the world (Flammer and Ioannou 2020). As a result, numerous governance and regulatory measures infused by the G20 were implemented to reshape the global financial system. After the devastating impacts the GFC had on people and the planet, investors and stakeholders turned to sustainable finance (for example, ESG investing) in efforts to mitigate the non-financial criteria related to climate change, environmental disasters and poor corporate governance, as well as the investment risks each of these posed (Townsend 2020). At the same time, financial inclusion initiatives were established by G20 leaders (for example, the Financial Inclusion Experts Group, Global Partnership for Financial Inclusion [GPFI]); central banks of emerging markets (for example, the Alliance for Financial Inclusion and its release of the Maya Declaration on Financial Inclusion); and the United Nations (for example, the Task Force on Digital Financing of the Sustainable Development Goals), to name a few (Arner et al. 2020).

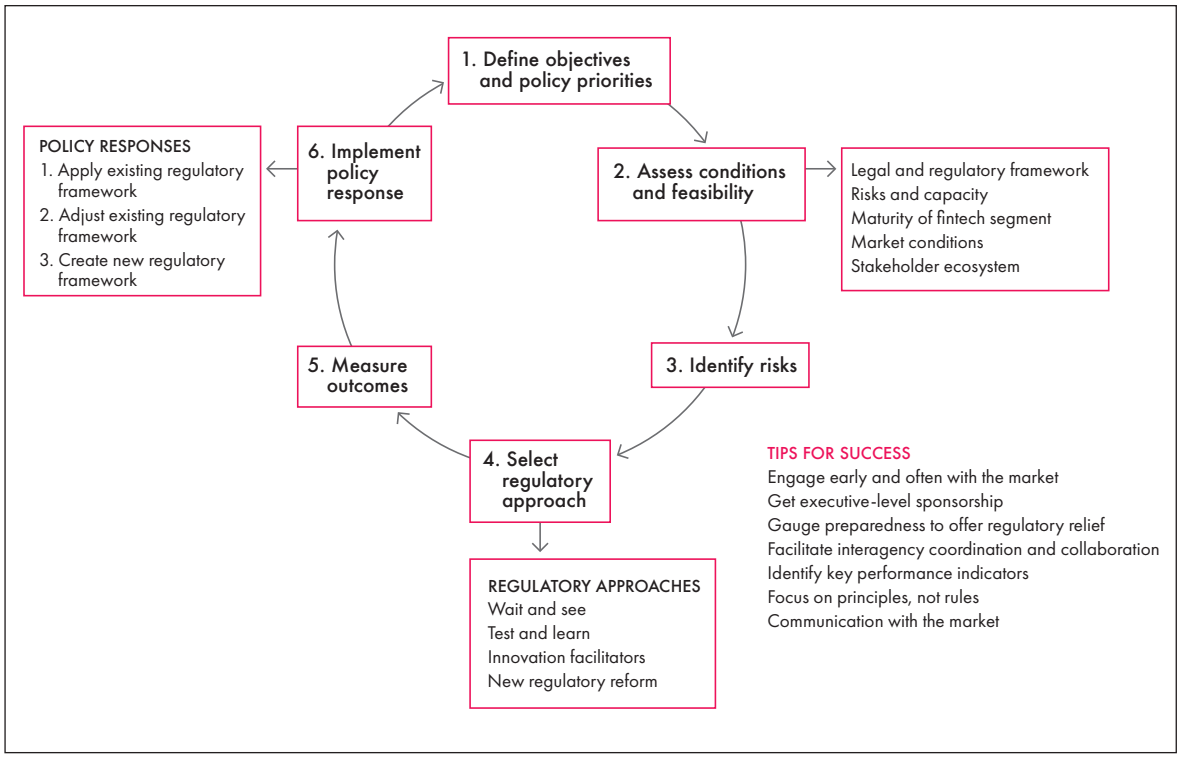
While fintech for good is relatively new in the literature and in practice, technology utilization to improve social and environmental outcomes is not. Upon reviewing the literature, information and communications technology (ICT) was first introduced in the literature (for example, Cornish 1982; Melody and Mansell 1986; Nooteboom 1992) in the 1980s to represent technologies such as telephone networks, computer networks, television and radio. In the sustainable development field, the most widely used reference to technology is "ICT for development," a term that was also used in 2000 for the UN Millennium Development Goals (International Telecommunication Union [ITU] 2015). With advancements and variance in digital innovations, the term ICT no longer accurately describes the field as it once did and thus must be revisited. The authors posit that "ICT for good" serves as an umbrella term for newer fields such as fintech for good (Arner et al. 2020; Alexander, Shi and Solomon 2017); AI for good (Clopath et al. 2019; Rolnick et al. 2019; Taddeo and Floridi 2018); blockchain for good (Sylvester 2019; Kewell, Adams and Parry 2017; Aganaba-Jeanty, Anissimov and Fitzgerald 2017); and big data for good (Marsden and Wilkinson 2018; Initiative for Global Environmental Leadership 2014; Maaroof 2015), in both academic and industry journals. To this end, stakeholders must be cautiously optimistic about advancing fintech's remarkable depth, power and speed in their efforts to accelerate sustainable development.

Recent Governance Responses

Cross-sector partnerships and multilateral efforts by bodies such as the FSB, the Bank for International Settlements, the G20, the Organisation for Economic Co-operation and Development (OECD) and numerous UN agencies have made some progress. Figure 1 depicts a process recently introduced by the World Bank Group (2020), offering guidance on regulatory approaches toward fintech. Despite such efforts, global adoption and implementation to integrate such frameworks are largely missing (Fay 2019). This trend is also evident across developed markets such as Canada and other G20 members (for example, China, the European Union, India and the United States), where regulatory bodies are still working to investigate and implement modifications.

