The Associations Between Financial Inclusion and Socio-economic Development in Transition Economies

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Declaration

I, Aiym Sarmanova, declare that this thesis named "The Associations Between Financial Inclusion and Socio-economic Development in Transition Economies" is my original work completed under the supervision of Dr. Jaromír Harmáček and submitted to the GLODEP consortium. All of the work and ideas are my own unless stated otherwise. All borrowed ideas, texts, and methods are duly cited and referenced. I have adhered to academic integrity and have not misrepresented any idea or result.

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Zásady pro vypracování

Research has shown that financial inclusion is often positively linked to pro-poor growth and economic empowerment of marginalized populations. Moreover, the age of digitalization has opened new frontiers for increased financial inclusion, especially amongst the most vulnerable parts of the population. While there is considerably less research on the economic and social impacts of digitalization at large, it is still suggested to have a substantial effect on reducing inequality and propelling economic growth. The role of both financial inclusion and digitalization in relation to development has been a topic of substantial academic interest, but little has been said about the particularity of examining the impact of these phenomena in the distinct institutional and economic contexts of transition economies. Moreover, most research has largely been directed at exploring the economic consequences of increased financial inclusion and digitalization, while most of the social and non-economic impacts have gone largely unaccounted for.

This paper will focus on exploring the link between financial inclusion and socio-economic development in transition countries with a particular focus on investigating the cross-country differences between the diverse set of countries that fall under this description. Additionally, the paper will investigate the variability in the level of digitalization between various transition economies and the possible opportunities and underlying obstacles in utilizing digitalization to ensure socio-economic development.

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Abstract

Research has shown that financial inclusion is positively linked to economic growth and poverty reduction. However, little has been said about its influence on social indicators of development. Moreover, the age of digitalization, coupled with the impact of the COVID-19 pandemic, has opened new frontiers for increased financial inclusion. This study aims to explore the connection between financial inclusion and social progress by introducing a novel composite index that reflects the evolving landscape of finance. This comprehensive index incorporates both demand and supply-side data to capture the multidimensional nature of financial inclusion. The association between the two concepts is investigated using bivariate correlation analysis. The link is also examined in regard to the distinct institutional and economic contexts of transition economies. The study's findings reveal a substantial global increase in financial inclusion, particularly in developing countries. A few of the transition economies have shown notable improvements as well. Moreover, the analysis demonstrates a significant correlation between financial inclusion and social progress. However, the strength of this relationship is slightly weaker for transition economies. These findings carry significant implications. Firstly, they call for a reevaluation of the conventional measures of financial inclusion prevalent in the literature. Secondly, the study highlights the transformative potential of financial inclusion in empowering marginalized populations and facilitating positive social outcomes.

Keywords: Financial inclusion, social progress, transition economies

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List of Abbreviations

ATM	Automated Teller Machine
CFII	Composite Financial Inclusion Index
CV	Coefficient of Variation
DFII	Demand-side Financial Inclusion Index
FD	Financial Development
FDI	Foreign Direct Investment
FIA	Financial Institutions Access
GDP	Gross Domestic Product
HDI	Human Development Index
IFI	Index of Financial Inclusion
IMF	International Monetary Fund
IMF FAS	International Monetary Fund Financial Access Survey
MIFI	Multidimensional Index of Financial Inclusion
PCA	Principal Component Analysis
SFII	Supply-side Financial Inclusion Index
SPI	Social Progress Index
SDG	Sustainable Development Goal
UN	United Nations

INTRODUCTION

Financial inclusion is widely recognized as a catalyst for inclusive growth and poverty reduction, and is considered by the United Nations as one of the enablers of several Sustainable Development Goals (SDGs). It enables individuals to access formal financial services, such as savings, which can increase their resilience to income shocks and smooth their consumption over time (Klapper et al., 2016). Efficient financial systems can also expand opportunities for individuals and businesses to pursue previously unattainable growth and development opportunities (Demirguc-Kunt & Klapper, 2012) and fulfill their fundamental needs, including education and health (Ozturk & Ullah, 2022). Closing the gender and income gaps in access to formal finance can further enhance the benefits of economic growth associated with the rapid development and transformation of financial systems to underprivileged populations.

In recent years, many developing countries have seen a rapid increase in a few indicators associated with financial inclusion. For instance, the percentage of people with bank accounts has risen drastically in Sub-Saharan Africa, largely thanks to mobile money accounts (Demirguc-Kunt et al., 2022). A similar increase is noted in the usage of digital payments and other e-banking services, which can largely be attributed to the impact of the COVID-19 pandemic. Financial inclusion presents a powerful tool for enhancing economic growth and eliminating various types of inequality. Its importance is widely acknowledged among development practitioners, but there are a few points of contention in academic circles as to how this complex concept is to be measured and how it impacts various social outcomes.

This study provides input on some of these vital points of discussion and proposes potentially rewarding topics for further research. The main objective pursued in this study is to empirically investigate how financial inclusion has changed across time and regions, while

maintaining a special focus on a group of transition economies. Additionally, the association between financial inclusion and social progress is investigated. As such, the main research questions posed are as follows:

RQ1: What is the level of financial inclusion across the world and how does it change over time?

RQ2: What is the level of financial inclusion in transition economies and how does it change over time?

RQ3: What is the association between financial inclusion and social progress across the world and in transition economies specifically?

To address these research objectives, the study first builds a unique multidimensional index of financial inclusion based on both demand and supply-side data. Then, based on said index, it investigates the association between social progress and financial inclusion using bivariate correlation analysis.

The thesis is organized as follows: the first chapter provides a literature review on the concept of financial inclusion broadly and as it relates to transition economies, while the second chapter provides a thorough overview of data and methods used in this analysis. The last chapter covers the empirical results of the study.

CHAPTER 1 LITERARUTE REVIEW

1.1 Definitions of financial inclusion

While it might seem simple at first, there has been considerable scholarly debate about the appropriate definition of financial inclusion, particularly given its increased popularity in development circles. This subchapter examines the various definitions of financial inclusion and outlines the definition used in the empirical analysis of this paper.

The notion of financial inclusion is closely intertwined with the issue of financial development. The role of the formal financial sector in propelling economic growth and reducing poverty has long been a highly discussed topic in academic circles (De Gregorio & Guidotti, 1995; Valickova et al., 2015; Durusu-Ciftci et al., 2017), but the spotlight on financial inclusion specifically is somewhat recent. Mohamed Yunus, a pioneer in the field of microfinance, played a crucial role in promoting financial inclusion as a means of addressing poverty (Chibba, 2009). His efforts were soon followed by the United Nations and the World Bank, with the former placing considerable emphasis on fostering inclusive financial systems as part of its framework for the International Year of Microcredit (Wang and Guan, 2017). Over time, improving financial inclusion has emerged as one of the core concepts in the international development sphere, viewed as a key enabler for achieving the Sustainable Development Goals. The expansive definition of financial inclusion proposed by the World Bank provides a great insight on the issue's standing in development circles and reads as follows: "financial inclusion means individuals and businesses have access to useful and affordable financial products and services that meet their needs – transactions, payments, savings, credit and insurance – delivered in a responsible and sustainable way" (World Bank, 2022).

A concept that first gained prominence in NGO and development practitioner circles soon became an issue of considerable discussion in academic settings as well. Early definitions tend to put more emphasis on financial exclusion defined as "processes that serve to prevent certain social groups and individuals from gaining access to the financial system" (Leyshon & Thrift, 1995, p. 314). Different sources of such exclusion include "problems with access, conditions, prices, marketing or self-exclusion in response to negative experiences or perceptions" (Sinclair, 2001, p. 16). As such, early works highlight the problem of financial exclusion rather than investigating the role of financial inclusion per se.

Later on, the literature shifts to a more insular focus of financial inclusion and its determinants and impact. The simplest definitions of the concept plainly state that financial inclusion is the degree to which the population can access and use formal financial services (Demirguc-Kunt & Singer, 2017). As put forth by Dasgupta (2009), being a treatment for financial exclusion, financial inclusion is best understood as a "a process of making formal financial services accessible and affordable to all" (p. 4310). Some definitions of the concept specifically highlight the importance of ensuring that the poor or other underprivileged members of society have access to the financial sector (Allen et al., 2016). Nonetheless, there exists a tacit agreement on financial inclusion being a complex issue with several dimensions. For instance, Sarma (2008) highlights three separate aspects of financial inclusion, namely access, availability, and usage. Sanderson et al. (2018) adopt a more practical definition by stating that financial inclusion involves "transactions, payments, savings, credit and insurance being distributed in a responsible and sustainable way" (p. 1). As the literature moves on from an overarching emphasis on access and usage, the efficiency and the quality of the available financial services starts to play a bigger role (Babajide et al., 2015).

The concept of digital financial inclusion has gained significant prominence with the onset of rapid digitalization. As e-banking and mobile money gain popularity in a number of developing countries, it has become increasingly important to move beyond traditional investigations of financial development and inclusion. Digital finance is defined as "financial services delivered through mobile phones, personal computers, the internet or cards linked to a reliable digital payment system" (Ozili, 2018, p. 330). In line with that definition, digital financial inclusion refers to the extent to which various financial services are provided and used digitally, particularly by the underbanked population (Zhang et al., 2019). The introduction of financial technology has transformed the banking sector, providing significant opportunities for increasing the extent to which various groups of people can effectively utilize the opportunities provided by the financial sector (Ahmad et al., 2021). Thus, current academic discussions surrounding financial inclusion are closely linked to developments in the fields of digital finance and FinTech, which may soon offer new insights into how the concept is defined and conceptualized.

Although it may be challenging to find a single definition of financial inclusion that encompasses all aspects of the concept, there is a general consensus on what it entails. Thus, in this paper, financial inclusion is defined as the widespread availability and usage of financial services, with no price or non-price barriers, to all members of society (Demirguc-Kunt et al., 2022).

1.2 Measuring financial inclusion

Financial inclusion is a notoriously difficult concept to operationalize. The crux of this difficulty stems from the lack of availability of data, but lack of a single widely accepted method of measuring financial inclusion also plays a role. The following chapter outlines the most

widely used measurements of financial inclusion and the advantages and disadvantages associated with each.

The simplest way to measure financial inclusion is to use one or both of the following metrics: the number of ATMs per 100,000 adults and the number of bank branches per 100,000 adults.[1] The most up-to-date and comprehensive example of this method is the broad-based index of Financial Development (FD) introduced by Svirydzenka (2016). Though the main focus of the index is to capture the scope of the overall development of financial institutions and markets, one of the sub-indices capturing access to financial institutions is solely composed of these two variables. Physical access is the dimension of financial inclusion that is best captured when relying on this operationalization of the concept. It also provides conceptual simplicity and is based on widely availability of data. In terms of constructing panel data with large coverage in terms of the number of countries and years, there are very few variables that could compare to the these two variables. However, one considerable disadvantage of this measurement is its limited ability to fully capture various dimensions of financial inclusion, especially in the age of rapid digitalization of finance. As pointed out by Sarma and Pais (2011), lack of consideration for other dimensions such as prevalence of internet banking, the level of financial literacy, remittances, and others greatly restricts these two variables' ability to capture the full extent of financial inclusion in given areas.

A development upon this simple measure of financial inclusion using other supply-side variables constitutes a second group of measurements to be discussed in this chapter. A notable example of this is the Index of Financial Inclusion (IFI) developed by Sarma (2008). The

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[1] In the absence of this data, some authors have proxied them by utilizing the geographic equivalent of the measures, namely the number of ATMs per 1000 km^2 and number of bank braches per 1000 km^2 (Khera et al., 2021).

aforementioned measurements of the number of ATMs and bank branches constitute the availability dimension of the IFI. The other two dimensions are accessibility, proxied by the number of bank accounts per 1000 persons, and usage, proxied by volume of credit and deposit relative to GDP (Sarma, 2008). The main goal of this index is to measure the level of inclusiveness of the formal financial sector, with 0 denoting complete financial exclusion and 1 denoting complete inclusion (Sarma, 2008, p. 615). The IFI is one of the most widely used multidimensional measurements of financial inclusion, having been used to investigate a variety of issues such as determinants of financial inclusion (Kumar, 2013) and the impact of financial inclusion on poverty and inequality (Park and Mercado, 2015; Koomson et al., 2020).

Using the IFI as basis, several authors have expanded or slightly modified the index to account for recent developments in data availability. One of the examples of this is the Composite Financial Inclusion Index (CFII) developed by Omar and Inaba (2020). The authors take advantage of newly available data in the field by substituting the usage dimension by the number of loan accounts and borrowers per 1000 adults and replacing the availability component with penetration, which is proxied by the number of deposit accounts and depositors per 1000 adults. The availability component remains the same across the two methods. The adjustments to Sarma's approach are meant to improve the index's precision, which is especially evident in the introduction of more exact measurements of the extent of borrowing and saving.

There exists a variety of composite indices that build on the general framework of the IFI. Their main strength is their ability to capture the multidimensional nature of financial inclusion while maintaining broad data coverage. Although it is an improvement on the somewhat overly simplified reliance on the spread of ATMs and bank branches, these measurements come with their own set of limitations. One of such limitations stems from the fact that these measurements

tend to completely rely on supply-side data which largely fails to capture the extent to which different groups of populations are actually benefiting from participation in the formal financial system (Pesque-Cela, 2021). The other notable limitation of this group of measurement methods is connected to their exclusive focus on aggregate indicators of financial inclusion. These indicators largely fail to account for micro-level patterns in access to financial services, especially when it comes to outlining geographical and societal heterogeneity in access.

As an alternative to the previously mentioned approaches to measuring financial inclusion, recent studies have introduced new ways of capturing this complex phenomenon (Fungacova & Weill, 2015). The main unifying thread for these measurements is their reliance on a unique dataset developed by the World Bank - the Global Findex. Using nationally representative surveys, this dataset provides the most comprehensive and easily available account of demand-side data on how adults actually use financial services, including detailed information on saving, borrowing, and usage of internet banking (Demirguc-Kunt & Klapper, 2012).

Some of the studies in this category focus on a singular survey question as proxy for financial inclusion. For instance, Kanga et al. (2022) utilize the percentage of respondents who report having an account at a bank or another type of financial institution as an indicator for financial inclusion. This is the less common approach to utilizing the Global Findex database. Most authors rely on several aspects of the survey to create a multidimensional index of their own, often coupled with more traditional variables discussed above. One example of this is a composite index built on traditional variables such as the spread of ATMs and bank branches supplemented by the data on the percentage of the population that possesses a debit card, has

saved at a financial institution, and has made electronic payments. (Wang and Guan, 2017). The index is only calculated for 2011 but takes advantage of both supply and demand-side data.

Camara and Tuesta (2014), on the other hand, create a multidimensional index for the same year using a slightly different approach. In addition to the conventional supply-side metrics, the authors incorporate a distinct dimension of barriers by utilizing the Global Findex questionnaire. This dimension aggregates responses to the question that probes the reasons why certain adults lack a bank account. The last dimension consists of three indicators, namely "holding at least one financial product, keeping savings, and having a loan in a formal financial institution" (Camara and Tuesta, 2014, p. 7). Another notable example of this category of measurements makes an explicit distinction between traditional and digital financial inclusion by creating separate indices for both. Khera et al. (2022) use various conceptual aspects of the Global Findex questionnaire to assess the comparative importance of these two types of financial inclusion for economic growth.

For the usage dimension of the traditional component, the authors rely on the percentage of adults who save at a financial institution, receive wages through a financial institution account, use financial institution accounts for utility, poses debit cards, and have a financial institution account, while the same dimension for the digital component constitutes of the percentage of adults who use internet to pay, have a mobile account, and use a mobile phone to receive wages or make utility payments (Khera et al., 2022). The access dimension of the two components utilizes the previously mentioned conventional measures of financial inclusion such as the number of ATMs and bank branches in combination with more uncommon indicators including the number of registered mobile money agents per 100,000 adults.

