

## The necessity of financial inclusion for enhancing the economic impacts of remittances

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### Abstract

International remittances by immigrants to their home countries is key in the funding development in migrant-sending countries. This study investigates the combined impact of international remittance inflows and financial inclusion on economic growth using a sample of 60 low- and middle-income countries over 1996–2017. The study constructs a composite financial inclusion index using principal component analysis. The results show that financial inclusion could strengthen the growth-enhancing effect of remittances. Thus, the study helps explain the development dilemma of remittance inflows and financial inclusion in migrant-sending countries to boost their economic growth.

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### 1. Introduction and background

The international remittances by immigrants to their home countries are one of the key sources of funding development in migrant-sending countries (Yoshino et al., 2020a). Recently, remittances have been recognized as a potential source of funding for the newly proposed sustainable development goals (SDGs) introduced by the United Nations. Therefore, academics and policymakers have prioritized these international

money flows as they could be important development financing sources.

With foreign direct investment (FDI) on a downward trend in recent years, remittances reached close to the level of foreign direct investment (FDI) flows. Remittances to low- and middle-income countries (LMICs) reached a record high of \$548 billion in 2019, larger than foreign direct investment (FDI) flows (\$534 billion) and overseas development assistance (about \$166 billion). This makes remittances the largest source of foreign exchange earnings in the LMICs, excluding China (World Bank, 2020; Ratha et al., 2020). However, in the wake of the COVID-19 pandemic, remittances shrunk drastically, endangering poverty reduction plans in migrant-sending economies and prolonging the achievement of the SDG1 (no poverty) of the United Nations (Karim et al., 2020; Yoshino et al., 2020b). The World Bank estimated that as the

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COVID-19 pandemic and economic crisis continues spreading, the remittance flows to LMIC were projected to decline by 7.2% to \$508 billion in 2020, followed by a further decline of 7.5% to \$470 billion in 2021. The projected declines in remittances were the steepest in recent history and were steeper than the 5% decline recorded during the 2009 global recession (World Bank, 2020). The gap between remittance and FDI flows is expected to widen further in 2020 as FDI flows decline more sharply than remittances (Ratha et al., 2020).

Regarding the determinants of international remittance inflows, Lucas and Stark (1985) and Azizi (2017; 2019a) suggest that altruism and self-interest are likely candidates. Whatever the reason for remittances, it has significant impacts on poverty reduction and economic growth in migrant-sending countries (Acosta et al., 2008; Aggarwal et al., 2011; Akobeng, 2016; Azizi, 2019b; Sobiech, 2019; Yoshino et al., 2018; 2019). However, methods for increasing the economic impacts of remittances need further discussion.

The growth-enhancing impact of remittances seems to be both direct and indirect. Mundaca (2009) provides a theoretical framework showing that remittances can significantly contribute to economic growth. According to his study, households receive remittances (in addition to labor income) and deposit them in financial intermediaries. These intermediaries can allocate these transfers into efficient projects and thus have implications for real rates of growth. This work has inspired several subsequent empirical studies (e.g., Giuliano & Ruiz-Arranz, 2009; Barajas et al., 2013; Bettin & Zazzaro 2012; Nyamongo et al., 2012) to evaluate the impact of remittances and financial development on growth. Giuliano and Ruiz-Arranz (2009) and Barajas et al. (2013) argue that remittances and the financial sector can be substitutes and that financial development tends to diminish the overall growth-pushing effect of remittances. Meanwhile, Nyamongo et al. (2012) reports a complementary effect. Thus, financial deepening seems to strengthen the positive effect of remittances on growth. The differences in the empirical studies can be explained by the different empirical methodologies used, the diversity of countries studied, and measures of financial development adopted.

This study aims to empirically assess the combined impact of international remittance inflows and financial inclusion on economic growth using data from 60 low-and middle-income countries during 1996–2017. This study aims to test whether financial inclusion could enhance the remittance inflow's impact on these countries' economic growth. In the empirical analysis section, we also evaluate how these effects may vary in different financial inclusion quintiles.

Furthermore, access to financial services is not synonymous with the use of financial services. Indeed, several economic agents who enjoy access to formal financial services might choose not to use them because of geographic and sociocultural reasons or high opportunity costs (Beck et al., 2007). Thus, additional and excessive provisions of financial infrastructure (i.e., bank branches and ATMs) in response to national financial inclusion schemes may waste resources. Essentially, the availability of financial infrastructure does not necessarily guarantee

economic growth. In contrast, the actual use of financial services could indeed be used. Therefore, carefully distinguishing between these two concepts when evaluating the aggregate impact of financial inclusion is essential.

A composite index of financial inclusion constructed from different financial indicators has been widely used in the literature (e.g., Beck et al., 2007; Sarma, 2008; Sarma & Pais, 2011; Wang & Guan, 2017). The financial inclusion indicators used in the literature vary, such as the number of bank branches, automated teller machines (ATMs), depositors, and lenders. However, these indicators have high correlation, and the financial inclusion index of this study is unique in that it uses the principal component analysis (PCA) technique wherein the correlation and redundant information are eliminated. In addition, for the robustness check, we also retest the investigated linkages using different single variables of financial inclusion (i.e., liquid liabilities to GDP, life insurance premium volume to GDP, nonlife insurance premium volume to GDP, and financial system deposits to GDP). The construction of the financial inclusion index will be discussed in greater detail in Section 4.