In 2018, the World Bank Group and the International Monetary Fund (IMF) launched "The Bali Fintech Agenda" policy paper, which proposed a framework on high-level fintech issues that countries should consider in their domestic policy discussions (World Bank Group and IMF 2018). The paper presented 12 policy proposals that cover issues related to enabling fintech, ensuring financial sector resilience, addressing risks, financial inclusion and promoting international cooperation. While global cross-sector agreements such as the Bali Fintech Agenda have offered blueprints for fintech for good, it is not clear where member nations stand relative to these proposals presently. The pervasiveness of the COVID-19 pandemic has since caused reprioritization and major setbacks to such governance implementations, which in turn have resulted in inconclusive data and lessons learned. The last known review of country responses was carried out by the World Bank and IMF in 2019

Figure 1: Process to Identify Regulatory Approaches and Policy Responses toward Fintech

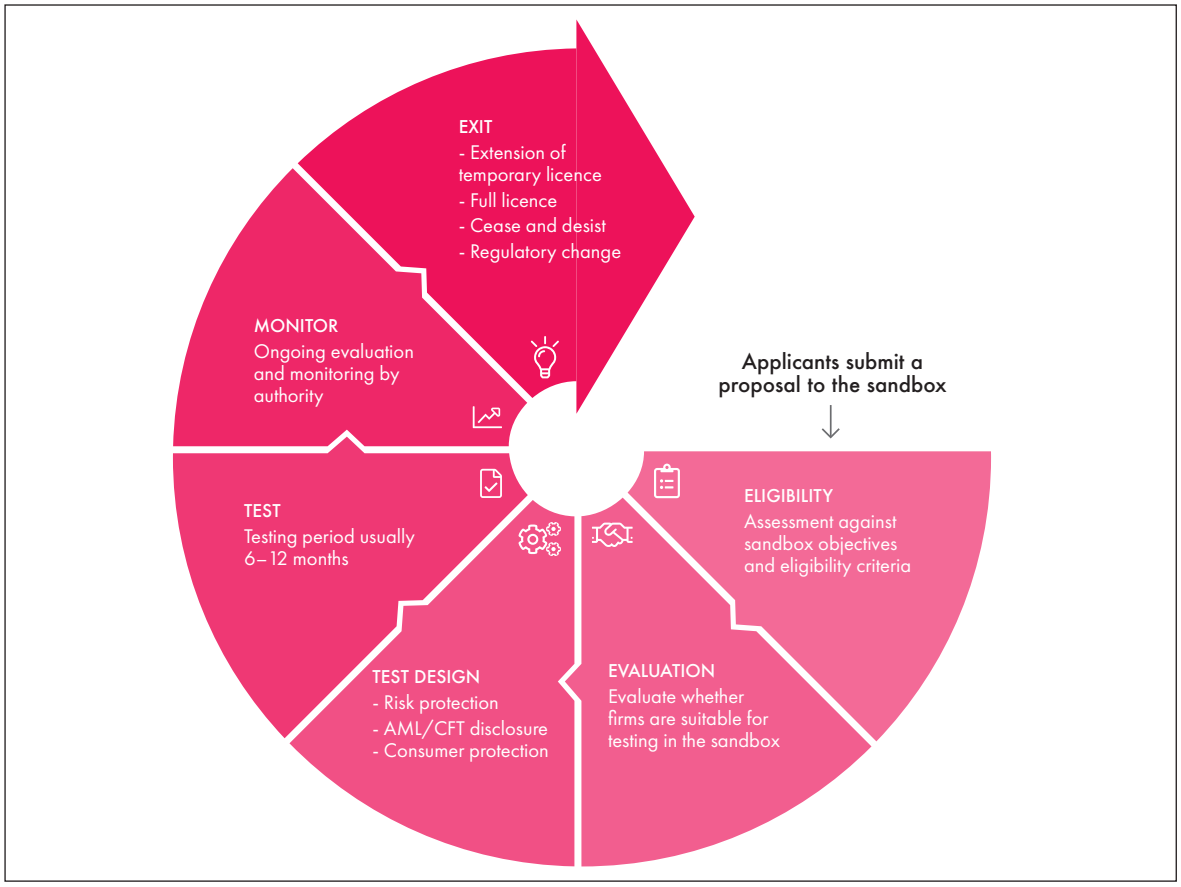


Source: World Bank Group (2020).

(IMF 2019). Findings from the report included three major themes. First, common in nearly all regions are critical infrastructural and regulatory gaps (ibid.). Second, monitoring of entities and activities is still confined within conventional regulatory parameters (ibid.). Third, legal frameworks to address issues are widely missing (ibid.). In its regional overview, the report highlighted the following: Africa has experienced rapid growth of mobile money in a push toward increased financial inclusion, but differences in regulatory approaches are noticeable and reactive to the pace of change (ibid.). East Asia has made significant advances in all major aspects of fintech. To keep up with this pace, regulators have established fintech units and regulatory "sandboxes" to respond to various risks (for example, consumer and investor protection concerns, financial stability and integrity) (ibid.). Entities utilize fintech sandboxes to test solutions in controlled environments to expose potential risks and benefits. Figure 2 shows the various phases of a fintech sandbox lifecycle (World Bank Group 2020). The European market is also rapidly growing but is distributed unevenly. While the European Union enforced two major regulations (the General Data Privacy Regulation and the Payment Services Directive 2) in 2018, their implications are yet to be seen. In West Asia, Central Asia and North Africa, adoption and progress are gradual, with concentration of activities only in a few countries and sectors. Regulatory responses vary widely across the Americas, with Latin American and Caribbean nations still trailing behind Canada and the United States.

While some major fintech advancements have been made in Canada, very little has followed with regard to governance and policy, and agreed-upon frameworks around their functions are ad hoc, incomplete and insufficient. In Canada, there is no single federal or provincial regulatory body that has jurisdiction over fintech firms. Instead, regulations are dependent on the types of services being offered by such firms (Global Legal Group 2021). This notion of light-touch regulation has some concerned about bad behaviour by firms, renewing fears of a GFC-like scenario (Fay 2019). Canadian regulators such as the Department of Finance, the Competition

Figure 2: A Typical Sandbox Lifecycle



Source: World Bank Group (2020).
Note: AML/CFT = anti-money laundering/combatting the financing of terrorism.

Bureau and some provincial agencies have made attempts at developing a fintech regulatory framework (Global Legal Group 2021). The Ontario Securities Commission, the Autorité des marchés financiers in Quebec and the Canadian Securities Administrators are currently utilizing fintech sandboxes to experiment with various solutions (Canadian Bankers Association 2018). Separately, the federal government in its 2018 Budget Implementation Act, Bill C-74, introduced changes (for example, the Bank Act, the Trust and Loan Companies Act and the Insurance Companies Act) in favour of fintech to provide financial institutions with new abilities (ibid.). What follows is an account of how these factors correspond to fintech for good in institutional and societal scenarios.