A considerable limitation associated with measuring financial inclusion in this manner is over-reliance on one single data source; this causes additional issues of time coverage because the Global Findex is only available for the years of 2011, 2014, 2017, and 2021. There may also be methodological and theoretical concerns regarding the appropriate approach to combining supply and demand-side data into a single index. Nevertheless, incorporating demand-side data on the usage of financial services provides a crucial perspective on how people are genuinely utilizing these services. Furthermore, the questionnaire's emphasis on capturing variations across gender and income lines adequately addresses a crucial component of the definition of financial inclusion that underlines the significance of providing equal access to all members of a given society. By considering these additional factors, a more comprehensive picture of financial inclusion can be derived.

1.3 Financial inclusion in transition economies

An additional point of focus for this paper is financial inclusion as it relates to a specific group of countries – transition economies. The following subchapter presents a brief history of transition economies, some of the common characteristics shared between them, and a brief overview of the development of their financial sector.

Transition or transitional economies are generally understood as those countries that are in the process of shifting from centrally planned systems to market economies (Kawalec & Kluza, 2001; Svejnar, 2002). Conventionally, the term is mainly used to describe the former countries of the Soviet Union and former socialist economies of Eastern and Central Europe, though some also add Asian countries of Cambodia, China, Vietnam, and Laos to their ranks (IMF, 2000). According to Round (2009), the term started gaining popularity as some Latin

American countries such as Brazil and Argentina started to move away from systems established by their military dictatorships in the 1980s, and truly solidified itself in the literature as countries of Central and Eastern Europe began to break away from Moscow, eventually culminating in the dissolution of the Soviet Union in 1991. Although the term "transition economies" is widely used, it has also faced criticism for potentially promoting a "one size fits all" approach to development and restructuring policies (Round, 2009). Although these countries share a common task of overhauling their economic systems and might exhibit some similar characteristics, they are far from being a homogeneous group. Thus, any examination of them as a group should be handled with caution and nuance, given the differences in their initial characteristics and geographical, institutional, and cultural backgrounds. With this caveat in mind, this literature review and the study in general follows the IMF's (2000) lead in outlining a concreate list of transition economies and focuses only on countries of Europe and Central Asia.[2]

With more than three decades of "transitioning" under their belt, these countries have ended up in drastically different economic conditions. Outlining the scholarly debate on the determinants of successful transition is far out of the scope of this paper, but a brief overview of some of the common challenges and different strategies adopted to overcome challenges of transition provides a useful foundation for understanding some cross-country differences. One of the main explanations behind great differences in economic performance among transition economies is the heterogeneity of their initial starting conditions. Discrepancies in factors such as average years of schooling, level of industrialization, and share of agriculture in the economy

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[2] In 2000, IMF's list of transition economies included Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, North Macedonia, Poland, Romania, Russia, Slovak Republic, Slovenia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan.

can account for differences in economic performance, especially in terms of dwindling output in the first decade of transition (IMF, 2000). There is broad consensus that the more successful reformers were quick to privatize previously government-owned businesses, but the effectiveness of their privatization strategies was largely conditioned by the strength of their judicial institutions (Estrin et al., 2009; Svejnar, 2002). Additionally, proximity to Western Europe and the fact that they have spent comparatively less time under communist rule could also explain their rapid economic development (Fischer and Sahay, 2000). Another important factor is the different level of official development assistance received by transition countries: the more successful reformers have received considerably more aid in per capita terms, which likely played a considerable role in financing vast reforms (Askarov and Doucouliagos, 2015). Overall, the success of transition depended on countries' ability to minimize corruption, finance public programs, and establish strong rule of law (Svejnar, 2002; De Melo and Gelb, 1996).

For many of the transition economies, developing their financial systems was akin to creating them from anew since they previously were simply part of the central planning system rather than genuine facilitators of complex transactions (Hermes & Lensink, 2000). In the early stages of transition, financial systems of transition economies shared some common characteristics such as low level of financial depth and ineffective banking systems (Coricelli, 2001; Semih Yildirim & Philippatos, 2007). As governments of post-communist countries began navigating their shift to market systems, the rapid liberalization process included the removal of interest rates and the easing of entry requirements for providers of financial services (Honohan, 1997). However, this led to increased exposure to market risk and faulty lending practices, which are some of the possible explanations behind the fragility of the financial systems found in some

of the transition economies. These factors may also explain why their populations may express decreased belief in the soundness of their financial sectors.

The IMF's multidimensional index of financial development discussed earlier provides a straightforward benchmark for evaluating cross-country differences in the financial sectors of transition economies. The Financial Institutions Access (FIA) component of this index is especially relevant since it incorporates the number of ATMs and bank branches per 100,000 adults, the most widely used proxies for financial inclusion. The table below presents a comparative ranking of transition economies for the overall FD and FIA indicators.

Table 1 Average FIA and FD for transition economies for the period of 1992-2020

Rank	Country	FIA[3]	Rank	Country	FD
1	Bulgaria	0,73	1	Russia	0,47
2	Slovenia	0,71	2	Hungary	0,42
3	Croatia	0,65	3	Slovenia	0,42
4	Russia	0,55	4	Czechia	0,39
5	Moldova	0,48	5	Poland	0,39
6	Slovakia	0,47	6	Croatia	0,39
7	Uzbekistan	0,46	7	Bulgaria	0,35
8	Latvia	0,46	8	Estonia	0,26
9	Poland	0,45	9	Kazakhstan	0,26
10	Estonia	0,43	10	Slovakia	0,24
11	Czechia	0,43	11	Latvia	0,22
12	North Macedonia	0.37	12	Romania	0,21
13	Lithuania	0,36	13	Uzbekistan	0,20
14	Hungary	0,36	14	Lithuania	0,20
15	Georgia	0,35	15	Moldova	0,19
16	Romania	0,32	16	North Macedonia	0.18
17	Armenia	0,30	17	Ukraine	0,17
18	Albania	0,25	18	Georgia	0,16
19	Ukraine	0,24	19	Armenia	0,15
20	Kazakhstan	0,20	20	Albania	0,15
21	Tajikistan	0,18	21	Azerbaijan	0,13
22	Azerbaijan	0,17	22	Belarus	0,12
23	Belarus	0,13	23	Turkmenistan	0,10
24	Kyrgyz Republic	0,12	24	Tajikistan	0,10
			25	Kyrgyz Republic	0,09

Source: IMF, Financial Development Database

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[3] Data is missing for Turkmenistan.

Former Soviet Union countries on average tend to show lower results for FIA, although notable exceptions exist in Moldova, Uzbekistan, and the Baltic countries. However, this trend is not reflected entirely in the overall index of financial development, as evidenced by Russia's top placement and relatively high results in countries like Kazakhstan and Uzbekistan. Nonetheless, eight of the ten last spots in the FIA are still occupied by former Soviet Union members. This highlights the persistent impact of initial conditions on the economic performance of transition economies. Furthermore, the lack of complete overlap between the FD and FIA underscores the multidimensional nature of financial development, with financial inclusion being only one of several significant indicators worth considering.

1.4 Financial inclusion and economic development

The investigation of the link between financial inclusion and various indicators of economic development has been a prominent topic of discussion in both academic and policy circles. For instance, Inoue (2019) finds that financial inclusion and deepening are negatively associated with poverty ratios in India. This claim is further supported by recent evidence based on national survey data, which suggests that financial inclusion has a strong poverty-reducing effect (Churchill and Marisetty, 2020). A broad consensus on the efficacy of financial inclusion as a tool of poverty alleviation has also been established as it applies to Sub-Saharan Africa. Using a large panel dataset, Khan et al. (2022) posit that financial inclusion is instrumental in decreasing poverty in Africa, while Nsiah et al. (2021) reach similar conclusions but maintain that the relationship only holds if the level of financial inclusion goes beyond a certain threshold. In terms of channels through which this relationship occurs, the more obvious one is that higher financial inclusion implies the lowering or complete erosion of barriers to formal finance faced by the poor (Jalillian & Kirkpatrick, 2002; Boukhatem, 2016). This in turn grants the

underprivileged population with access to valuable services such as insured saving accounts and high quality and less risky borrowing tools. The less obvious channel through which financial inclusion impacts poverty reduction is via job creation and increased public spending as result of economic growth associated with greater financial development (Koomson et al., 2020).

In a similar vein, some authors investigate the link between financial inclusion and income inequality. While the impact of various fiscal instruments for income redistribution is well-studied, the potential effect of higher access to financial instruments on reducing income inequality is a more novel topic of academic discussion. For example, Turegano and Herrero (2018) find that financial inclusion is significantly and negatively related to income inequality, while the same cannot be argued for the impact of the financial sector size on income inequality. Moreover, Kim (2016) posits that the negative relationship between financial inclusion and income inequality mediates the negative impact of the latter on overall economic growth. On the other hand, Dabla-Norris et al. (2015) argue that increased access to financial access serves the poor and helps to minimize income inequality only when policy efforts are specifically targeted at low-income individuals, rather than general easing of borrowing constraints. Recent studies have also accounted for the role of FinTech in the financial inclusion-income inequality nexus, with Demir et al. (2022) finding financial innovation to have an indirect negative effect on income inequality through increasing financial inclusion. In conclusion, there exists a broad scholarly consensus on increased access to finance leading to lower income inequality, though the extent and longevity of this effect may differ across countries and levels of economic and institutional development (Huang and Zhang, 2020).

1.5 Financial inclusion and social progress

Most of the literature on the impact of financial inclusion has focused on one of the following economic metrics of development: poverty, income inequality, and economic growth. In terms of non-economic measurements of development, there are a few studies that focus on the relationship between financial inclusion and human development, mainly proxied by the Human Development Index (HDI) (Raichoudhury, 2016). Using the IFI developed by Sarma (2008) described earlier, Sarma and Pais (2011) find that HDI and financial inclusion tend to demonstrate similar patterns of movement among 49 countries included in their analysis. Kuri and Laha (2011) find similar results for different states within India. Later studies employ more sophisticated econometric tools to determine the relationship between financial inclusion and human development. Using a Generalized Method of Moments (GMM) technique, Matekenya and Moyo (2021) establish a positive relationship between human development and financial inclusion based on a sample of countries in Sub-Saharan Africa. Abdelghaffar et al. (2022) reach similar conclusions but point out that the strength of the positive relationship is conditioned by a country's income, namely that lower- and middle-income countries stand to reap more benefit from higher financial inclusion. Generally, research on the nexus between financial inclusion and social progress is very limited and the majority of it is limited to investigating the relationship on a simple correlation level.

However scarce, the existing literature on the topic allows for presenting a general conceptual breakdown of how financial inclusion may foster social development. The bulk of the literature underlines the role of financial inclusion in reducing poverty and income inequality, which in turn leads to higher human and social development (Datta and Singh, 2019; Abdelghaffar, 2022). On its own, financial inclusion is said to have a positive effect on

increasing human capital, along with leading to higher investment in education and health due to increased access to savings and other formal financial services (Matekenya et al., 2021).

1.6 Gaps in the literature and contributions

There are three main contributions that this paper attempts to provide. First, this paper constructs a comprehensive measurement of financial inclusion that takes advantage of both supply and demand-side data available today. Moreover, by moving away from more conventional measurements of financial inclusion, the newly constructed index presented in this paper captures the rapidly changing landscape of financial services provision and attempts to account for the emergence of fintech and its considerable impact.

The second contribution of this paper is that it tries to capture the association between financial inclusion and social progress by utilizing the Social Progress Index (SPI). Unlike other comparable indices with a similar focus, the SPI does not include any economic metrics of development and solely uses social and environmental outcome indicators (Stern et al., 2022). This is in direct contrast to tools such as the HDI, one third of which consists of data on per capita income. As mentioned previously, the exiting literature has mainly focused on empirically investigating the relationship between financial inclusion and phenomena such as human development or economic factors of development such as poverty or growth. By utilizing the SPI, this paper is able to shed a light on how increased access to the formal financial sector, especially among the previously unbanked or underbanked populations, may be interlinked with social progress at large and contribute to the growing literature on how financial inclusion shapes various dimensions of development.

Lastly, this paper specifically focuses on financial inclusion in transition economies. As noted previously, the positive impact of financial inclusion on development may differ across regions and country-specific characteristics. Though not a homogenous group, transition economies' shared history and some common remnants of centrally planned economic systems make them a specifically interesting case for consideration. The policies adopted in the overhaul and development of the financial sector as part of the liberalization, institutional reforms, macroeconomic stabilization, and privatization processes associated with transition have led to considerably different outcomes for these economies. However, this period of rapid change makes this group of countries some of the best improvers in several measures of financial inclusion (Demirguc-Kunt et al., 2019). By focusing on transition economies, this paper contributes to understanding some of the regional and country-specific dynamics of the financial inclusion and development nexus.

CHAPTER 2 DATA AND METHODOLOGY

2.1 Data sources

This study is based on three primary sources of data. The first source of data is the Global Findex, which was launched by the World Bank in 2011 and provides demand-side data on the use of financial services. The database comprises nationally representative surveys conducted by Gallup, Inc. The first edition of the database included three categories of indicators related to formal financial accounts, savings behavior, and sources of borrowing (Demirguc-Kunt and Klapper, 2012). The subsequent releases in 2014 and 2017 introduced additional indicators, such as mobile money and financial technology usage (Demirguc-Kunt et al., 2015; Demirguc-Kunt et al., 2018). The latest edition of the Findex, conducted during the COVID-19 pandemic, offers a unique perspective on the acceleration of financial inclusion and the digitalization of finance as a result of the recent health crisis (Demirguc-Kunt et al., 2022). For most of the developing countries the interviews are carried out in a face-to face nature, but the number of countries for which data is collected this way has dropped due to the logistic issues connected to the COVID-19 pandemic (Demirguc-Kunt et al., 2022). Sampling and nonresponse errors are corrected using poststratification weight, which is determined by population statistics on gender and age; final weights coupled with poststratification weights ensure that the surveys carry a nationally representative nature (Demirguc-Kunt et al., 2022).

Table 2 Data coverage of the Global Findex by year, indicator, and country

Year	Number of countries	Number of indicators
2011	148	45
2014	142	76
2017	146	94
2021	123	114

Source: World Bank, Global Financial Inclusion (Global Findex) Database

The supply-side data comes from the IMF Financial Access Survey (FAS), which covers 189 countries for the period of more than 15 years and is based on the data provided by central banks and other regulators. It is a large, unbalanced panel dataset collected on an annual basis, with some of the indicators normalized relative to the size of the population or volume of GDP and differentiates between various providers of financial services such as commercial banks, microfinance institutions, and credit unions (IMF, 2023). Some of the most notable indicators included in the database are the number of ATMs and financial institution branches, number of depositors or borrowers, and number of active mobile money accounts.

Lastly, the data on social progress comes from the Social Progress Imperative, an independent think tank. The Social Progress Index (SPI) is a multidimensional index based exclusively on non-economic indicators with the aim of capturing a country's well-being in an objective and holistic manner (Porter et al., 2014). The index is divided into three broad dimensions: Basic Human Needs, Foundations of Well-being, and Opportunity. The first dimension aims to account for a country's ability to provide for its' citizens' most essential needs and includes indicators such as child mortality rate, satisfaction with water quality, and access to electricity. People's ability to improve and sustain their well-beings is gauged by the Foundations of Well-being dimension, which consists of indicators such as life expectancy at 60 and equal access to quality education and healthcare. The last dimension investigates whether there is ample opportunity and freedom for people to pursue their goals and reach their full potential using variables such as access to justice, equal protection index, and perception of corruption.[4]

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[4] For the full breakdown of the index and its methodology see Stern et al., 2022.