Institutional and Societal Fintech for Good

Three major fintech for good approaches have emerged related to achieving the SDGs. The first is at the institutional level and involves redirecting the allocation of existing financial resources toward *sustainable finance* (for example, ESG investing). The second is at the societal level and includes the expansion of financial resources through *financial inclusion* to support the SDGs. The third is at the regulatory level and uses technology (regulatory technology or "regtech") to (re)design enhanced financial governance systems (Arner et al. 2020). The following explores the first two approaches, which are central to the focus of this paper.

Sustainable Finance

It is widely studied that SRI can support climate action (for example, Eccles et al. 2014; Geobey, Westley and Weber 2012; Weber and Feltmate 2016). SDG 13 aims to "take urgent action to combat climate change and its impacts" by integrating measures into national policies and institutional capacity building.[7]

This section explores whether and how fintech for good could be used by ESG data firms that provide investors with non-financial performance information. Sustainable finance and fintech are both major policy areas concerning stakeholders across sectors, exemplified by numerous initiatives by researchers and policy makers across G20 member states, the United Nations and the European Commission (Arner et al. 2020). Despite this, a paucity of research still exists in how they interact and whether additional governance and regulatory considerations are necessary. This was the case with the European Commission's Sustainable Finance Action Plan, which made no mention of fintech (ibid.). Further, despite the growing availability of computational resources within financial institutions and the emergence of fintech more than a decade ago, existing solutions have only recently evolved to correspond with the growing interest in SRI and the abundance of big data related to ESG (Monteleoni, Schmidt and McQuade 2013; Weber and Feltmate 2016).

Pre-existing complexities in the ESG domain have, for some time, prompted stakeholders to demand alternative ESG data. For instance, Robert G. Eccles and Judith Stroehle (2018) stated that despite the growing appetite for data and empirical evidence showing a correlation between ESG performance and financial outcomes, the field remains unorganized and without universally agreed-upon standards (Eccles, Ioannou and Serafeim 2014; Khan, Serafeim and Yoon 2016). With more than 100 data providers (for example, Vigeo Eiris, KLD, MSCI, ISS-oekom, Sustainalytics, Morningstar) in the ESG ecosystem, their incomplete efforts to standardize metrics, indicators and methods have created a variance in ratings and recommendations that confuse and misinform investors and undermine the soundness of ESG disclosure (Eccles and Stroehle 2018).[8] Further, conventional ESG providers struggle in three major ways: first, ESG data is mainly sourced from company disclosure materials; second, ESG scores and data are typically a year old; and third, there are discrepancies and a lack of standardization among data providers (Malinak, Du and Bala 2018; Folger-Laronde et al. 2020).

Thus, some investors have turned to ESG fintech for good firms that consume big data and apply subsets of AI such as machine learning and natural language processing (NLP). Such tools are currently being used by asset managers, asset owners and quantitative managers who seek real-time alternative ESG data and analytics to support their clients' investing needs. Figure 3 shows venture capital funding in institutional fintech since 2010 (Mastercard 2020).

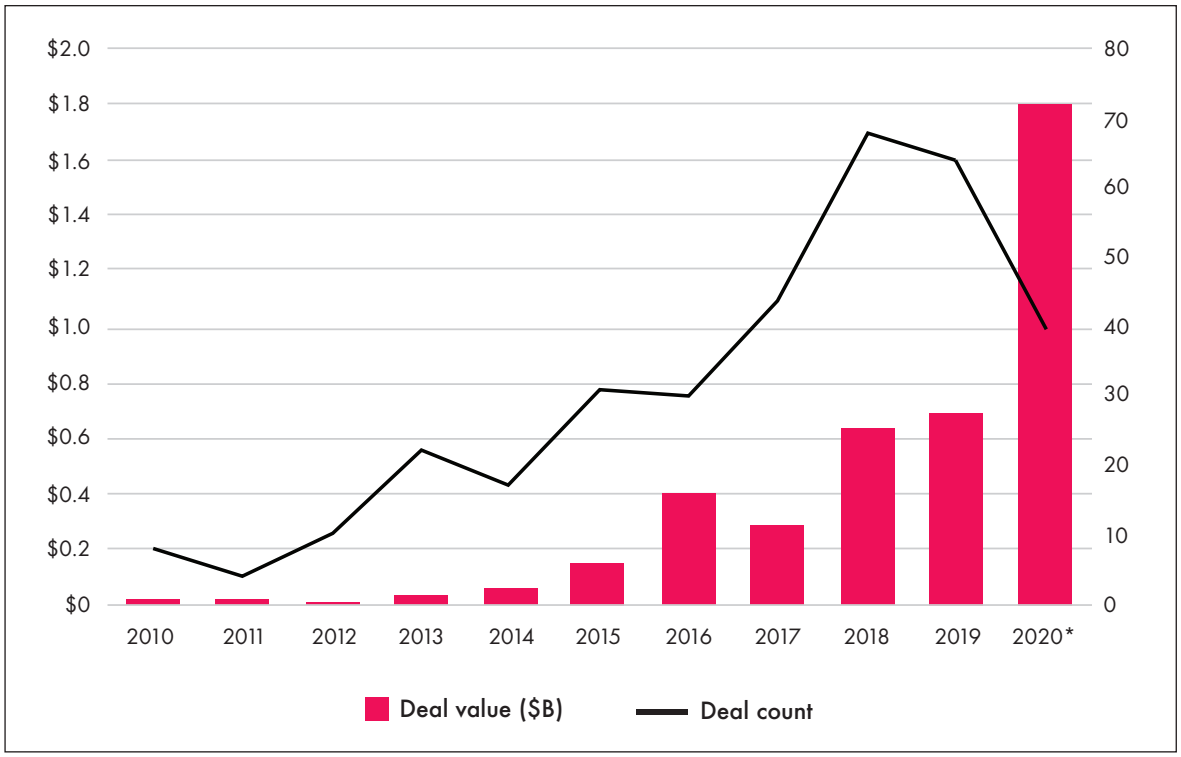
In 2013, Truvalue Labs, one of the first AI-driven ESG data providers, was founded.[9] Truvalue Labs analyzes public sentiment from alternative sources such as news media, think tanks, social media, non-governmental organizations (NGOs) and academic journals related to company ESG performance (Serafeim 2020). Specifically, Truvalue Labs uses AI to analyze unstructured big data from more than 100,000 sources, such as analyst reports, news and social media, and government sources, and incorporates the Sustainability Accounting Standards Board's 30 materiality classifications to generate scores (0–100) (ibid.). It is noted that transparency and validation are provided to the user by enabling them to track the source of information that informs the sentiment analysis. For instance, a drilling company could receive positive sentiment following news of their investment to improve waste and hazardous materials management, materials sourcing and product safety. Facebook, on the other hand, could receive negative sentiment due to exposure to data privacy issues, concerns about regulatory pressure and user rights (ibid.). It has been reported that Truvalue Labs's sentiment analysis can also codify the degrees of positivity or negativity, instead of just the conventional binary approach: positive versus negative sentiment. According to Serafeim (ibid.), AI will make attempts to assign a more negative score to an event such as an oil spill that harms several people or communities and a less negative score to an event that causes minor injuries to one person.