2.2 Construction of a multidimensional index of financial inclusion

Financial inclusion is a complex concept, a nuanced investigation of which requires a composite index that can capture the various dimensions of access and usage of financial services. To create such index, this study follows the methodological approach of composite indicator creation established by the OECD (2008), which outlines a three-step procedure: 1) variable normalization; 2) aggregation of normalized variables into sub-indices based on the conceptual framework; and 3) aggregation of the sub-indices into the final multidimensional index. This chapter provides a detailed overview of how this approach is applied in this study and details the processes of indicator selection, treatment of missing data, normalization of variables, and assignment of weights used in the final aggregation.

The majority of prior studies have compartmentalized financial inclusion either based on theoretical components such as availability, usage, and depth (see Sha'ban et al., 2020; Sarma, 2008, Matekenya et al., 2021) or more novel components such as traditional and digital financial inclusion (see Kanga et al., 2022; Khera et al., 2021). This paper argues for a slightly modified approach to dissecting financial inclusion based on which side of the financial services provision equation the data comes from. The supply-side data provides a picture of financial inclusion based on the outlook of the providers of financial services and consists of largely conventional indicators, including the number of ATMs and volume of credit or deposit. However, despite its much wider coverage, an exclusive reliance on supply-side data would lead to a considerable dismissal of a unique perspective provided by demand-side data. Supply-side data does not necessarily capture if and how people are genuinely using various financial services. There is also the likelihood of over exaggeration that comes with this type of data since financial account ownership, for instance, is not unique to individuals as many people have several bank accounts.

Therefore, adding demand-side data to the equation is essential to understanding the full scope of financial inclusion. By building two separate sub-indices to distinguish between the two sources of data, the approach ensures that the vastly different perspectives of financial inclusion are accounted for. Subsequently combining them into a single index helps to mitigate the weaknesses of each source.

As such, the MIFI is constructed based on a conceptual framework illustrated in Figure 1, taking into consideration the overview of the literature, the guiding definition of financial inclusion, and the availability of data. The division into two sub-indices is driven by an attempt to provide more clarity and ease of understanding, as well as to account for the conceptual and practical differences between the two dimensions of financial inclusion.

Figure 1 The conceptual framework of the MIFI[5]
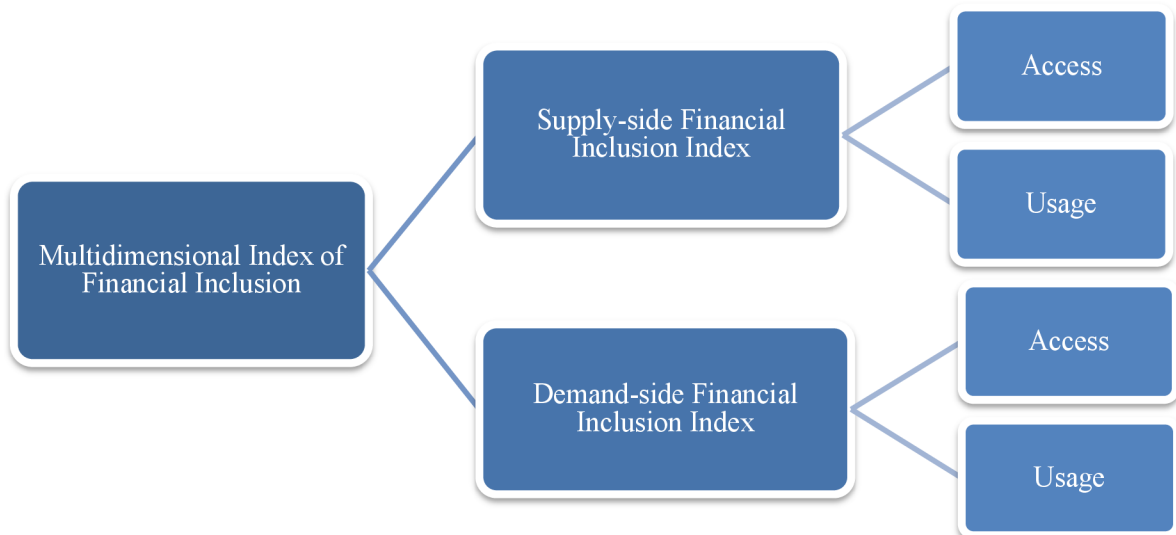
2.2.1 Indicator selection

The indicator selection process for the Supply-side Financial Inclusion Index (SFII) largely follows the approach developed by Sarma (2008) and Omar and Inaba (2020). In line with these authors, access to financial services is proxied by the number of ATMs and the number of financial institution branches per 100,000 adults. The level of usage of financial services is measured by the number of deposit and loan accounts with financial institutions per 100,000 adults. All four of these variables are sourced from the IMF Financial Access Survey. The choice of these specific four variables is explained by the availability of data and the previous literature's reliance on them as adequate measurements of financial inclusion. Some of the indicators used by studies with otherwise comparable indices for financial inclusion were excluded from the calculation due to a large number of missing data points for countries and years of interest. Limiting the SFII to these particular variables also helps to maintain its simplicity and concise nature since it is part of a larger multidimensional index.

Table 3 Summary statistics of the underlying data for the SFII

Code	Variable Name	Obs	Mean	St. Dev	Min	Max
SFII1	Number of ATMs per 100,000 adults	2,267	46.70	45.86	0	288.59
SFII2	Number of financial institution branches per 100,000 adults[6]	2,430	24.39	21.37	0.04	171.74
SFII3	Number of deposit accounts with financial institutions per 100,000 adults[7]	1,656	1347.96	1326.76	0.013	10157.63
SFII4	Number of loan accounts with financial institutions per 100,000 adults[8]	1,505	343.39	408.63	0.002	4870.96

Source: IMF Financial Access Survey database

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[6] The IMF FAS database disaggregates data relative to population size by the type of financial institution. This variable represents a sum of four following separate indicators: number of commercial bank branches per 100,000 adults, number of credit union and credit cooperative branches per 100,000 adults, number of all microfinance institution branches per 100,000 adults, branches of other deposit takers per 100,000 adults.

[7] Similarly, to the previous variable, this is also a sum of number of deposit accounts for all types of financial institutions represented in the database.

[8] The same aggregation procedure applies to this variable.

While the SFII provides a valuable look into financial inclusion from the point of view of the suppliers of financial services and relies on more conventional metrics of financial inclusion, the Demand-side Financial Inclusion Index (DFII) is aimed at capturing the degree of access and usage of financial services based on data provided by the users themselves. As discussed previously, the Global Findex dataset provides aggregated survey responses for a large variety of variables that attempt to gauge how different groups of people access and utilize financial services. For reasons of simplicity and to account for missing values, the DFII is constructed using five indicators from the database. The access dimension of the index is represented by the share of adults with a financial institution account. The usage of financial services is proxied by the following six variables: share of adults with a financial institution account, share of adults that saved at a financial institution, share of adults that borrowed from a financial institution, share of wage recipients that received wages into a financial account, share of adults that made a utility payment using a financial institution account, and share of adults that made or received a digital payment.

The outlined structure largely follows the methodologies put forward by Wang and Guan (2017) and Khera et al. (2021). The former study utilizes six variables from the Global Findex, three of which can also be found in the financial inclusion index outlined in this paper. The other three used by Wang and Guan (2017) were not chosen for this paper either due to high correlation between the variables or due to conceptual differences. On the other hand, Khera et al. (2021) present an overall financial inclusion index with a main goal of determining the differential impact of traditional and digital financial inclusion on economic growth, which is markedly distinct from the goals of this paper. As such, the divergence of research objectives and of conceptual understandings along with data availability explains the lack of complete overlap

in indicators.[9] Nonetheless, both of these studies have played an instrumental role in narrowing done the vast list of variables presented in the original data source.[10]

Table 4 Summary statistics of underlying data for the DFII[11]

Code	Variable Name	Obs	Mean	St. Dev	Min	Max
DFII1	Share of adults with a financial institution account	554	0.555	0.316	0.004	1
DFII2	Share of adults that saved at a financial institution	554	0.229	0.197	0.001	0.809
DFII3	Share of adults that borrowed from a financial institution	554	0.204	0.176	0.006	0.828
DFII4	Share of wage recipients that received wages into a financial institution account	400	0.553	0.289	0.011	0.991
DFII5	Share of adults that made a utility payment using a financial institution account	402	0.234	0.251	0	0.867
DFII6	Share of adults that made or received a digital payment	411	0.541	0.299	0.041	1

Source: IMF Financial Access Survey database

2.2.2 Treatment of missing data

The Global Findex database provides data for the years of 2011, 2014, 2017, and 2021. Most of the indicators of interest are not included in the questionnaire for 2011, so the analysis in this paper only focuses on the other three years. Due to this limitation of the demand-side data, the IMF FAS dataset has also been limited to these three years. The full breakdown of the extent of the missing data issues among all indicators included in the MIFI is presented in Table 5.

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[9] For instance, the variable capturing debit card ownership has been present in both Khera et al. (2021) and Wang and Guan (2017), and it has been excluded due to high correlation with other variables in the MIFI. Khera et al. (2021) use the variable measuring the number of adults who receive wages through a financial institution account, while this paper utilizes the indicator on the number of wage recipients who receive wages into a financial account as it better captures the actual usage of this particular financial service by the relevant population. Furthermore, this paper does not include a few indicators related to the usage of mobile money used by Khera et el. (2021) since it does not fully align with the research objectives outlined earlier.

[10] See Appendix B for correlation matrices for the indicators used in the DFII and SFII.

[11] The adult population in the Global Findex is considered to be respondents over the age of 15.

Table 5 Percentage of data availability for all individual indicators of MIFI by country-year pairings

Code	Variable name	2014a[12]	2014b	2017a	2017b	2021a	2021b
Supply-side Financial Inclusion Index							
	Total number of countries	190	24	190	24	190	24
	Percentage of available country-year pairings						
SFII1	Number of ATMs per 100,000 adults	94.2	100	92.1	100	81.1	95.8
SFII2	Number of financial institution branches per 100,000 adults[13]	94.2	95.8	92.1	95.8	82.6	95.8
SFII3	Number of deposit accounts with financial institutions per 100,000 adults[14]	65.3	62.5	66.3	75	61.1	66.6
SFII4	Number of loan accounts with financial institutions per 100,000 adults	64.2	54.2	65.7	66.6	60.5	66.6
Demand-side Financial Inclusion Index							
	Total number of countries	142	24	147	25	123	22
	Percentage of available country-year pairings						
DFII1	Share of adults with a financial institution account	100	100	100	100	100	100
DFII2	Share of adults that saved at a financial institution	100	100	100	100	100	100
DFII3	Share of adults that borrowed from a financial institution	100	100	100	100	100	100
DFII4	Share of wage recipients that received wages into a financial institution account	93.7	100	99.3	100	99.3	100
DFII5	Share of adults that made a utility payment using a financial institution account	94.4	100	100	100	99.3	100
DFII6	Share of adults that made or received a digital payment	100	100	100	100	100	100

To maintain the statistical integrity of the index, the selection process for indicators was guided by the goal of minimizing the number of missing data points.[15] The presence of missing values in the dataset can be attributed to uneven survey coverage for the Global Findex over

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[12] "a" is used to denote all countries, while "b" is used to indicate transition economies.

[13] The IMF FAS database disaggregates data relative to population size by the type of financial institution. This variable represents a sum of the four following indicators: number of commercial bank branches per 100,000 adults, number of credit union and credit cooperative branches per 100,000 adults, number of all microfinance institution branches per 100,000 adults, and branches of other deposit takers per 100,000 adults.

[14] The same aggregation procedure applies to this variable by type of institution applies to SFII3 and SFII4.

[15] A number of initial variables were excluded from the final index structure, mainly those found in the IMF FAS.

time, partially caused by the COVID-19 pandemic, and incomplete data reporting by countries

for the IMF FAS. Two main approaches are undertaken to address the missing data issue. The

first approach addresses the issue of all data missing for some years. For the IMF FAS, data

might be missing for the specific years of 2014, 2017, and 2021, but is available for the

surrounding years. Therefore, for some countries the values for missing variables are replaced

from previous or following years using a maximum of a three-year range.[16] In cases where

possible, between year linear interpolation is used. When it comes to the Global Findex database,

the number of countries included in each survey year is inconsistent, as shown earlier in Table 2.

A closer examination of available data reveals that the values tend to change quite a bit from

year to year, especially for developing countries. Therefore, the same interpolation or

substitution between years does not constitute a viable option in this case. In order to maintain

the statistical soundness of the final index, the number of countries included in the calculation of

the final index and the two sub-indices differs year-to-year depending on data availability.

The second approach is utilized to address the issue of missing data for some, not all,

variables in a given year. For the IMF FAS data, there is a somewhat large group of countries for

which data is only available for two or three of the four selected indicators. In such cases pre-

imputation regression methodology is applied,[17] where the missing data point is regressed on the

available variables and GDP per capita,[18] which is not otherwise included in the final index. The

choice of this particular external variable for the simple regression imputations is motivated by

its higher data availability and considerable correlation with imputed variables. This approach to

handling missing values is implemented exclusively under two conditions: first, when a country

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[16] There are a few exceptions to this rule. See Appendix C for more.
[17] In line with Stern et al. (2022).
[18] GDP per capita in current US dollars sourced from the World Bank.

reports complete data for at least two out of the four relevant indicators, and second, when there is no available data for a particular indicator for any of the years included in the IMF FAS. Though this is a well-established treatment of missing variables, the fact that this is a less than ideal approach in this case is thoroughly acknowledged and addressed more comprehensively in the subchapter on assigning weights.

Apart from that, there are missing value concerns related to a considerable difference in the number of countries covered by the two databases. Over 30 countries are dropped from the IMF FAS to match the Global Findex, though the overwhelming majority of them are small island nations. A number of countries are also excluded from the Global Findex database to align with the country coverage in the supply-side data.[19] Additionally, a number of countries are excluded from the analysis due to very limited data availability.[20] See Appendix A for the full set of countries included in the study.

2.2.3 Normalization of variables

In order to account for some skewness and limit the impact some outliers might have on the overall index; a few upper boundaries are set for some of the indicators included in the SFII. While the variables on the number financial institution branches, deposit and loan accounts are capped at the 99th percentile, the ATMs variable is manually set at 200 ATMs per 100,000 adults. While individual treatment of each indicator allows for a more nuanced approach, a

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[19] Among these countries is Turkmenistan, for which no data exists in the IMF FAS and only the year 2017 is covered in the Global Findex. This narrows down the list of transition countries analyzed in this paper.
[20] A considerable number of countries, including large economies such as the US and the UK, are excluded from the analysis due to having data for only one of the four main indicators, namely the number of ATMs per 100,000 adults or the number of financial institution branches per 100,000 adults. Belarus is one of the countries that had to be excluded for this reason, which also decreases the number of transition countries under consideration.

similar standardization approach is applied to both the SFII and the DFII to ensure the overall coherence of the final index. To achieve this goal, the following equation is used:

$$A_i = \frac{x_i - m_i}{M_i - m_i} * 100 \qquad (1)$$

where *x* is the underlying value of a given variable I, *m* is the minimum for variable I, and *M* is the maximum value for that same indicator. The values are subsequently multiplied by 100 to bring them to the desired 0 to 100 scores. This procedure largely follows the lead of the UN, especially as it relates to the Human Development Index, and prior studies that have attempted to measure financial inclusion (Sarma, 2008; Park and Mercado, 2017). Normalizing variables in this way allows for a uniform index that permits a straightforward comparative analysis between countries.