7 See https://sustainabledevelopment.un.org/topics/climatechange.

8 See https://shift.tools/contributors/490/about.

9 See www.factset.com/about-our-company.

Figure 3: Venture Capital Activity in Fintech and Sustainability



Source: Mastercard (2020) (www.mastercard.com/news/media/bz5nmfg4/mastercard_start_path__pitchbook_fintech_for_good_report.pdf).
Note: *As of October 28, 2020.

Related Governance Challenges

With the rising demand for fintech for good offerings, governance mechanisms must confront the duality of what is considered "good." While ESG fintech solutions can be useful to investors when evaluating a firm's sustainability activities, it is not clear whether the algorithms that power such solutions have considered ethics, inclusion and environmental factors that could potentially compromise progress toward the SDGs. A recent study (Vinuesa et al. 2020) published in *Nature* revealed that while AI enabled the accomplishment of 134 SDG targets, it inhibited the progress of 59. The study indicated that failure to enforce governance and regulatory oversight for AI for sustainable development could result in negative societal and environmental implications (ibid.).

From an ethics and inclusion perspective, key aspects that require governance attention include transparency, equity, auditability and accountability. For instance, different algorithms that process the same raw data may ultimately produce different outcomes, which may have discriminatory, exclusionary and exploitative implications (Ehrentraud et al. 2020). A recent study surveyed numerous jurisdictions and found that none enforced any regulatory requirements for financial institutions that employ AI (ibid.). Another growing subdomain of AI ethics is sustainable AI, which confronts whether AI itself is environmentally sustainable when considering computing power and energy consumption required for training AI (van Wynsberghe 2021). For instance, Emma Strubell, Ananya Ganesh and Andrew McCallum (2019) showed that training a single NLP model, which uses deep learning, could produce the same amount of carbon dioxide (CO_2) (around 600,000 lb.) as five cars over the cars' entire lifespan (van Wynsberghe 2021). Thus, policy makers must continue refining regulation and legislation standards that address these ethical considerations.

To address some of these challenges, nations such as Singapore have released frameworks to promote AI fairness, ethics, accountability and transparency, while the Netherlands promotes soundness, accountability, fairness, ethics, skills and transparency (Ehrentraud et al. 2020). The Canadian Institute for Advanced Research's Pan-Canadian AI Strategy (appointed by the federal government in 2017) has been working to develop the world's first national AI strategy, including a workstream titled "AI & Society."[10] Other nations, in particular in the G20, also have efforts under way that look to expose and address negative implications for society (Ehrentraud et al. 2020).

Financial Inclusion

The 2030 Agenda for Sustainable Development recognizes that poverty is the greatest global challenge and its eradication is a requirement for sustainable development. SDG 1 aims to "end poverty in all its forms everywhere"[11] and pushes for robust protection systems and spending on primary services to help individuals escape poverty.

This section explores whether and how fintech could help promote an inclusive digital economy that provides financial services to the unbanked (those who have no bank account or transactions through a mobile money provider) and underserved individuals living in poverty. Around 700 million people today live on less than $2 per day and 1.3 billion people are multidimensionally poor.[12] Some priority areas and associated targets include reducing poverty by 50 percent (by 2030), improving access to sustainable livelihoods and entrepreneurial opportunities, empowering people living in poverty with support systems and addressing the disproportionate impact of poverty on women (United Nations 2019). While extreme poverty has declined, this trend has slowed and the United Nations warns that we are not on track to achieve its 2030 global target (less than three percent living in extreme poverty) (ibid.). The COVID-19 pandemic has further exacerbated circumstances for the most vulnerable. Since 2020, the following trends have been observed: global poverty (SDG 1)[13] has increased for the first time in decades; inequalities and dangers that women and girls face have increased (SDG 5);[14] the world is facing the worst economic recession since the great recession (SDG 8);[15] and investment in fossil fuels remains higher than in climate action (SDG 13).[16]

Financial inclusion is one of the UN Global Compact[17] categories in which the financial sector can play a role in addressing the SDGs, with about 1.7 billion people remaining unbanked (Demirgüç-Kunt et al. 2017; Weber 2018). The United Nations states that to eradicate poverty by 2030, "affordable technological solutions have to be developed and disseminated widely."[18] The role of fintech for good, concerning financial inclusion, has been discussed by stakeholders after the onset of the GFC. In 2008, policy makers established the Alliance for Financial Inclusion while G20 leaders endorsed a Financial Inclusion Action Plan at the Seoul G20 Summit in 2010 and created the GPFI (Gabor and Brooks 2017). In 2015, the United Nations emphasized financial inclusion in multiple SDGs (numbers 1, 5 and 10) and noted the value of technology in accelerating them (Greenvest and United Nations Environment Programme 2017). In 2018, a collaboration between the IMF and World Bank gave rise to the Bali Fintech Agenda, which established a broad road map to appropriately implement digital financial inclusion (Sahay et al. 2020).

In the Global South (in countries such as China, Ghana, India, Kenya, Myanmar, Peru and Uganda), fintech for good has also been advanced by governments, mobile money networks and NGOs to help address the needs of individuals who are generally unbanked or experiencing poverty. Offerings include income and liquidity support, filing tax returns, flexible loan repayments, lower transaction costs and increased transaction limits, which are helping shift away from conventional financial service practices (ibid.). Fintech for good firms such as CreditVidya[19] and Zest Finance use alternative data such as "digital fingerprinting" captured from an individual's device, browser and

10 See https://cifar.ca/ai/.

11 See https://sdgs.un.org/goals/goal1.

12 See www.undp.org/six-signature-solutions.

13 Ibid.

14 See https://sdgs.un.org/goals/goal5.

15 See https://sdgs.un.org/goals/goal8.

16 See https://sdgs.un.org/goals/goal13.

17 See https://unglobalcompact.org/.

18 See https://sustainabledevelopment.un.org/topics/technology.

19 See https://creditvidya.com/how-it-works.

social media activity to predict creditworthiness.[20] In Kenya, M-Shwari uses a mobile money system (M-Pesa) to incorporate phone history in its assessment of credit risk (Bharadwaj and Suri 2020). With 20 percent of adults (37 million users) in Kenya actively using this service, M-Shwari is seen by some as a financial inclusion success story (Bharadwaj and Suri 2020; Cantú and Ulloa 2020). The service incorporates predictive algorithms and AI to analyze social and telecom data to assess creditworthiness. Within a few minutes, a credit score is produced, offering the terms of the loan (Bharadwaj and Suri 2020). On a macro level, insights about the economic health and resilience of a community can also be extrapolated from the use of mobile financial services, monthly airtime top-up patterns and the purchase of value-added services.[21] Despite their potential to contribute to the SDGs, these examples (such as the institutional ones noted above) must be approached with great caution due to risks related to data security, accountability and bias.

With regard to global remittances, recorded annual flows in 2018 to low- and middle-income nations reached $529 billion (a 9.6 percent increase since 2017) (World Bank 2019). Conventional transactions pose barriers such as high fees, lack of traceability and beneficiaries who lack formal identification or bank accounts (ibid.). To address this, fintech for good related to remittance transactions may remove such constraints by ensuring transparency of inflows, directing remittances toward socially responsible purchases, offering cheaper transaction fees (a reduction from 10 percent to three percent), securing the privacy of individuals and creating digital IDs that can be used for other money transfers (United Nations Development Programme 2018). Fintech for good is also being used to provide unbanked individuals with insurance rates for farming, credit scores and loans through consent-based alternative data sources such as digital (email, social media and mobile transactions), behavioural and psychometric. Despite much progress, governance mechanisms are necessary to ensure such initiatives address inclusion, ethics and collaboration in their design, development and implementation.

Related Governance Challenges

While anecdotal indications seem to show great potential for fintech for good when considering financial inclusion, risks and unintended consequences have been hard to quantify and are loosely studied. In order for fintech for good to best serve financial inclusion, "exclusive inclusion" must be addressed. Broadly defined, exclusive inclusion is the deliberate or unintentional practice of "including" or aiding particular groups of people while knowingly or unknowingly excluding others. The concept can also refer to providing services that (from the perspective of the provider) seem to address recipients' needs while overlooking or ignoring their other interconnected needs. Often, such practices worsen pre-existing risks or trigger new ones.

For instance, fintech for good has the potential to close gender gaps and ensure women (currently one billion are unbanked) are not left behind; however, special attention needs to be paid to pre-existing barriers for women such as access to technology (smartphones and internet access), cultural and social norms, and digital and financial literacy (D'Silva et al. 2019; Sahay et al. 2020). Undocumented individuals (particularly women) could face even more risks and complexities. This is important given fintech for good is often the only viable option for many refugees who are seeking loans. Further, as the spread of credit has increased from Global North countries to such individuals, it has resulted in uneven distribution of credit access and livelihood support, since some (for example, entrepreneurs) are deemed worthy of loans while others experience further exclusion (Bhagat and Roderick 2020). Critics of fintech for good suggest that such options are an extension of financialization and situate marginalized people as recipients of unregulated financial services through technology (Gabor and Brooks 2017).

To cultivate dignity, agency and benefits to underbanked and unbanked individuals, efforts should be made by fintech for good firms to include recipients in the design, development, implementation and feedback phases. The principle of *sankofa*, derived from the Akan people of Ghana, illustrates this mindset (Temple 2010). It states that to collectively shape and inform the future, we must look back and recognize the past, or *anything about us, done without us, does nothing for us* (ibid.). This concept underscores the importance of clear and effective regulatory oversight and governance frameworks and agreed-upon metrics for

20 See www.zest.ai/product.

21 See www.undp.org/content/undp/en/home/six-signature-solutions.html.

monitoring. While some work has been carried out by the likes of the OECD, the G20 and the ITU, these efforts must be broadened to reflect the diversity of global contexts to generate buy-in and participation by stakeholders (UN Secretary-General's High-level Panel on Digital Cooperation 2019).

Navigating through a Pandemic

Fintech for Good: A Crisis Response?

Economist W. Brian Arthur's (2009) seminal book, *The Nature of Technology: What It Is and How It Evolves*, investigated how and why concepts such as technology, invention and innovation arise and evolve. Arthur's theoretical foundation about the evolution of technology is grounded in three key factors that make up what he refers to as "combinatorial evolution" (ibid.). This can be summarized as technology organically creating itself, out of itself. His theory draws from economist Joseph Schumpeter (1911), who argued that the innovation of technologies arises from a combination of existing technologies, and sociologist William Ogburn (1922), who complemented this understanding by stating that inventions arise cumulatively from earlier inventions. Arthur (2009, 9) extends these earlier concepts by suggesting a third factor: that technology evolves as a result of "constant capturing and harnessing of new natural phenomena" or a collection of phenomena working together. With this lens, fintech for good arises from combinations of technologies (computer hardware and software) and accumulations of inventions (electricity and neural networks), as well as phenomena (crises).

Throughout history, fintech for good has exponentially evolved as a result of crises, which have undoubtedly shaped our world today. For instance, after the 2003 severe acute respiratory syndrome epidemic, nations such as China introduced fintech and e-commerce services. Today, China is the fintech capital, having the four biggest unicorns in the world: Ant Financial Group (worth $60 billion), Lufax (worth $18.5 billion), JD Finance (worth $7 billion) and Qufenqi (worth $5.9 billion) (Sharma 2016). The GFC of 2008 also saw the acceleration of fintech for good, which set the foundation for the current landscape. Finally, during the Ebola crisis (2018–2020) in Sierra Leone, digital payment services were introduced so that health-care workers could receive their salaries on time. This solution reduced wait times from one month to one week and enabled workers to focus on saving lives instead of worrying about their financial well-being (Office of the United Nations Secretary-General's Special Advocate for Inclusive Finance for Development et al. 2018).