2.2.4 Assigning weights

In recent literature, more and more authors have embraced objective data weighting methods in their construction of financial inclusion indices. For instance, while a number of studies rely on two-stage or three-stage Principal Component Analysis (PCA) method (Zeqiraj et al., 2022; Camara and Tuesta, 2014; Khera et al., 2021), Wang and Guan (2017) prefer the coefficient of variation (CV) method. However, the majority of earlier papers in the field of financial inclusion rely upon more subjective methods of assigning weights to the variables included in their indices. Among the preferred methods are equal weighting by taking the arithmetic means of the corresponding indicators in each sub-index (Gupte et al., 2012; Sha'ban et al., 2020), measure of the distance from the ideal (Sarma, 2008), differential weighting, often justified by conceptual underpinnings and data limitations. The later method is adopted by Omar and Inaba (2020), the work of which highly influences the construction of the SFII. This partially

explains the choice of different weight assignment in aggregating the underlying indicators into the two sub-indices. The bigger reason is limitations in data availability, especially as it relates to the variables included in the SFII. As illustrated in Table 5, a notable number of countries only have values for the variables on the number of ATMs and financial institutions. While the approaches to treatment of missing data described in the earlier subchapter somewhat alleviate this issue, a closer examination of data patterns reveals that there is a certain tendency for overestimation when using simple regression imputations. Therefore, based on previous literature and in an attempt to account for possible bias as the result of limited data availability, this paper assigns different weights for indicators included in the SFII, as presented in Table 6.

Table 6 Assigned weights to the indicators included in the SFII

Code	Variable Name	Assigned weight
SFII1	Number of ATMs per 100,000 adults	0.3
SFII2	Number of financial institution branches per 100,000 adults	0.3
SFII3	Number of deposit accounts with financial institutions per 100,000 adults	0.2
SFII4	Number of loan accounts with financial institutions per 100,000 adults	0.2

For the DFII, which does not exhibit similar limitations in data availability, simple arithmetic average of the six included variable is assumed. The final index is the arithmetic mean of both sub-indices. As such, the final functional forms of the aggregators are assumed to construct the two sub-indices and the final index of financial inclusion:

$$SFII = 0.3 * SFII1 + 0.3 * SFII2 + 0.2 * SFII3 + 0.2 * SFII4 \quad (2)$$

$$DFII = \frac{DFII1 + DFII2 + DFII3 + DFII4 + DFII5 + DFII6}{6} \quad (3)$$

$$\text{MIFI} = \frac{SFII + DFII}{2} \quad (4)$$

2.3 Investigating the association between the MIFI and social progress

This paper fills the gap in the existing literature by investigating the association between social progress and financial inclusion, using novel complex multidimensional indices for both phenomena. While the MIFI, described earlier, is used as proxy for the latter concept, the Social Progress Index is utilized to measure the degree of social progress in a given country. A simple correlation analysis is employed in analyzing the association between these two variables and their subsequent sub-indices. Addition of a few control variables such as trade openness, net FDI inflows as share of GDP, and GDP per capita to the regression framework allows for a more nuanced analysis. To assess the strength of the association for transition economies specifically, a dummy variable is created to differentiate between these economies and the rest.

Additionally, transition economies are divided into four sub-categories based on current level of economic development and time under communism: the Baltics include Estonia, Latvia, and Lithuania,[21] while countries like Albania and North Macedonia make up the Balkans.[22] The Central and Eastern European group consists of countries that have joined the EU and are considered by many to have concluded their transition process: Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Slovak Republic, and Slovenia. The last group contains other former Soviet countries like Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. This meticulous distinction allows to differentiate countries by their level of economic development, as proxied by accession to the EU, and by their proximity to the Soviet Union.

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[21] These three are separated from other EU members to reflect the fact that they are former Soviet Union countries.
[22] These two countries are in a separate category since they were never part of the Soviet Union and are not members of the EU.

CHAPTER 3 RESULTS

3.1 Multidimensional index of financial inclusion: stylized facts

After having accounted for all missing data points, the MIFI index is available for 124 countries in 2014, 130 countries in 2017, and 113 countries in 2021.[23] Final results for transition economies are presented along with SPI scores in tables 9 to 11. Full country rankings can be found in Appendix D. This subchapter is structured as follows: first, the two sub-indices are briefly analyzed on their own, followed by a discussion on some of the differences between the two across time and regions. The final part is dedicated to providing some stylized facts on the changes and patterns in the final index of financial inclusion, with a specific focus on transition economies.

From 2014 to 2021, all six indicators included in the DFII showcase considerable growth across income groups and regions. Among the six, the share of adults with a financial institution account (DFII1) is widely used as a simple proxy for financial inclusion and is also the variable with highest scores for all regions across time. As illustrated in Figure 2, the mean value for this variable increased by roughly 10 points, meaning financial institution account ownership has reached around 65% of the global population in 2021. The most rapid increase among the demand-side variables has been noted for the indicator on share of adults that made a utility payment using a financial institution account (DFII5), followed by the share of adults that made or received a digital payment (DFII6). It's safe to say that both of these jumps probably result from increases in financial access granted by the spread of e-banking and its' acceleration due to

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[23] This significant drop is largely explained by low country coverage in the 2021 issue of the Global Findex survey, mainly due to the impact of the COVID-19 pandemic.

the COVID-19 pandemic. Further empirical investigation of drivers of financial inclusion could shed more light on this pattern.

Figure 2 Average values for indicators included in the DFII by year
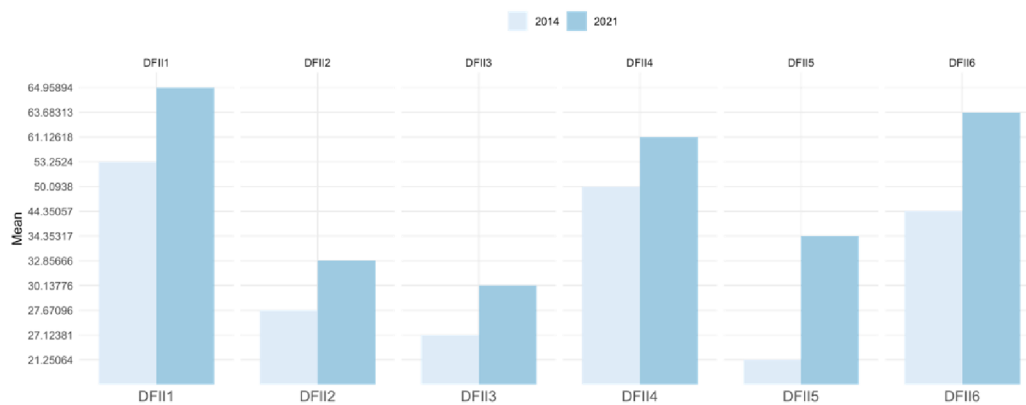
Source: Author's calculations based on the Global Findex database

Some of the countries with highest values for the composite Demand-side Financial Inclusion Index across time are Norway, Luxembourg, South Korea, Canada, Australia, and Spain. As expected, all of these countries are among high income economies, but not all high-income countries perform equally well in this dimension. For instance, Romania's highest score of 43.12 was recorded in 2021, but is surpassed by values for countries like China and Thailand, which have scored above 60 for the same year. Some high-income countries like the United Arab Emirates have even recorded a decrease in DFII results from 63.39 in 2017 to 42.41 in 2021. Despite these notable exceptions, there is a concentration of high-income countries at the top of the DFII ranking. While the results for this group of countries is largely stable, the most improved countries are concentrated in other income categories. Among this group are countries like Ukraine, Senegal, the Philippines, Moldova, and Kyrgyzstan, which have managed to double their results from 2014 to 2021, as displayed in Figure 3. On the other hand, some countries like Lebanon and Mauritania display diminishing scores over time.

Figure 3 DFII scores for selected countries by year
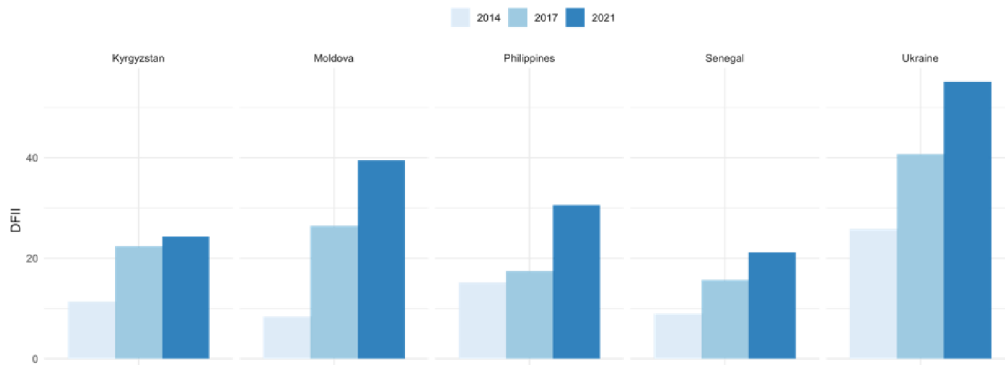
A similar association with income holds for the SFII as well. Most high-income countries score around 65, while very few low-income economies score above 10. However, unlike the DFII, the SFII doesn't exhibit universally increasing results over time. For most high performers the SFII values tend to either decrease over time or remain stagnant. For instance, values for Austria, Portugal, and Australia decrease by over ten points between 2014 and 2021. Where improvements exist, they are not as drastic as those recorded for the DFII. Figure 4 illustrates that the scale of increases is not particularly large even for the most improved countries.

Figure 4 SFII scores for most improved by year and country

A potential explanation for this is the reduced relevance of physical markers of financial inclusion like the number of ATMs and bank branches as the result of rapid digitalization of finance, especially considering that this decrease is particularly evident among high-income

countries. This finding is a further argument in support of reconsidering and reevaluating the role of traditional measurements of financial inclusion.

Despite some of the aforementioned discrepancies, the correlation between the SFII and the DFII for the whole dataset is quite high, around 0.77. This is illustrative of the fact that the two dimensions of financial inclusion capture two distinctive sides of this complex concept, but do not differ drastically. The level of correlation remains similar throughout the years, as seen in the table below.

Table 7 Correlation between SFII and DFII

	Value
Correlation between SFII and DFII for the whole dataset	0.7759
Correlation between SFII and DFII for the year 2014	0.7834
Correlation between SFII and DFII for the year 2017	0.8058
Correlation between SFII and DFII for the year 2021	0.7513

Source: Author's calculations based on the IMF FAS and Global Findex databases

A closer examination of the linkage between the two sub-indices suggests that many countries tend to score higher on the DFII than the SFII as illustrated in Figure 5. Some especially prominent examples of this are Norway, New Zealand, Estonia, and Denmark. On average, the difference between the two sub-indices is around 10 points for all countries. This value steadily increases to 15 points in 2017 and about 19 points in 2021. As seen in Figure 5 only a handful of countries like Uruguay, Uzbekistan, and Georgia have higher values for SFII than for DFII in 2021. This can partially be explained by the fact that values for variables included in the SFII have a slight tendency to skew to the right. A more substantial explanation, however, is most likely connected to the fact that DFII grew more substantially across the years than the SFII, as discussed earlier.[24] In a practical sense, this might stem from the fact that the number of ATMs and bank branches, which are the two most prominent variables included in

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[24] See Appendix E for a comparative boxplot graph between DFII and SFII by year.

SFII, tend to decrease in many countries, as the role of digital finance increases. The physical markers of financial accessibility may also become less pertinent in the wake of the COVID-19 pandemic.

Figure 5 also demonstrate regional dynamics across these two sub-indices.[25] In both years, countries in Sub-Saharan Africa and South Asia tend to demonstrate lower results than countries in other regions. For 2014, mean DFII value for South Asia is around 12 and slightly higher for Sub-Saharan Africa at roughly 17.[26] However, both of these regions exhibit considerable improvement of roughly 8 points each by 2021. In contrast, countries included in the Europe and Central Asia category generally occupy the top spots, but also demonstrate the most heterogeneity. While most Northern and Western European countries are at the top of the list, most Eastern European and Central Asian countries rank considerably lower. For instance, the 2014 values for both sub-indices of Austria, one of the best performers in the region, are almost double the values for Poland. This gap is considerably smaller by 2021, largely due to substantial improvements among Eastern European and Central Asian countries.

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[25] Regional division according to the World Bank.
[26] For comparison, the same metric for Latin America and the Caribbean is roughly 27 and 36 for Middle East and North Africa.

Figure 5 Scatterplot between DFII and SFII for 2014 (top) and 2021 (bottom)
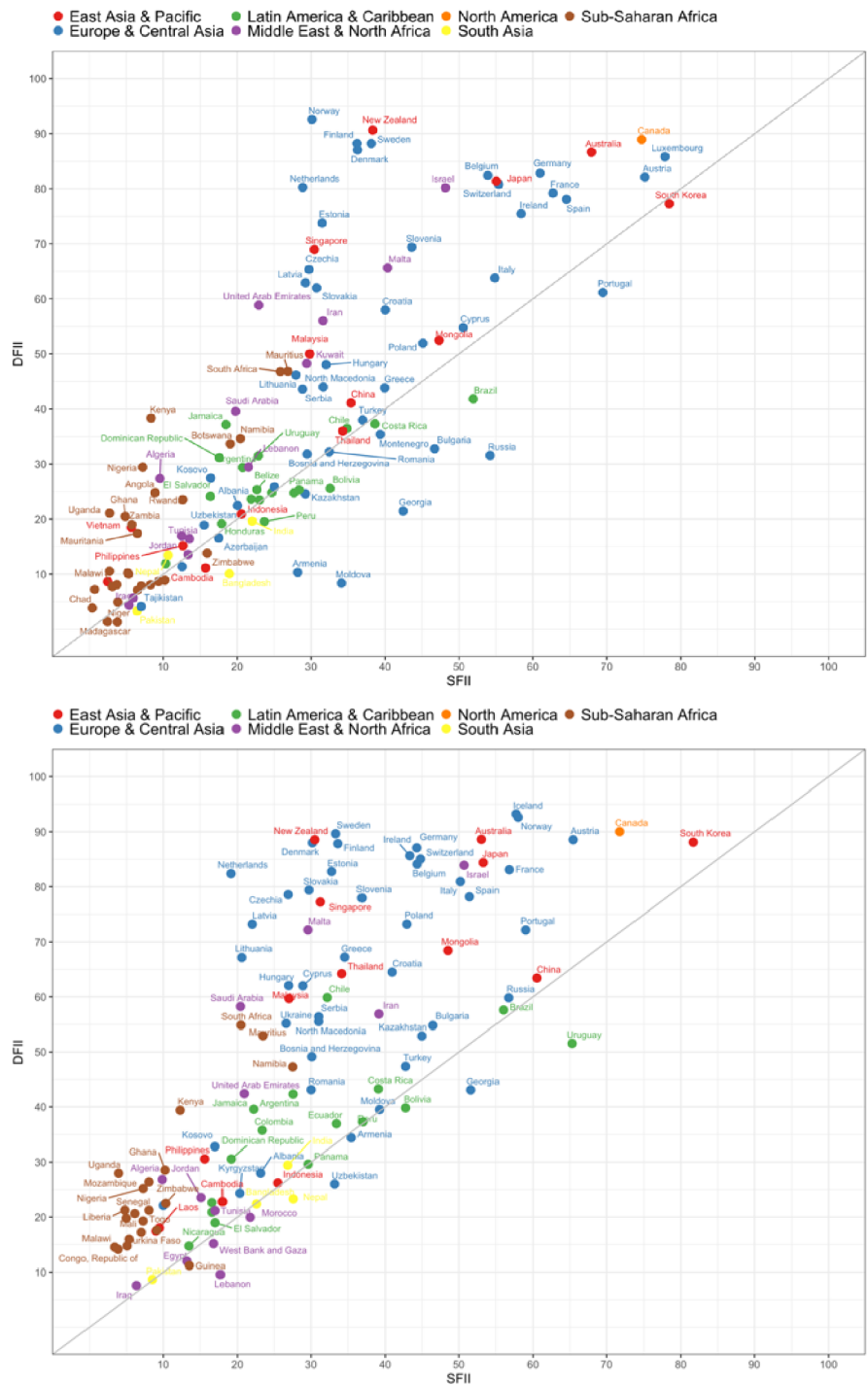
Note: A diagonal line added for comparison.
Source: Author's calculations based on IMF FAS and the Global Findex databases.

The correlation between the SFII and the DFII decreases considerably when accounting for transition economies only, as demonstrated in the following table:

Table 8 Correlation between SFII and DFII for transition economies

	Value
Correlation between SFII and DFII for transition economies	0.3700
Correlation between SFII and DFII for transition economies for 2014	0.4412
Correlation between SFII and DFII for transition economies for 2017	0.4504
Correlation between SFII and DFII for transition economies for 2021	0.1910

Source: Author's calculations based on IMF FAS and the Global Findex databases

This difference can potentially be explained by a significantly lower number of observations, but also the rapid development of digital finance and fintech in those countries. This change is captured especially well in one of the indicators included in the DFII, which accounts for the percentage of the population that has made or received a digital payment. Figure 6 presents how the value for this variable has changed over time for a few selected transition economies. The majority of transition economies has demonstrated consistent and considerable growth in this indicator, which highlights the impact of digitalization in finance for increased financial inclusion.

Figure 6 Percentage of the population that has made or received a digital payment for selected transition countries
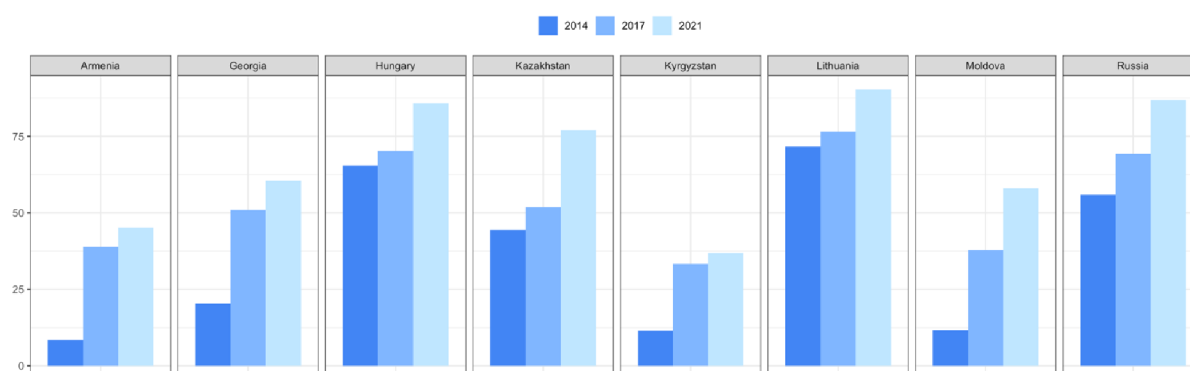
Source: The Global Findex

This trend of increased reliance on accessing and using formal financial services digitally may be one of the explanations behind this discrepancy in correlation between SFII and DFII among

transition economies and rest of the countries included in the database, but this finding requires further investigation.

The MIFI combines the demand and supply-side dimensions in an attempt to provide a full picture of the level of financial inclusion based on the type of data available today. The final country rankings for all three years demonstrate that the level of economic development is a solid predictor of comparative financial inclusion levels. In 2014, the first thirty spots of the MIFI ranking are occupied by high-income countries, with the only exception being Mongolia. The reason behind such high financial inclusion for Mongolia is likely the government's extensive usage of the formal financial sector for pensions, health insurance, and other transfers, along with its policy of universal cash-handouts from the Human Development Fund (Camara and Tuesta, 2014). Another exception to the income rule is Brazil, the best performer in the Latin America and the Caribbean region. With its score of 46.87, Brazil ranks at 32, which is higher than some high-income countries such as Romania, Greece, and Kuwait, which, similarly to Mongolia, is probably in large part explained by high degree of usage of formal financial accounts among recipients of government transfers (Demirguc-Kunt et al., 2015). While Brazil scores higher on the SFII than on the DFII, it is the opposite for Mongolia, though the difference between the two dimensions for both countries is quite low. Figure 7 provides a more detailed overview of country performance in terms of MIFI for 2014.

Figure 7 MIFI distribution map, 2014
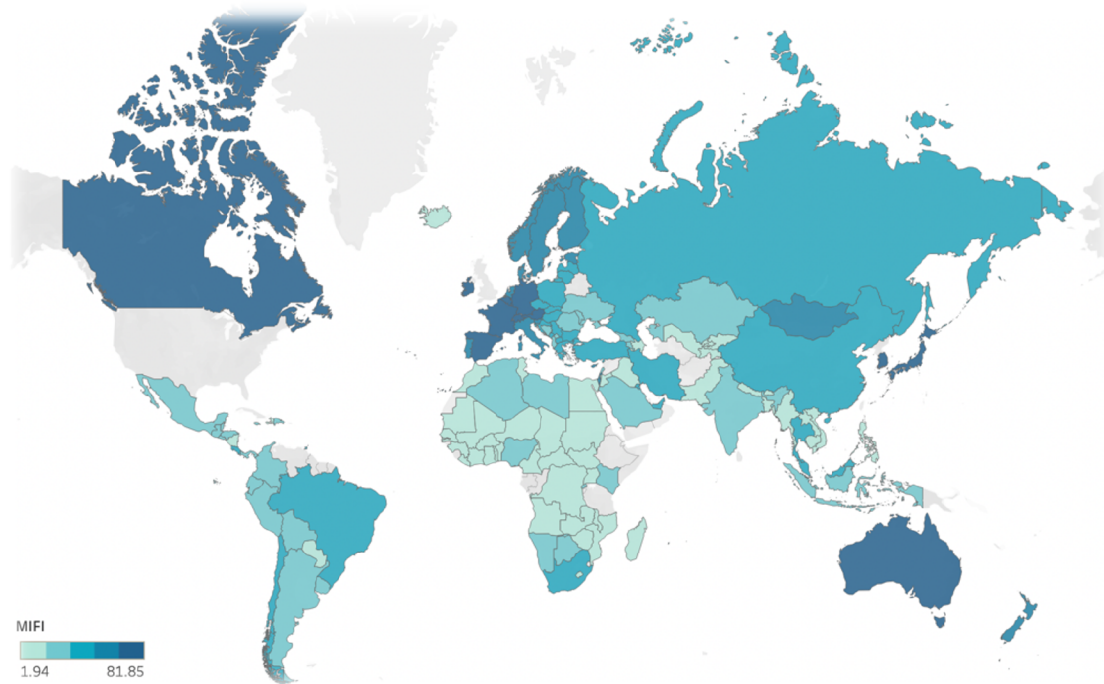
Source: Author's calculations based on IMF FAS and the Global Findex databases

The interlinkage between income and MIFI is also evident among transition economies. With values ranging from 6 to 56, this group of countries clearly illustrates the vastly different development paths they have taken since beginning their transition processes. In comparison to other countries, 10 out of 23 transition economies score above the average value for MIFI. The high-income countries of Central and Eastern Europe find themselves in the top half of Table 9, while most former members of the Soviet Union rank lower. The highest average value is found in the Baltics, closely followed by other EU members. This further highlights the existence of a large gap between these three countries and other post-Soviet states. The only non-EU member in the top 10 is Russia, which generally tends to score high across more traditional measurements of financial inclusion based on supply-side data.[27] This pattern is also illustrated in the fact that

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[27] See Sarma (2008) and the FIA sub-index in Svirydzenka (2016).

Russia is one of the handful of transition economies with considerably higher results for the SFII than for the DFII.

Table 9 Transition economies ranked by MIFI for 2014

Country	SPI	SFII	DFII	MIFI	Rank[28]
Slovenia	83.16	43.62546	69.3979	56.51168	1
Estonia	83.61	31.51051	73.75186	52.63119	2
Croatia	78.15	40.04016	57.99558	49.01787	3
Poland	79.65	45.1335	51.92419	48.52884	4
Czech Republic	82.56	29.73939	65.33564	47.53752	5
Slovak Republic	78.56	30.75855	61.97406	46.36631	6
Latvia	78.74	29.26448	62.88638	46.07543	7
Russia	69.66	54.21608	31.56263	42.88935	8
Hungary	78.05	32.03918	48.03913	40.03915	9
Bulgaria	73.42	46.73574	32.78435	39.76005	10
North Macedonia	68.24	31.66044	44.00577	37.8331	11
Lithuania	81.27	27.97004	46.17895	37.07449	12
Romania	73.80	32.46615	32.22319	32.34467	13
Georgia	70.23	42.4633	21.46959	31.96644	14
Kazakhstan	67.58	29.24813	24.57396	26.91105	15
Ukraine	70.18	25.06496	25.84285	25.45391	16
Albania	69.98	20.08476	22.46384	21.2743	17
Moldova	69.18	34.14627	8.395128	21.2707	18
Armenia	68.15	28.21805	10.34037	19.27921	19
Uzbekistan	57.23	15.56762	18.89868	17.23315	20
Azerbaijan	59.39	17.51917	16.56673	17.04295	21
Kyrgyzstan	64.35	12.59628	11.36894	11.98261	22
Tajikistan	52.80	7.035414	4.129071	5.582242	23

Source: The Social Progress Imperative and author's calculations based on the IMF FAS and the Global Findex databases

By 2017, the average value for MIFI increases from 32.1 to 33.6 across the whole dataset. Generally, the results for the SFII remain on the same level, so this increase can largely be attributed to a nearly 4-point increase in the average value for the DFII. Additionally, the country income-financial inclusion nexus starts to somewhat lose relevancy with time. One example of this is upper-middle income economies such as Turkey and Georgia joining the ranks

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[28] The results for Tables 9 to 10 are ranked by the MIFI value.

of the top 40 performers. A few countries from the lower middle-income group have demonstrated remarkable improvement. A clear example of this is Tajikistan, which has managed to increase its result from 2014 by almost four times, even outperforming fellow transition economies such as Kyrgyzstan and Azerbaijan. Albeit on a smaller scale, Georgia is country that has reached considerable improvements, now ranking higher than some EU member states such as Lithuania and Hungary.

Transition economies experienced a four-point higher increase in the average MIFI value from 2014 to 2017 compared to the rest of the dataset. The top ten transition economies list is largely made up of EU members, with the exception of Russia and Georgia. Some relative underperformers among the Central and Eastern European group are Romania and Hungary: the former has improved its result by around 2 points, while the latter has remained roughly at the same level.

Many Central Asian economies have greatly improved their outcomes. One of the notable examples is Kazakhstan, which has managed to move up a rank over Romania, a high-income country. Interestingly, this improvement is driven purely by the DFII, since the SFII for this country remains largely unchanged. These marked improvements for countries in the lower bottom of the table may possibly be explained by the catch-up effect, but a more detailed country-specific investigation of determinants of financial inclusion and specific policies addressing the issue might provide more nuanced explanations.

Table 10 Transition economies ranked by MIFI for 2017

Country	SPI	SFII	DFII	MIFI	Rank
Slovenia	84.88	42.14413	73.56691	57.85552	1
Estonia	84.61	33.88636	78.29842	56.09239	2
Poland	81.33	45.13622	65.12203	55.12913	3
Croatia	80.72	42.76469	65.91905	54.34187	4
Russia	70.30	58.74188	46.41016	52.57602	5
Slovakia	79.93	30.65728	68.9155	49.78639	6
Czechia	84.17	27.11228	67.30888	47.21058	7
Latvia	80.26	27.3673	66.6531	47.0102	8
Bulgaria	75.57	43.57573	47.29713	45.43643	9
Georgia	73.17	50.9506	39.19279	45.07169	10
North Macedonia	70.12	33.12414	50.91419	42.01917	11
Lithuania	82.68	25.21674	57.87302	41.54488	12
Hungary	78.16	29.42158	50.94584	40.18371	13
Kazakhstan	68.67	29.25242	39.85944	34.55593	14
Romania	76.00	31.84212	35.20941	33.52576	15
Ukraine	71.79	25.3444	40.72231	33.03336	16
Armenia	70.78	30.91224	33.85244	32.38234	17
Moldova	70.36	26.15239	26.43895	26.29567	18
Albania	72.57	21.2676	25.64403	23.45581	19
Uzbekistan	59.89	21.74572	21.07412	21.40992	20
Tajikistan	53.77	7.143476	33.30697	20.22522	21
Kyrgyzstan	66.72	16.60593	22.42771	19.51682	22
Azerbaijan	61.96	17.01338	17.3413	17.17734	23

Source: The Social Progress Imperative and author's calculations based on the IMF FAS and the Global Findex databases

In contrast to a roughly one-point increase in the average MIFI value from 2014 to 2017, the latest year covered by this paper delivers considerable improvement across the whole dataset. The average MIFI value for 2021 is around 38 points, which is about a four-point increase from 2017 and roughly a six-point increase from 2014. The increase is largely driven by improvements in the DFII, which is consistent with previous findings. Figure 8 showcases a considerable bridging of the regional divide. Though higher levels of financial inclusion may still be largely concentrated in North America and Western Europe, improvements in the average MIFI results for countries like Brazil, China, Kazakhstan, and Poland show some promising signs of progress in other parts of the world. For China, which has almost doubled its MIFI score

from 2017 to 2021, the improvement is mainly driven by about a 30-point jump in the SFII, though the DFII score has also increased by more than 10 points. In the last decade, traditional financial service providers in China have concentrated their efforts on increasing the physical outreach of their services, including the expansion of financial infrastructure such as ATMs and bank branches (Chen and Yuan, 2021). This, however, is one of the few extreme cases, because the SFII scores increase by only about a year on average, while notable improvements in the DFII seem to drive most of the overall increase in the values for the MIFI across the whole dataset.