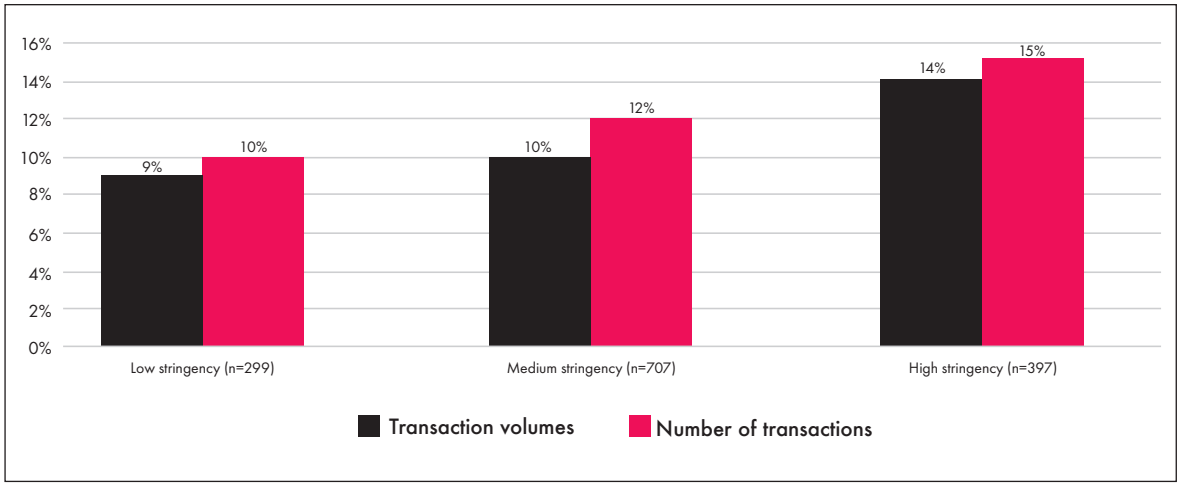
COVID-19: A "Natural Experiment"

The COVID-19 pandemic is the most devastating and pervasive challenge in modern history. This global emergency has been classified as a "mega-crisis," or a system that consists of numerous crises, each with interconnected parts, drivers and consequences (Pashang 2020). More than a year and a half has gone by since cases of COVID-19 first appeared in Wuhan, China. As of September 2021, more than 200 million cases and more than 4.5 million deaths have been confirmed worldwide, and the pandemic continues to spread havoc despite ongoing vaccination programs.[22] Due to physical distancing and lockdown measures resulting from the pandemic, financial services designed around cash and in-person interactions to open accounts, determine creditworthiness or provide financial literacy significantly shifted to contactless and cashless transactions, deployment of government support measures and lending (Sahay et al. 2020). Fintech has evolved from spending to lending to fill existing gaps within traditional financial services (ibid.).

The global demand for fintech services increased dramatically during the pandemic, particularly in response to the varying severity of lockdown restrictions enforced across regions. A major cross-sector study analyzed 1,385 fintech firms across 169 countries and found that services in markets with more stringent lockdown restrictions reported larger growth in volume and number of transactions (Cambridge Centre for Alternative Finance, World Bank and World Economic Forum 2020). Figure 4 illustrates that fintech firms situated in regions with the highest

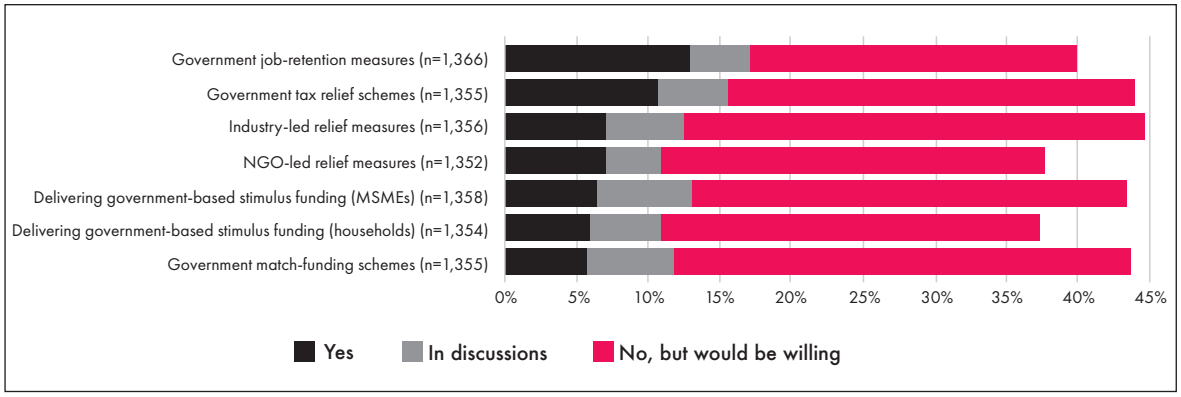
22 See https://covid19.who.int/.

Figure 4: Transaction Volumes and Number of Transactions under Low, Medium and High COVID-19 Lockdown Stringencies, All Fintech Verticals (% Change, Year-on-Year Q1–Q2)



Source: Cambridge Centre for Alternative Finance, World Bank and World Economic Forum (2020).
Note: *As of October 28, 2020.

Figure 5: Implementation or Delivery Partner in COVID-19-Related Relief Measures of Schemes, All Fintech Verticals (% of Respondents)



Source: Cambridge Centre for Alternative Finance, World Bank and World Economic Forum (2020).
Note: "N/A" and "No, not interested" responses have been omitted.

stringency measures reported 50 percent more volume and transactions (year-on-year Q1 to Q2) than those in the lowest quantile (ibid.).

In many parts of the world, fintech for good has supported individuals and businesses through challenges caused by the pandemic. For instance, small and medium-sized enterprises (SMEs) in Latin America that were in need of relief were able to access government transfers through digital disbursements (Cantú and Ulloa 2020). Through the mobile app of a state-owned bank,

the federal government in Brazil was able to increase access for unbanked and underbanked individuals to receive aid. Similar occurrences took place in Peru and Argentina via municipalities, while in Mexico, fintech firms applied alternative credit rating technology to provide loans (approved in 24 hours) at a lower cost to SMEs. Figure 5 highlights areas where fintech for good played a role in supporting governments around the world with pandemic relief measures (Cambridge Centre for Alternative Finance, World Bank and World Economic Forum 2020).

In Canada, the pandemic accelerated the digitalization of the economy and reignited debate about the future of cash and banking. Before the pandemic, the BoC had piloted Project Jasper, one of the most comprehensive crypto-based central bank digital currencies in the world (IMF 2019; FSB 2017). Less than a year after the onset of the pandemic, with growing hesitancy among consumers about using cash, BoC Deputy Governor Timothy Lane stated that "if we want to be ready to develop any kind of digital central bank product, we need to move faster than we thought was going to be necessary" (Gordon 2020, para. 4). For central banks in emerging and frontier markets, financial inclusion has been among the main reasons for exploring cryptocurrencies such as stablecoin (Bank for International Settlements 2020).