Figure 8 Map distribution of MIFI, 2021
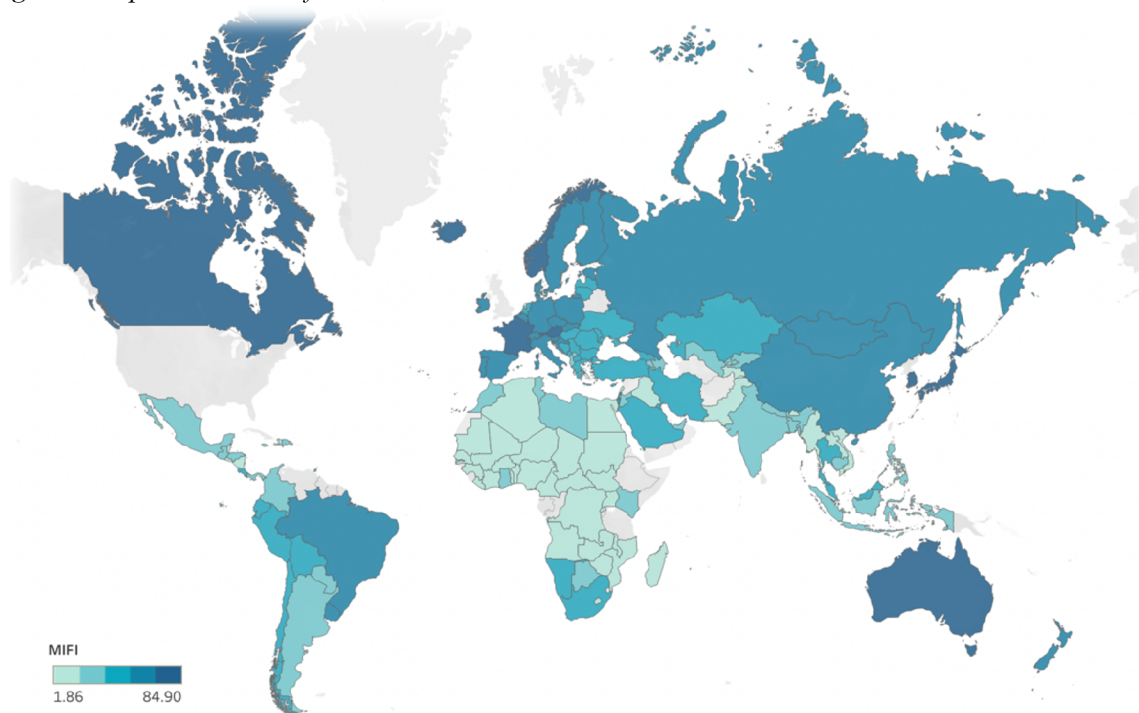
Source: Author's calculations based on IMF FAS and the Global Findex databases

In terms of general trends for transition economies, the average score for MIFI for this subset of countries has increased by about 13%, which is very similar to the average increase for the rest of the dataset. The previously noted dichotomy of contrasting growth rates between the two sub-indices applies to transition economies as well. While the mean value for the SFII has

remained roughly at the same level, the average DFII score has increased by more than 16% between 2017 and 2021. The clearest example of this is Russia. In comparison to 2017, the DFII score for this country has increased by almost 30 %. This progress coupled with Russia's consistently high values across the supply-side measurements puts the country slightly above other high-income transition countries such as Poland and Estonia.

Table 11 Transition economies ranked by MIFI for 2021

Country	SPI	SFII	DFII	MIFI	Rank
Russia	72.12	56.72068	59.80849	58.26458	1
Poland	80.74	42.96323	73.2414	58.10231	2
Estonia	85.83	32.81336	82.75364	57.7835	3
Slovenia	84.28	36.88904	77.93349	57.41127	4
Slovakia	80.84	29.74339	79.3904	54.56689	5
Czechia	85.08	26.91603	78.55227	52.73415	6
Croatia	81.79	40.94255	64.50128	52.72192	7
Bulgaria	76.45	46.48288	54.79227	50.63758	8
Kazakhstan	71.24	44.99599	52.90771	48.95185	9
Latvia	81.74	22.0355	73.23379	47.63464	10
Georgia	74.48	51.62422	43.08382	47.35402	11
Hungary	78.21	26.98112	62.04636	44.51374	12
Lithuania	83.70	20.60973	67.15968	43.8847	13
North Macedonia	72.60	31.06318	55.51271	43.28795	14
Ukraine	73.95	26.63934	55.16232	40.90083	15
Moldova	73.13	39.25959	39.51459	39.38708	16
Romania	76.87	30.03764	43.11624	36.57694	17
Armenia	74.21	35.48734	34.38773	34.93753	18
Uzbekistan	65.96	33.23499	26.02047	29.62773	19
Albania	73.86	23.18381	28.00653	25.59517	20
Kyrgyzstan	67.75	20.35379	24.32708	22.34043	21
Tajikistan	56.01	10.0398	22.11441	16.07711	22
Azerbaijan[29]	62.96	21.74002	*NA*	*NA*	*NA*

Source: *The Social Progress Imperative and author's calculations based on the IMF FAS and the Global Findex databases*

A comparatively high increase in the DFII scores is also noted for countries like Kazakhstan and Ukraine. The former is also one of the most improved in terms of ranking, and

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[29] Azerbaijan is not included in the Global Findex for the year 2021, therefore only the SFII could be calculated in this case.

dissimilar to Russia, this result can be equally attributed to considerable increases in both the SFII and the DFII. Such great expansion of financial inclusion in non-high-income transition economies is largely thought to be a result of efficiency gains associated with digital finance and FinTech (Morgan and Zhang, 2019). However, empirical literature on the catalysts of such notable improvements in these countries is scarce.

3.2 Financial inclusion and social progress

As a concept, social progress might be even more elusive than financial inclusion. However, there is considerable research suggesting that the two are linked in a meaningful manner, so this paper investigates the association between these two phenomena using the newly constructed multidimensional index of financial inclusion and the SPI. Figure 9 provides a brief overview of how these two metrics compare to each other across time and income groups. One notable point of difference between the two variables illustrated in the figure is that the range for MIFI scores is considerably larger than that for SPI scores.

A higher SPI score is generally associated with a higher MIFI score and this pattern continues with time. In fact, the correlation level between these two variables is at 0.88 for the whole dataset and remains similarly high when considering data for each year on its own. Notably, the association between the MIFI and GDP per capita is not as high as the one for the SPI.[30] This observation further illustrates the need to consider the impact of financial inclusion on non-economic indicators of development in order to grasp its full potential as a policy tool.

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[30] Correlation coefficient for these two variables is 0.77 when considering the whole dataset.

Figure 9 Scatterplot between SPI and MIFI for 2014 (top) and 2021 (bottom)

Source: Author's calculations based on IMF FAS and the Global Findex databases.

The association between the MIFI and the SPI is further tested by controlling for variables such as GDP per capita, trade openness[31] and FDI,[32] which have been noted to have a significant impact on social progress and human development (Abdelghaffar et al., 2022). To accomplish this, a fixed effects panel data framework with robust estimators is used. The results are presented in Table 12.

Table 12 Fixed effects regression framework analysis of social progress, financial inclusion, GDP per capita, trade openness, and FDI inflows for the whole dataset

	Coefficient	Standard error	t-value	p-value
Dependent variable: SPI score				
MIFI	0.230***	0.027	8.67	0.000
GDP per capita	0.000	0.000	2.17	0.032
Trade openness	-0.001	0.014	-0.06	0.950
FDI	-0.15***	0.003	-5.56	0.000
Constant	59.558	1.772	33.61	0.000
Observations	354			
R-squared:				
within	0.3467			
between	0.7779			
overall	0.7721			

*Note: *** p<0.001, ** p<0.01, * p<0.05.*
Source: Author's calculations based on IMF FAS, SPI, and the Global Findex databases.

The outcome of this regression framework illustrates that the positive link between financial inclusion and social indicators of development remains strong even when keeping a number of possibly significant variables constant. It is important to note that the introduction of this model into the research framework of the overall study does not imply an attempt at establishing causality, but rather a way of further investigating how these two phenomena are associated with each other.

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[31] Proxied by volume of exports and imports as share of GDP; sourced from the World Development Indicators by the World Bank.
[32] Measured as net inflows of FDI as share of GDP; sourced from the World Development Indicators by the World Bank.

Despite the strength of the association, there are a few countries that tend to deviate from this pattern. For instance, Mongolia consistently exhibits much higher MIFI scores than other countries at similar levels of social progress. On the other hand, countries with relatively high levels of SPI like Uruguay and Panama tend to underperform when it comes to the extent of financial inclusion.

When differentiating by income, the correlation between the MIFI and the SPI is highest for low and high-income countries. However, the level of correlation drops to about 0.5 for upper and lower-middle-income economies, as they demonstrate more variability in their respective levels of financial inclusion. For instance, Colombia and Brazil are upper-middle-income economies with similar levels of social progress, but the difference in their MIFI scores is more than 30 points. Similarly, Georgia and Armenia present a case of a regional pair with significantly different results in terms of financial inclusion, with the former ranking considerably higher than the latter. An especially pronounced introduction and adoption of new financial technologies in some of these countries is one plausible explanation for this trend. However, a closer examination of the interlinkage between income, social development, and financial inclusion could prove useful in understanding why these particular countries exhibit such different results.

An additional level of analysis between social progress and financial inclusion can be derived from the sub-indices of both measurements. In terms of financial inclusion, the association between the SPI and the DFII is stronger than the one for the SFII. As mentioned earlier, the operational relevancy of supply-side measurements of financial inclusion may decrease in relation to rapidly changing customer behavior in financial services. Countries with higher SPI scores display a general trend of decreasing SFII scores over time.

While this does not explicitly provide any empirical argument in regard to the comparative efficiency of various financial inclusion indicators, it, nonetheless, poses an interesting research puzzle.

Table 13 Correlation between SPI, MIFI, and their sub-indices

	SPI	MIFI	DFII	SFII	BHN	FOW	OPP
SPI	1.0000						
MIFI	0.8813	1.0000					
DFII	0.8664	0.9631	1.0000				
SFII	0.7861	0.9208	0.7819	1.0000			
BHN	0.9102	0.7517	0.7112	0.7107	1.0000		
FOW	0.9782	0.8876	0.8849	0.7738	0.8648	1.0000	
OPP	0.9320	0.8440	0.8437	0.7326	0.7174	0.8961	1.0000

Source: Author's calculations based on the IMF FAS, the Global Findex, and SPI databases

In terms of social progress, the strength of the association between the sub-indices of the SPI and the MIFI differ as well. Interestingly, the association is the strongest for the Foundations of Well-being (FOW) dimension, which covers issues like health, access to education, and environmental quality. The association is weakest for the Basic Human Needs (BHN) dimension, which includes indicators in realms like basic medical care and personal safety.

Figure 10 Scatterplot of MIFI and SPI for transition economies, 2021
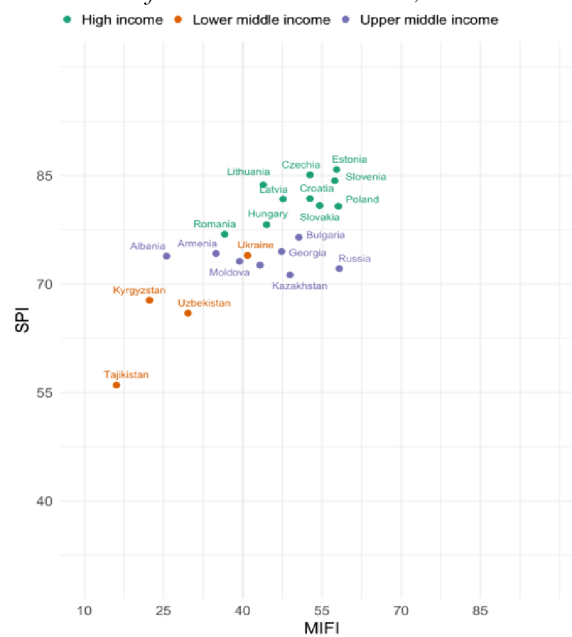
Source: Author's calculations based on the IMF FAS, the Global Findex, and SPI databases

The association between financial inclusion and social progress is slightly less pronounced for transition economies. The correlation coefficient for the whole subset is around 0.7. It remains on a similar level for 2014 and 2017 but decreases substantially to around 0.61 in 2021. This further illustrates how varied of a group this is and provides a compelling illustration of how different outcomes of their respective transition processes. Figure 10 provides a graphical illustration of the association between these two indices among transition economies in 2021. On average, high-income transition economies exhibit higher scores for both the SPI and the MIFI, with a few exceptions such as Romania and Hungary. A few upper middle economies like Bulgaria, Georgia, and Kazakhstan have equally high or close scores for the MIFI but underperform in terms of social progress. Lower-middle-income transition countries, despite improvements over time, remain on the lower part of the ranking for both indices. An exception to this is Ukraine, which ranks comparatively higher on both the SPI and the MIFI than other transition countries in the same income category.

Overall, there is great overlap between financial inclusion, social development, and income, but they do not exactly mirror each other. Some countries have made great improvements in financial inclusion, but the extent of these improvements does not necessarily reflect in their comparative level of social progress yet.

3.3 Limitations and suggestions for future research

There are a few methodological and theoretical limitations to this study. First, there is no universally accepted way to measure financial inclusion. The index constructed in this paper is the result of careful consideration of previous literature and available data. Depending on the conceptual and theoretical framework of financial inclusion and its measurement, some may argue for the inclusion of other available indicators from the datasets used in this paper or may

opt to use completely diverging sources of data. Moreover, rapidly changing landscape of financial services provision in the age of FinTech constitutes a serious motivation for reevaluating the role and relevance of more conventional variables used as proxy for financial inclusion.

From a methodological perspective, one possible limitation of the index is the reliance on subjective weighting rather than some objective weighting methods that have been used in previous literature. The choice of assigned weighting for the MIFI is motivated by limited data availability and less than ideal results yielded from regression imputations. While this method is widely used in financial inclusion literature, some may question its' statistical soundness. Keeping the country and time coverage as wide as possible was one of the guiding principles for this analysis, so several methods were used to treat the issue of missing data. Assigned weighting allows to limit the impact of variables with imputed observations as to maintain the statistical integrity of the final index. As such, finding an efficient way of integrating objective weighting methods while creating a multidimensional index for a complex issue like financial inclusion presents a promising potential avenue for future research.

One of the research questions posed by the study was aimed at establishing whether there is an association between financial inclusion and social progress. While the association has been established, this does not provide much insight on the potential strength and direction of causality between these two phenomena. Establishing any level of causality would require the utilization of more sophisticated statistical models, especially given the potential issue of reverse causality. As mentioned previously, not a lot of scholarly attention has been directed towards non-economic implications of financial inclusion. This is a notable gap that could be addressed by future research.

CONCLUSION

Increasing access to the formal financial sector can be a compelling policy goal on its own but it can also serve as a mains to achieve inclusive growth and reduce poverty. To understand the extent of financial inclusion, determine cross-country differences, and to identify future avenues for improvements, there needs to be an empirically sound way of measuring such a complex concept. Although there are a number of measurements proposed in the literature, the rapidly changing landscape of the financial sector driven by technological innovation and digitalization challenges these measurements and motivates us to reevaluate how we understand financial inclusion in the first place.

The findings of this study suggest that previously utilized proxies for financial inclusion based on physical accessibility or macro-level data may start losing relevancy in the height of e-banking. Changing customer behavior and increased availability of new sources of data calls for a reevaluation of how we assess the extent of financial inclusion in different areas. A conceptually and statistically sound indicator of financial inclusion is necessary for empirical investigations of whether increased access to the formal financial sector actually leads to positive socio-economic outcomes.

This study presents a novel multidimensional index of financial inclusion to investigate the income, regional, and time patterns. The findings illustrate that high-income countries tend to exhibit higher levels of financial inclusion but there are a few outlier countries that constitute compelling cases of success. Financial inclusion generally increases with time and the rate of increase is higher for developing countries. The same pattern applies to transition economies, though there are a few cases of non-EU countries showing great improvements over time. The

experiences of these transition economies could serve as sources of valuable policy insight for other developing countries with formerly weak financial and market systems.

Using this index, this study additionally examines the interlinkage between social progress and financial inclusion. Previous research has established financial inclusion to be an important driver of economic growth and poverty production, but little has been said about its influence on indicators of social development. Financial exclusion is often said to be a type of overall social exclusion. Therefore, eliminating barriers to formal financial services, especially for the previously unbanked or underbanked populations, can prove to be a crucial tool for equality and social improvement. The findings in this paper demonstrate a strong degree of association between financial access and social progress. This linkage holds true over time and when controlling for a few factors associated with socio-economic development. For transition economies, the association is less pronounced, with a number of countries at similar levels of social progress demonstrating vastly different results for the extent of financial inclusion. Depending on circumstance, these rapid gains in financial inclusion for some of these countries may be a sign of accelerated socio-economic development in the future.

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Appendix A

List of countries included covered by year and index:

Year	Coverage by index	Country List
2014	MIFI	Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bangladesh, Belgium, Belize, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Cambodia, Cameroon, Canada, Chad, Chile, China, P.R.: Hong Kong, China, Colombia, Republic of the Congo, Democratic Republic of Congo, Costa Rica, Croatia, Cyprus, Czech Republic, Côte d'Ivoire, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Finland, France, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Honduras, Hungary, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kosovo, Kuwait, Kyrgyzstan, Latvia, Lebanon, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Mali, Malta, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, North Macedonia, Norway, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Romania, Russia, Rwanda, Saudi Arabia, Senegal, Serbia, Singapore, Slovak Republic, Slovenia, South Africa, South Korea, Spain, Sudan, Sweden, Switzerland, Tajikistan, Thailand, Togo, Tunisia, Türkiye, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, Vietnam, West Bank and Gaza, Zambia, Zimbabwe
	Only SFII	Bhutan, Central African Republic, The Gambia, Haiti, Iceland, Laos, Liberia, Libya, Lesotho, Morocco, Maldives, Mozambique, Paraguay, Trinidad and Tobago
2017	MIFI	Albania, Algeria, Argentina, Armenia, Australia, Austria, Azerbaijan, Bangladesh, Belgium, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Cambodia, Cameroon, Canada, Central African Republic, Chad, Chile, China, P.R.: Hong Kong, China, Colombia, Congo, Dem. Republic of the Congo, Costa Rica, Croatia, Cyprus, Czech Republic, Côte d'Ivoire, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Finland, France, The Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Honduras, Hungary, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Kenya, Kosovo, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, North Macedonia, Norway, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russia, Rwanda, Saudi Arabia, Senegal, Serbia, Singapore, Slovak Republic, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Tajikistan, Thailand, Togo, Trinidad and Tobago, Tunisia, Türkiye, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, Vietnam, West Bank and Gaza, Zambia, Zimbabwe
	Only SFII	Angola, Belize, Bhutan, Haiti, Iceland, Jamaica, Sudan
2021	MIFI	Albania, Algeria, Argentina, Armenia, Australia, Austria, Belgium, Benin, Burkina Faso, Bangladesh, Bulgaria, Bosnia and Herzegovina, Bolivia, Brazil, Cambodia, Canada, Switzerland, Chile, China, Côte d'Ivoire, Cameroon, Republic of the Congo, Colombia, Costa Rica, Cyprus, Czech Republic, Germany, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Finland, France, Georgia, Ghana, Guinea, Greece, China, P.R.: Hong Kong, Honduras, Croatia, Hungary, Indonesia, India, Ireland, Iran, Iraq, Iceland, Israel, Italy, Jamaica, Jordan, Japan, Kazakhstan, Kenya, Kosovo, Kyrgyzstan, Laos, Lebanon, Liberia, Lithuania, Latvia, Morocco, Moldova, North Macedonia, Mali, Malta, Myanmar, Mongolia, Mozambique, Mauritius, Malawi, Malaysia, Namibia, Nigeria, Nicaragua, Netherlands, Norway, Nepal, New Zealand, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Paraguay, Romania, Russian Federation, Saudi Arabia, Senegal, Singapore, Serbia, Slovak Republic, Slovenia, Sweden, Togo, Thailand, Tajikistan, Tunisia, Türkiye, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, South Africa, South Korea, Spain, West Bank and Gaza, Zambia, Zimbabwe
	Only SFII	Angola, Azerbaijan, Belize, Bhutan, Botswana, Central African Republic, Chad, Democratic Republic of the Congo, The Gambia, Guatemala, Haiti, Kuwait, Lesotho, Libya, Luxembourg, Madagascar, Maldives, Mauritania, Mexico, Montenegro, Niger, Rwanda, Sudan, Trinidad and Tobago, Vietnam

Correlation matrices for underlying variables of DFII and SFII before treatment of missing data:

Code	Variable Name	SFII1	SFII2	SFII3	SFII4
SFII1	Number of ATMs per 100,000 adults	1.0000			
SFII2	Number of financial institution branches per 100,000 adults	0.5310	1.0000		
SFII3	Number of deposit accounts with financial institutions per 100,000 adults	0.6605	0.3560	1.0000	
SFII4	Number of loan accounts with financial institutions per 100,000 adults	0.5806	0.3750	0.5726	1.0000

Code	Variable Name	DFII1	DFII2	DFII3	DFII4	DFII5	DFII6
DFII1	Share of adults with a financial institution account	1.0000					
DFII2	Share of adults that saved at a financial institution	|0.8283	1.0000				
DFII3	Share of adults that borrowed from a financial institution	0.7258	0.7772	1.0000			
DFII4	Share of wage recipients that received wages into a financial institution account	|0.9052	0.7851	0.7545	1.0000		
DFII5	Share of adults that made a utility payment using a financial institution account	0.8365	0.8645	0.8205	0.8261	1.0000	
DFII6	Share of adults that made or received a digital payment	0.9310	0.8253	0.8032	0.8891	0.8817	1.0000

List of exceptions to the three-year range rule for treatment of missing data for the variables included in the SFII:

Country	Variable	Note
Brazil	SFII3	Values for 2017 and 2021 years taken from 2013
Central African Republic	All	Missing values for all for four variables for 2021 replaced by values for 2017
China	SFII4	Value for 2014 taken from 2019
Libya	SFII4	Values for 2017 and 2021 years taken from 2011
Kazakhstan	SFII4	Values for 2014 and 2017 taken from 2021
Paraguay	SFII4	Value for 2014 taken from 2019

Appendix D

Full country rankings by MIFI for 2014:

Country	SFII	DFII	MIFI	Rank
Canada	74,86018	88,93861	81,8994	1
Luxembourg	77,86941	85,82263	81,84602	2
Austria	75,34598	82,10561	78,7258	3
South Korea	78,65783	77,28736	77,9726	4
Australia	68,01019	86,64523	77,32771	5
Germany	61,02719	82,82991	71,92855	6
Spain	64,5272	78,08356	71,30537	7
France	62,73935	79,20377	70,97157	8
Japan	55,03755	81,35954	68,19855	9
Belgium	53,8834	82,41032	68,14686	10
Switzerland	55,45284	80,76894	68,11089	11
Ireland	58,4726	75,44167	66,95713	12
Portugal	69,45464	61,13912	65,29688	13
New Zealand	38,36352	90,63128	64,4974	14
Israel	48,255	80,17561	64,21531	15
Sweden	38,05447	88,20121	63,12784	16
Finland	36,15286	88,19786	62,17536	17
Denmark	36,30377	87,04585	61,67481	18
Norway	30,24781	92,57999	61,4139	19
Italy	54,843	63,77239	59,30769	20
Slovenia	43,65457	69,3979	56,52623	21
Netherlands	28,85919	80,24265	54,55092	22
Malta	40,34276	65,62811	52,98544	23
Cyprus	50,55726	54,78246	52,66986	24
Estonia	31,48216	73,75186	52,61701	25
China, P.R.: Hong Kong	30,40651	74,17753	52,29202	26
Mongolia	47,31404	52,44521	49,87963	27
Singapore	30,47428	68,95412	49,7142	28
Croatia	40,19363	57,99558	49,0946	29
Poland	45,10487	51,92419	48,51453	30
Czechia	29,69844	65,33564	47,51704	31
Brazil	51,92585	41,8237	46,87477	32
Slovakia	30,76138	61,97406	46,36772	33
Latvia	29,23289	62,88638	46,05963	34
Iran	31,62185	56,04311	43,83248	35
Russia	54,22973	31,56263	42,89618	36
Greece	39,94537	43,83588	41,89063	37
United Arab Emirates	22,92446	58,85987	40,89217	38
Hungary	32,00791	48,03913	40,02352	39
Malaysia	29,8073	49,9987	39,903	40
Bulgaria	46,70847	32,78435	39,74641	41
Kuwait	29,44022	48,26066	38,85044	42
China	35,39162	41,09863	38,24512	43
Costa Rica	38,63086	37,2864	37,95863	44

Republic of North Macedonia	31,62865	44,00577	37,81721	*45*
Turkey	36,98185	37,9752	37,47853	*46*
Montenegro	39,34323	35,38783	37,36553	*47*
Lithuania	27,96709	46,17895	37,07302	*48*
Mauritius	26,85497	46,84411	36,84954	*49*
South Africa	25,83281	46,7905	36,31166	*50*
Serbia	28,79261	43,60655	36,19958	*51*
Chile	34,85144	36,45271	35,65208	*52*
Thailand	34,27508	36,00515	35,14012	*53*
Romania	32,43652	32,22319	32,32986	*54*
Georgia	42,4373	21,46959	31,95344	*55*
Bosnia and Herzegovina	29,45623	31,80897	30,6326	*56*
Saudi Arabia	19,76889	39,5661	29,6675	*57*
Bolivia	32,55074	25,57456	29,06264	*58*
Jamaica	18,46471	37,15997	27,81234	*59*
Namibia	20,42146	34,63011	27,52579	*60*
Uruguay	22,91453	31,50554	27,21004	*61*
Kazakhstan	29,15002	24,57396	26,86199	*62*
Panama	28,37451	25,33261	26,85356	*63*
Botswana	19,0463	33,66961	26,35795	*64*
Guatemala	27,67723	24,75059	26,21391	*65*
Lebanon	21,52037	29,44259	25,48148	*66*
Ukraine	25,03507	25,84285	25,43896	*67*
Argentina	20,72079	29,36771	25,04425	*68*
Ecuador	24,68226	24,80046	24,74136	*69*
Dominican Republic	17,5775	31,17122	24,37436	*70*
Belize	22,66913	25,34821	24,00867	*71*
Kenya	8,338017	38,33692	23,33747	*72*
Colombia	23,01365	23,46563	23,23964	*73*
Mexico	21,95126	23,63935	22,79531	*74*
Kosovo	16,41767	27,46278	21,94022	*75*
Peru	23,66641	19,5604	21,6134	*76*
Albania	20,04573	22,46384	21,25479	*77*
Moldova	34,10817	8,395128	21,25165	*78*
India	22,02965	19,64804	20,83884	*79*
Indonesia	20,56651	20,91826	20,74239	*80*
El Salvador	16,36966	24,11883	20,24424	*81*
Armenia	28,18476	10,34037	19,26257	*82*
Honduras	17,88469	19,16641	18,52555	*83*
Algeria	9,55027	27,36923	18,45975	*84*
Nigeria	7,216329	29,42019	18,31826	*85*
Rwanda	12,63907	23,53765	18,08836	*86*
Uzbekistan	15,5232	18,89868	17,21094	*87*
Azerbaijan	17,50119	16,56673	17,03396	*88*
Angola	8,89747	24,78738	16,84242	*89*
Tunisia	13,55451	16,42082	14,98767	*90*
Zimbabwe	15,93846	13,81319	14,87582	*91*

Jordan	12,49385	16,92972	14,71179	*92*
Bangladesh	18,93427	10,08733	14,5108	*93*
Philippines	12,68943	15,16409	13,92676	*94*
West Bank and Gaza	13,35971	13,57821	13,46896	*95*
Cambodia	15,71585	11,14429	13,43007	*96*
Ghana	4,853771	20,50858	12,68118	*97*
Zambia	5,735913	19,01602	12,37597	*98*
Vietnam	5,660723	18,46924	12,06498	*99*
Nepal	10,67269	13,44132	12,057	*100*
Kyrgyzstan	12,55513	11,36894	11,96204	*101*
Mauritania	6,492453	17,39133	11,94189	*102*
Uganda	2,7354	21,0958	11,9156	*103*
Nicaragua	10,33662	11,90812	11,12237	*104*
Senegal	10,23365	8,935462	9,584554	*105*
Benin	9,35813	8,716084	9,037107	*106*
Togo	8,267652	8,099561	8,183606	*107*
Côte d'Ivoire	5,197436	10,25106	7,724246	*108*
Burkina Faso	5,315614	10,03664	7,676126	*109*
Mali	7,020778	7,864876	7,442827	*110*
Cameroon	6,526865	7,128417	6,827641	*111*
Congo, Republic of	2,720096	10,55182	6,635957	*112*
Sudan	3,718599	8,119603	5,919101	*113*
Egypt	5,9392	5,6749	5,80705	*114*
Tajikistan	7,035284	4,129071	5,582177	*115*
Myanmar	2,50278	8,656913	5,579846	*116*
Malawi	3,109823	7,736992	5,423408	*117*
Iraq	5,378143	4,388655	4,883399	*118*
Pakistan	6,449585	3,316149	4,882867	*119*
Guinea	3,85063	4,927279	4,388955	*120*
Congo, Democratic Republic of	0,731527	7,231701	3,981614	*121*
Madagascar	3,786672	1,327726	2,557199	*122*
Chad	0,401855	3,870322	2,136088	*123*
Niger	2,457491	1,395485	1,926488	*124*
Mozambique	5.45021	*NA*	*NA*	*NA*
Morocco	18.67847	*NA*	*NA*	*NA*
Trinidad and Tobago	23.22696	*NA*	*NA*	*NA*
Maldives	12.21331	*NA*	*NA*	*NA*
Iceland	66.02737	*NA*	*NA*	*NA*
Central African Republic	.5012837	*NA*	*NA*	*NA*
Liberia	2.414319	*NA*	*NA*	*NA*
Bhutan	15.54272	*NA*	*NA*	*NA*
Lesotho	5.371419	*NA*	*NA*	*NA*
Haiti	2.816197	*NA*	*NA*	*NA*
Laos	5.876179	*NA*	*NA*	*NA*
Gambia, The	5.216302	*NA*	*NA*	*NA*
Paraguay	15.01071	*NA*	*NA*	*NA*
Libya	9.02322	*NA*	*NA*	*NA*

Full country rankings by MIFI for 2017:

Country	SFII	DFII	MIFI	Rank
Luxembourg	75,66164	89,32668	82,49416	1
Canada	73,22207	91,29198	82,25703	2
South Korea	78,12362	83,60687	80,86525	3
Austria	67,07067	83,48687	75,27877	4
Australia	63,75937	85,71397	74,73666	5
Japan	55,24056	83,1194	69,17998	6
France	59,88377	77,96019	68,92198	7
Switzerland	50,22519	86,27305	68,24911	8
Spain	59,8509	76,56567	68,20829	9
Ireland	56,08621	79,36832	67,72726	10
Belgium	51,49543	83,78731	67,64137	11
Germany	46,23563	86,772	66,50381	12
Israel	47,25009	83,60323	65,42666	13
Portugal	64,05993	65,88884	64,97438	14
Italy	53,82679	72,3196	63,07319	15
New Zealand	35,94345	88,68901	62,31623	16
Finland	35,14507	87,04926	61,09716	17
Sweden	33,74944	86,55182	60,15063	18
Norway	24,55311	94,45149	59,5023	19
Denmark	31,76201	86,5131	59,13755	20
Slovenia, Rep. of	42,17351	73,56691	57,87021	21
Mongolia	54,24712	61,09798	57,67255	22
Estonia, Rep. of	33,86036	78,29842	56,07938	23
Singapore	32,20383	78,80392	55,50387	24
Poland, Rep. of	45,10903	65,12203	55,11553	25
Croatia, Rep. of	42,98363	65,91905	54,45134	26
Malta	37,05921	69,24539	53,1523	27
Russian Federation	58,75649	46,41016	52,58332	28
Netherlands, The	23,42141	81,40839	52,4149	29
China, P.R.: Hong Kong	30,7691	73,58097	52,17503	30
Slovak Rep.	30,66286	68,9155	49,78918	31
Cyprus	43,1907	54,85757	49,02414	32
Iran, Islamic Rep. of	35,5762	60,20028	47,88824	33
Czech Rep.	27,12641	67,30888	47,21764	34
Latvia	27,33539	66,6531	46,99425	35
Brazil	49,71082	43,24916	46,47999	36
Bulgaria	43,5492	47,29713	45,42316	37
China	40,48605	49,76744	45,12675	38
Georgia	50,92888	39,19279	45,06084	39
Türkiye, Rep of	38,37537	51,18345	44,77941	40
United Arab Emirates	24,85052	63,39359	44,12206	41
Greece	38,48994	48,53397	43,51196	42
Montenegro	41,44843	44,20713	42,82778	43
Costa Rica	41,87213	42,37389	42,12301	44
North Macedonia, Republic of	33,09341	50,91419	42,0038	45