Related Governance Challenges

The FSB has indicated that fintech does not yet (by itself) pose significant risks (Restoy 2019; Sahay et al. 2020). From a macroeconomic perspective, given appropriate regulations are in place, fintech for good may offer positive outcomes by enabling greater portions of the population to participate in formal economic activity. This was supported by the IMF, which suggested fintech for good has the potential to enhance the efficacy of post-pandemic macroeconomic policies, when considering income creation and employment (Sahay et al. 2020).

Notwithstanding these opportunities, it is not yet understood whether or how such opportunities could instead exacerbate pre-existing and/or new risks to those they intend to serve. Looking to prior examples, the rapid development of fintech has resulted in structural unintended consequences, leading to a spike in predatory lending practices and financing terrorism and corruption (Orol 2018). In 2020, such practices have already been observed in Indonesia, where the Financial Services Authority shut down more than 1,000 unlicensed digital lenders that offered prohibited services and employed contentious debt collection approaches (Faux 2020; Sahay et al. 2020). These trends could intensify during the pandemic given that millions of people have faced sudden job loss and unemployment. To mitigate these risks, there is a need for cross-sector partnerships at both the domestic and international levels for policy development (Sahay et al. 2020).

Stringent lockdown restrictions have also increased the over reliance on fintech for good, which may lead to unintentional harms that foster exclusive inclusion. Due to the online-only nature of digital services, individuals without technological accessibility or literacy may be discriminated against and excluded. Unequal access to digital infrastructure, potential biases in data analytics and modelling, and lack of access to technology (for example, smartphones, computers and the internet) could also lead to new forms of exclusion if there is a strong drive toward digital financial services during and after the pandemic (ibid.). Further, the pandemic could restrict already marginalized groups such as women, the elderly, those with disabilities, non-status migrants and those living in remote communities (UN Secretary-General's High-level Panel on Digital Cooperation 2019). Additionally, those experiencing homelessness, trafficked individuals (whose finances may be controlled or surveilled) and incarcerated individuals (who are forbidden to use electronic devices) would likely be excluded in a cashless society (Engert, Fung and Hendry 2018; Choi et al. 2021).

The COVID-19 pandemic is the first "natural experiment" event or test of resilience of fintech for good. To evolve governance objectives, cross-sector partnerships and multilateral activities must continue to be explored, including regulatory sandboxes that expose potential risks and benefits. Seminal reports such as the Bali Fintech Agenda have offered frameworks for fintech for good in the past; however, there still are no internationally agreed regulatory standards. The pervasiveness of the pandemic may very well have led to the reallocation of resources and priorities related to these ambitions. The silver lining is that, as the global community endeavours to navigate out of this natural experiment, fintech for good has once again answered the call to serve people and the planet in times of crisis.

To ensure fintech for good stays *good*, this paper offers three key policy recommendations.

Key Policy Recommendations

While numerous journal articles, policy reports and grey literature (published through non-traditional channels) have been published by scholars, governments, standard-setting and regulatory bodies, and private sector firms, few have investigated and incorporated findings of governance for fintech for good, from both societal and institutional vantage points. Although this proposal aligns with and complements earlier important works, including the 2020 report *The Promise of Fintech: Financial Inclusion in the Post COVID-19 Era* (Sahay et al. 2020), this paper narrows the focus and disentangles concepts by providing three key policy recommendations when considering fintech for good. Drawing on findings from the literature, policy makers should consider the following recommendations.

Mitigate Unintended Social and Environmental Consequences

It is necessary to call on national governments, the private sector, intergovernmental organizations and civil society to research, promote and implement fintech for good policies that respect social inclusion and environmental protection, using the SDGs as a framework. Fintech for good must incorporate an inclusive, ethical and collaborative approach into its design, development and implementation. With the increased dependence on emerging technologies as a solution to development, both social and environmental implications must be considered.

First, inequitable social relations may appear between those who define, control and administer technology for development and the recipients of such solutions (Vinuesa et al. 2020). These inequalities may ultimately violate the SDGs and, therefore, fintech for good initiatives should consider who is included and excluded, who benefits and why, and how to empower the marginalized (Gupta and Vegelin 2016). This entails an in-depth and critical understanding of the challenges faced by the present generations without compromising the livelihoods of future generations (Bansal 2019). Inclusion, feedback and input of end users are necessary ingredients that ensure value, consideration, agency and dignity for unbanked individuals (Dupas et al. 2018). As social, environmental and technological needs and constraints evolve, encouraging feedback from relevant stakeholders is important to ensure that fintech for good initiatives continue to add value to the user (ibid.). This input ensures that voices and changing circumstances are considered and that resources are effectively allocated to address them (Young 2011).

Second, rapid innovation and greater access to technology have unintended consequences on the environment (World Economic Forum 2019). The increased demands for energy that produce and fuel digital technologies have significant impacts on the environment in several ways, including increased resource mining, electricity usage, harmful by-products, fossil fuel consumption and electronic waste (ibid.). The World Economic Forum (ibid.) stated that electronic waste is the fastest growing waste stream globally, reaching 48 million tonnes and worth $62 billion.

While much work is to be done, large organizations ("big tech") have recently started building sustainability programs to reduce and offset these implications (Rolnick et al. 2019). Technology giants such as Google have partnered with NGOs to shift toward circular economies by investing in restorative and regenerative data centres, products and supply chains (Google 2016). Google has been carbon neutral since 2007 and for several years has been matching its energy usage with 100 percent renewable energy purchases (ibid.). The company has also designed carbon-lowering AI systems to shift heavy computing in their data centres during peak times using wind and solar power, without creating additional demands on electricity. This is part of an ambitious effort to source carbon-free energy on a 24/7 basis (ibid.). Despite this progress, big tech companies such as Google also contribute to climate change. For instance, Google's AlphaGo Zero AI project generated the same amount (96 tonnes) of CO_2 during its 40 days of training as 23 American homes (van Wynsberghe 2021). Not surprisingly, Amazon and Microsoft, despite promoting their sustainability efforts, also release large amounts of CO_2 emissions to run their services (Strubell, Ganesh and McCallum 2019).

Recipients or users of fintech for good should play a role in the design, development and implementation of such innovations. This would ensure that various perspectives are considered equitably, which may increase adoption and enhance livelihoods (Gupta and Vegelin 2016). Predicting the needs of future generations through sustainable development, therefore, is not against generating business wealth but aims to address two unique and interrelated criteria: wealth should meet people's basic needs and should be generated within the constraints of the Earth's productive capacity (Bansal 2019).

Promote ESG Disclosure

Stakeholders and markets are increasingly pressuring corporations, including financial services providers, to disclose details about their socio-ecological impacts via reporting (ElAlfy and Weber 2019). Azlan Amran, Shiau Ping Lee and S. Susela Devi (2014) argue that reporting assists decision makers, namely, socially responsible investors, in processing environmental, economic and social data. Compared to 1999, there has been an increase in corporations (from 35 percent to 80 percent of the top 250 companies of the Global 500) producing reports, especially those who operate in "sensitive" industries (for example, resource extraction) (ibid.). Reporting quality has and continues to face criticism surrounding the accuracy and transparency of ESG data. This has resulted in "greenwashing" and organizational biases that prevent concerned stakeholders from making effective and informed investment decisions (Eccles and Stroehle 2018). For instance, organizational leaders can control and disseminate information, withholding information to ultimately influence market performance (ibid.).

Fintech for good providers must be held to the same disclosure standards. Reports could include information about a provider's economic, environmental and social activities so that stakeholders can evaluate motivations, reputation and short- and long-term direction (ElAlfy and Weber 2019). ESG disclosure for fintech for good providers would also be a vital step forward to demonstrate transparency and effective governance as well as to enhance reputation and accountability. Such topics have recently entered mainstream discourse related to blockchain technology. Tesla CEO Elon Musk, a proponent of cryptocurrency, recently tweeted about Tesla halting the bitcoin as a payment method due to the exorbitant energy consumption of mining. Mining bitcoin is energy-intensive and typically relies on electricity generated by coal. Musk tweeted: "Cryptocurrency is a good idea...but this cannot come at great cost to the environment" (Musk, quoted in BBC News 2019). Soon after, shares plunged by 10 percent, and at one point a week later, they had dropped by 30 percent (down to $34,770) (Browne and Kharpal 2021). As a result, investors and public actors have come to know that mining bitcoin consumes more energy (121.36 TWh/year), and hence produces CO_2, than all of Argentina (121 TWh/year) (Criddle 2021). Musk later signalled that Tesla would consider accepting payment through other cryptocurrencies that were less energy-intensive (Peterseil and Hajric 2021). Subsequently, bitcoin prices surged again when Musk tweeted that he met with the newly formed Bitcoin Mining Council that aims to "promote energy usage transparency & accelerate sustainability initiatives worldwide" (Saylor 2021). The sustainability case for business in this regard has the potential to incentivize fintech providers and investors alike toward ESG practices.

Strengthen Cross-Sector Partnerships

As the 17 SDGs and 169 associated targets are interconnected, the fulfillment of the 2030 Agenda will require sectors (including incumbents, start-ups, regulators and policy makers) to work collectively on financial resources, sharing of knowledge and technology, and tackling issues in all countries, especially developing ones (UN Secretary-General's High-level Panel on Digital Cooperation 2019). To support this aim, the United Nations can serve as a convener to explore the role, configuration and implementation of strategies that apply to fintech for good initiatives.

In both institutional and societal cases described in previous sections, experts from NGOs, the private sector, academia and government must come together to address sustainable development. This should be done with community members and end users contributing to solutions that will affect their livelihoods (Erdiaw-Kwasie and Alam 2016). With this mindset, collaborations would allow each actor to identify and overcome existing gaps more effectively (ibid.). Global innovation systems have conventionally been created by single institutions in the private or public sectors, but have fallen short of meeting global targets, especially those addressing issues related to poverty, climate

change and associated vulnerabilities (Casillas and Kammen 2010; Eakin, Lemos and Nelson 2014; Pinkse and Kolk 2012). Typically, technologies are not developed for markets that do not drive revenue, or when developed, they do not consider the end user's needs, lowering agency, adoption and efficacy (Anadon et al. 2016). For instance, smaller fintech providers in Sub-Saharan Africa eagerly, but hesitantly, partner with larger incumbents as they often face power imbalances and fear that their businesses are at risk (Chetty et al. 2019).

During the COVID-19 pandemic, the integration of government digital systems and fintech for good firms proved effective in providing policy support in the absence of physical human interaction. Therefore, to ensure digital financial inclusion, a fiscal response must work in parallel with digital infrastructure implementation as well as enhance digital and financial literacy. Actors across sectors must strike a balance to ensure digital innovation can thrive while governance and regulatory mechanisms are in place as the demand increases for fintech for good. This will help prevent risks to financial integrity as well as to consumers (cybersecurity, predatory lending practices and so forth). Further, policy makers can work toward international standards and agreements on data privacy, cybersecurity, digital identification and digital currencies (Sahay et al. 2020).

Fintech for good may present risks and contradictory, unintended or unexpected consequences. To effectively identify and manage the risks and opportunities related to fintech for good, there is a need for global dialogue and governance involving multiple stakeholders aligned with the SDGs. Partnerships (across and within sectors) and policies should be developed to share and bridge digital resources (data, knowledge, practices and tools) besides addressing topics with multiple lenses. This approach will aid in increasing standards consistency across institutions, digital equality and inclusion for underrepresented voices such as women and traditionally marginalized groups, and the interoperability of data and access for end users (UN Secretary-General's High-level Panel on Digital Cooperation 2019). Serving as an impartial facilitator, bodies such as the United Nations can work with actors to develop fintech for good impact assessments and to ensure mechanisms that safeguard against data security and privacy issues (Hilbert 2017). Other major areas requiring coordination include the lack of harmonized standards and interoperability of technology, fragmentation of payment systems, lack of commonly accepted application programming interface standards, and development of open-sourced platforms and a common payments ecosystem (Bank for International Settlements 2019; Ehrentraud et al. 2020).

Conclusion

Fintech for good is evolving rapidly. With its continued emergence, there will be both opportunities and risks related to sustainable development and financial stability that policy makers and regulators should consider. This paper investigated the role and implications of fintech in achieving the SDGs. To address current and future governance challenges, three key recommendations were provided to serve as a guidepost for fintech for good in both institutional and societal settings as well as through the COVID-19 pandemic. As with any innovation, fintech for good can provide either opportunities or exacerbate social or environmental inequalities, and responsibility falls on academics, policy makers, corporate actors, innovators and citizens to work toward solutions that benefit the three pillars of sustainability.

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