Lithuania	25,21542	57,87302	41,54422	*46*
Malaysia	28,07062	54,29514	41,18288	*47*
Kuwait	29,45443	51,32222	40,38833	*48*
Hungary	29,39006	50,94584	40,16795	*49*
Thailand	35,09526	45,17849	40,13688	*50*
Chile	33,31503	46,88543	40,10023	*51*
Uruguay	31,53545	45,224	38,37973	*52*
Serbia, Rep. of	29,24172	47,03693	38,13932	*53*
Trinidad and Tobago	24,04301	50,82367	37,43334	*54*
Mauritius	24,91252	49,31447	37,11349	*55*
Namibia	23,61235	49,55908	36,58572	*56*
Kazakhstan, Rep. of	29,14707	39,85944	34,50325	*57*
Bosnia and Herzegovina	29,51546	38,72994	34,1227	*58*
Saudi Arabia	21,41562	45,71987	33,56775	*59*
Romania	31,81161	35,20941	33,51051	*60*
Bolivia	36,95415	29,81228	33,38321	*61*
Ukraine	25,31498	40,72231	33,01864	*62*
Maldives	14,83761	51,17629	33,00695	*63*
South Africa	25,71713	40,10346	32,91029	*64*
Armenia, Rep. of	30,87977	33,85244	32,3661	*65*
Peru	33,17055	26,63834	29,90445	*66*
Panama	30,12047	26,5297	28,32508	*67*
Dominican Rep.	20,41582	35,0086	27,71221	*68*
India	25,54209	28,52065	27,03137	*69*
Ecuador	25,15229	28,22344	26,68786	*70*
Argentina	24,60692	28,56069	26,5838	*71*
Colombia	24,04783	28,59863	26,32323	*72*
Moldova, Rep. of	26,11482	26,43895	26,27689	*73*
Guatemala	26,94581	25,10136	26,02359	*74*
Kenya	10,5114	41,02799	25,7697	*75*
Lebanon	21,28321	29,00262	25,14292	*76*
Indonesia	23,32449	26,91655	25,12052	*77*
Botswana	20,30423	29,58352	24,94387	*78*
Albania	21,22802	25,64403	23,43602	*79*
Honduras	17,97665	28,44296	23,2098	*80*
Kosovo, Rep. of	17,09922	28,37174	22,73548	*81*
Mexico	22,91123	21,2022	22,05671	*82*
Uzbekistan, Rep. of	21,70462	21,07412	21,38937	*83*
Tunisia	15,78719	25,61851	20,70285	*84*
Bangladesh	20,56071	20,52497	20,54284	*85*
Tajikistan, Rep. of	7,128293	33,30697	20,21763	*86*
Jordan	14,77009	24,82049	19,79529	*87*
El Salvador	18,88914	20,21423	19,55168	*88*
Kyrgyz Rep.	16,56643	22,42771	19,49707	*89*
Libya	8,983663	28,68005	18,83185	*90*
Paraguay	17,4451	20,15114	18,79812	*91*
Ghana	8,597808	27,70078	18,14929	*92*

Zimbabwe	13,13942	22,52757	17,8335	*93*
Morocco	21,10776	13,97298	17,54037	*94*
Azerbaijan, Rep. of	16,96888	17,3413	17,15509	*95*
Nicaragua	15,14944	17,69991	16,42467	*96*
Nepal	14,91164	17,73765	16,32465	*97*
Rwanda	11,8936	20,49448	16,19404	*98*
Algeria	9,725369	22,49914	16,11226	*99*
Philippines	14,29938	17,45846	15,87892	*100*
Nigeria	6,764821	24,3108	15,53781	*101*
Zambia	5,846012	24,88521	15,36561	*102*
West Bank and Gaza	15,09231	13,18396	14,13813	*103*
Mozambique, Rep. of	6,753113	21,18695	13,97003	*104*
Togo	9,13156	18,36983	13,75069	*105*
Benin	7,35951	19,29727	13,32839	*106*
Uganda	3,314171	23,31908	13,31662	*107*
Lesotho, Kingdom of	6,37317	20,02054	13,19686	*108*
Gambia, The	10,25715	16,11279	13,18497	*109*
Vietnam	5,807505	20,11812	12,96281	*110*
Cambodia	12,74318	12,89557	12,81937	*111*
Egypt, Arab Rep. of	9,040163	15,86238	12,45127	*112*
Senegal	9,18048	15,68703	12,43376	*113*
Burkina Faso	5,448301	18,59216	12,02023	*114*
Cameroon	7,355638	16,26016	11,8079	*115*
Mauritania, Islamic Rep. of	9,539543	13,8354	11,68747	*116*
Lao People's Dem. Rep.	7,303998	13,64646	10,47523	*117*
Mali	7,015805	13,12857	10,07219	*118*
Liberia	3,943191	14,95106	9,447125	*119*
Pakistan	7,628803	10,73197	9,180387	*120*
Côte d'Ivoire	5,515435	12,71669	9,116064	*121*
Malawi	3,190521	14,29041	8,740467	*122*
Guinea	4,125101	10,29839	7,211748	*123*
Congo, Rep. of	3,545002	10,87794	7,211472	*124*
Myanmar	4,080665	10,04549	7,063078	*125*
Iraq	5,016518	8,743053	6,879786	*126*
Congo, Dem. Rep. of the	0,800481	10,05707	5,428777	*127*
Madagascar, Rep. of	4,186316	4,748676	4,467496	*128*
Central African Rep.	0,583992	8,183111	4,383552	*129*
Niger	2,279642	6,114858	4,19725	*130*
Chad	0,544753	7,370029	3,957392	*131*
Bhutan	19.68936	*NA*	*NA*	*NA*
Angola	7.080244	*NA*	*NA*	*NA*
Iceland	65.14217	*NA*	*NA*	*NA*
Haiti	3.490252	*NA*	*NA*	*NA*
Belize	20.2839	*NA*	*NA*	*NA*
Jamaica	20.49509	*NA*	*NA*	*NA*
Sudan	3.816394	*NA*	*NA*	*NA*

Full country rankings by MIFI for 2021:

Country	SFII	DFII	MIFI	Rank
South Korea	81,82307	88,10338	84,96323	1
Canada	71,92222	90,03015	80,97618	2
Austria	65,65604	88,5554	77,10572	3
Iceland	57,69768	93,23293	75,4653	4
Norway	57,97467	92,63494	75,30481	5
Australia	53,14647	88,61504	70,88075	6
France	56,79976	83,09114	69,94545	7
Japan	53,311	84,37936	68,84518	8
Israel	50,81033	83,89886	67,35459	9
Germany	44,31864	87,07829	65,69846	10
Portugal	58,99447	72,19249	65,59348	11
Italy	50,20007	80,9185	65,55928	12
Switzerland	44,95573	85,04478	65,00025	13
Spain	51,42994	78,15874	64,79434	14
Ireland	43,38235	85,63567	64,50901	15
Belgium	44,32613	84,1063	64,21622	16
China	60,52077	63,41825	61,96951	17
Sweden	33,23173	89,64347	61,4376	18
Finland	33,57949	87,83164	60,70557	19
New Zealand	30,53371	88,55263	59,54317	20
Denmark	30,20456	87,99378	59,09917	21
Uruguay	65,52737	51,55827	58,54282	22
Mongolia	48,52028	68,44125	58,48076	23
Russian Federation	56,72855	59,80849	58,26852	24
Poland, Rep. of	42,93519	73,2414	58,08829	25
Estonia, Rep. of	32,78609	82,75364	57,76987	26
Slovenia, Rep. of	36,91573	77,93349	57,42461	27
Brazil	55,61271	57,59379	56,60325	28
China, P.R.: Hong Kong	31,10213	81,40891	56,25552	29
Slovak Rep.	29,75869	79,3904	54,57455	30
Singapore	31,2956	77,21012	54,25286	31
Croatia, Rep. of	41,17889	64,50128	52,84009	32
Czech Rep.	26,94774	78,55227	52,75	33
Greece	34,56449	67,22682	50,89565	34
Malta	29,57892	72,20591	50,89241	35
Netherlands, The	19,11604	82,3713	50,74367	36
Bulgaria	46,45571	54,79227	50,62399	37
Thailand	34,16039	64,20796	49,18418	38
Kazakhstan, Rep. of	44,91137	52,90771	48,90954	39
Iran, Islamic Rep. of	39,17698	56,86715	48,02206	40
Latvia	22,00233	73,23379	47,61806	41
Georgia	51,60411	43,08382	47,34397	42
Chile	32,19698	59,85675	46,02687	43
Cyprus	28,88543	62,00009	45,44276	44
Türkiye, Rep of	42,67683	47,3863	45,03156	45

Hungary	26,94912	62,04636	44,49774	*46*
Lithuania	20,59904	67,15968	43,87936	*47*
Serbia, Rep. of	30,9849	56,37238	43,67864	*48*
Malaysia	26,99552	59,66991	43,33271	*49*
North Macedonia, Republic of	31,03175	55,51271	43,27223	*50*
Bolivia	42,75829	39,81552	41,28691	*51*
Costa Rica	39,06072	43,26516	41,16294	*52*
Ukraine	26,60875	55,16232	40,88554	*53*
Bosnia and Herzegovina	30,09978	49,15093	39,62535	*54*
Moldova, Rep. of	39,22434	39,51459	39,36946	*55*
Saudi Arabia	20,40956	58,23022	39,31989	*56*
Mauritius	23,46099	52,93718	38,19909	*57*
South Africa	20,46793	54,85094	37,65944	*58*
Namibia	27,50448	47,30011	37,4023	*59*
Peru	36,97775	37,28581	37,13178	*60*
Romania	30,00737	43,11624	36,56181	*61*
Ecuador	33,44786	36,94585	35,19686	*62*
Argentina	27,55462	42,32713	34,94088	*63*
Armenia, Rep. of	35,45682	34,38773	34,92227	*64*
United Arab Emirates	20,92547	42,41266	31,66907	*65*
Jamaica	22,20775	39,57442	30,89109	*66*
Panama	29,60526	29,62962	29,61744	*67*
Uzbekistan, Rep. of	33,20073	26,02047	29,6106	*68*
Colombia	23,35695	35,75353	29,55524	*69*
India	26,82123	29,43687	28,12905	*70*
Indonesia	25,48286	26,23452	25,85869	*71*
Kenya	12,28723	39,386	25,83662	*72*
Albania	23,1456	28,00653	25,57607	*73*
Nepal	27,57844	23,30617	25,4423	*74*
Kosovo, Rep. of	17,00933	32,79335	24,90134	*75*
Dominican Rep.	19,15764	30,55787	24,85775	*76*
Philippines	15,6539	30,57846	23,11618	*77*
Bangladesh	22,57846	22,38701	22,48273	*78*
Kyrgyz Rep.	20,31662	24,32708	22,32185	*79*
Morocco	21,72435	19,9502	20,83727	*80*
Cambodia	18,00128	22,79811	20,39969	*81*
Honduras	16,60538	22,63439	19,61988	*82*
Ghana	10,24063	28,55979	19,40021	*83*
Jordan	15,13232	23,5481	19,34021	*84*
Tunisia	17,05374	21,17365	19,1137	*85*
Paraguay	16,6058	20,89426	18,75003	*86*
Algeria	9,8618	26,84247	18,35213	*87*
El Salvador	17,03895	18,95806	17,99851	*88*
Mozambique, Rep. of	8,073066	26,41458	17,24382	*89*
Zimbabwe	10,34277	22,50038	16,42157	*90*
Nigeria	7,263573	25,19975	16,23166	*91*
Tajikistan, Rep. of	10,02969	22,11441	16,07205	*92*

West Bank and Gaza	16,83149	15,15009	15,99079	93
Uganda	3,925619	27,99018	15,9579	94
Senegal	8,059701	21,23571	14,64771	95
Nicaragua	13,48341	14,71278	14,0981	96
Lao People's Dem. Rep.	9,469475	18,01319	13,74133	97
Lebanon	17,71365	9,581495	13,64757	98
Mali	6,136985	20,62999	13,38349	99
Togo	9,141808	17,61383	13,37782	100
Cameroon	7,252714	19,26707	13,25989	101
Myanmar	9,006085	17,444	13,22504	102
Liberia	4,777361	21,24634	13,01185	103
Egypt, Arab Rep. of	13,21295	11,97736	12,59515	104
Zambia	4,96543	19,77988	12,37266	105
Guinea	13,53801	11,18969	12,36385	106
Benin	7,002201	17,21698	12,10959	107
Côte d'Ivoire	5,366792	15,94994	10,65837	108
Burkina Faso	5,09389	14,73873	9,91631	109
Congo, Rep. of	3,855561	14,1289	8,992231	110
Malawi	3,394259	14,51406	8,954159	111
Pakistan	8,515649	8,687281	8,601465	112
Iraq	6,35512	7,58857	6,971845	113
Sudan	5.433213	*NA*	*NA*	*NA*
Angola	6.59328	*NA*	*NA*	*NA*
Lesotho, Kingdom of	12.63165	*NA*	*NA*	*NA*
Gambia, The	10.07141	*NA*	*NA*	*NA*
Mauritania, Islamic Rep. of	11.13618	*NA*	*NA*	*NA*
Kuwait	32.13617	*NA*	*NA*	*NA*
Mexico	24.16692	*NA*	*NA*	*NA*
Madagascar, Rep. of	3.971557	*NA*	*NA*	*NA*
Guatemala	22.73188	*NA*	*NA*	*NA*
Chad	.6666635	*NA*	*NA*	*NA*
Azerbaijan, Rep. of	21.65125	*NA*	*NA*	*NA*
Congo, Dem. Rep. of the	.7485131	*NA*	*NA*	*NA*
Bhutan	23.68695	*NA*	*NA*	*NA*
Trinidad and Tobago	23.98849	*NA*	*NA*	*NA*
Montenegro	35.28057	*NA*	*NA*	*NA*
Maldives	18.31851	*NA*	*NA*	*NA*
Niger	2.205984	*NA*	*NA*	*NA*
Belize	25.46859	*NA*	*NA*	*NA*
Haiti	2.400741	*NA*	*NA*	*NA*
Botswana	26.7988	*NA*	*NA*	*NA*
Libya	8.481771	*NA*	*NA*	*NA*
Central African Rep.	.5839924	*NA*	*NA*	*NA*
Rwanda	11.91922	*NA*	*NA*	*NA*
Luxembourg	69.92066	*NA*	*NA*	*NA*
Vietnam	6.089145	*NA*	*NA*	*NA*

Appendix E

Boxplot of SFII and DFII by Year

Source: Author's calculations based on IMF FAS and the Global Findex databases