Our study contributes to extant literature on remittance, finance, and economic growth in several ways. First and foremost, we develop an empirical model combining the effects of two on-debating economic indicators (i.e., remittances and financial inclusion) on growth. As governments around the world are focused on improving financial inclusion in their country, this study can be interesting for policymakers in remittances-receiving countries. In particular, for less-developed economies, this study answers the following question: Once the financial inclusion is enhanced, what is the impact of remittances on growth?

Second, the empirical part of this paper is built on Nyamongo et al. (2012) and Sobiech (2019) and expands these studies in several ways. In their research, Nyamongo et al. (2012) depend on two variables: the ratio of credit to the private sector to GDP (DC) and broad money to GDP (M2). Although these two ratios could provide information on the depth and size of financial systems, they are criticized for underestimating the contribution of foreign funds (M2) (Le et al., 2019) and focusing solely on claims in the private sector (Beck et al., 2000). Thus, we extend the study by Nyamongo et al. (2012) by adopting a composite index constructed from different financial indicators. The relevance of the composite index is discussed earlier. Besides, our study is relatively close to that of Sobiech (2019), but it addresses different financial phenomena. While Sobiech (2019) provides evidence on the impact of overall financial development, we focus on the effect of inclusiveness on a financial system. Financial inclusion naturally refers to a status where an increasing number of excluded populations in a country can access and use formal financial services. Therefore, it reflects not only financial development but also financial literacy (Yoshino et al., 2017). Thus, financial inclusion could provide information on the development of the financial system and human capital.

Furthermore, a large and comprehensive financial system does not guarantee higher level of access and use of local citizens' financial services. Thus, as discussed earlier,

financial inclusion also strengthens the positive impact of remittances on growth. To this end, the empirical part of our study can provide a good complement for findings from Sobiech (2019).

The remainder of this paper is structured as follows. Section 2 reviews the related literature. Section 3 reports and discusses the empirical analysis. Section 4 concludes the paper.

## 2. Literature review

Given the surge in value and importance of remittances, many studies have aimed to examine the developmental impacts of remittances' on receiving countries. Studies focusing on this nexus, albeit limited in number, have somewhat mixed outcomes. Senbeta (2013) found that remittances significantly impact capital accumulation, while the impact on total factor productivity (TFP) growth is insignificant. These findings suggest that while remittances enhance investment and contribute to physical capital accumulation, the lack of an efficiency-enhancing effect or possible adverse impact on TFP growth would make the net effect on economic growth ambiguous. Rao and Hassan (2012) demonstrate that these transfers could affect GDP per capita in different channels: investment, financial development, productivity, and output volatility. However, on an aggregate level, these effects can be canceled out. Yoshino et al. (2019) find that international remittances significantly reduce the poverty gap and poverty severity ratio. In the sample of 10 Asian developing countries, a 1% increase in international remittances as a percentage of GDP leads to a 22.6% decline in the poverty gap ratio and a 16.0% decline in the poverty severity ratio. Besides, Clemens and McKenzie (2014) further explain that the recorded high volume of remittances during the last 2 decades is a result of the changes in this transfer's definition rather than its actual increase. Azizi (2020) documents a positive impact of remittances on financial development in developing countries. This is particularly important as financial development fosters long-run growth and reduces poverty.

Moreover, growing concerns that an increase in the inflows of remittances can lead to the deterioration of institutional quality (Abdih et al., 2012), exacerbation of corruption (Berdiev et al., 2013), fuel inflation (Ball et al., 2013), and reduction of labor force participation as receiving households may choose to live on migrants' transfers instead of working (Cox Edward & Oreggia, 2009).

In contrast, another strand of literature (i.e., Acosta et al., 2008; Aggarwal et al., 2011, Azizi, 2019b; Sobiech, 2019) has generally supported the view that remittances are catalysts for economic growth, mostly through indirect channels. They explain that remittances can lower poverty and inequality (Acosta et al., 2008; Akobeng, 2016; Yoshino et al., 2019), push financial development (Aggarwal et al., 2011; Brown et al., 2013), improve productivity (Azizi, 2018), and encourage investment (Le, 2011), which eventually contributes to growth. Among the above studies, Azizi (2019b) investigates the impacts of workers' remittances on poverty and inequality by using data for 103 developing countries from

1990 to 2014. They find that a 10% increase in per capita remittances leads to a 1% decrease in poverty headcount, 1.8% decrease in poverty gap, and 2.5% decrease in poverty headcount. Several studies have assessed the impact of remittances on human capital development. Azizi (2018) finds that remittances raise health expenditures and reduce malnutrition and child mortality rates. Remittances increase enrollment in all schools and school completion rate.

Interestingly, several studies (Benmamoun & Lehnert, 2013; Giuliano & Ruiz-Arranz, 2009; Ramirez, 2013; Sobiech, 2019) show that impact of remittances on economic growth depend on the level of financial development. Specifically, Giuliano and Ruiz-Arranz (2009), Barajas et al. (2013), Sobiech (2019), and Le et al. (2019) argue that remittance inflows could significantly benefit the development in developing countries where a financial market is not yet developed. They further argue that between migrants' transfers and the financial sector has a substitute effect, as evidenced by a negative sign on the interaction term between these two variables. According to them, when a financial system is well-developed, credit constraints are removed and migrants' money is not necessarily used efficiently. However, in countries with a less-developed financial system and greater credit constraints, remittances could act as important sources of financing for growth-enhancing activities.

Similarly, Bettin & Zazzaro (2012) also report a negative coefficient on the combined effect of remittances and the financial sector, but they explain that the negative sign does not mean they are substitutes. In this case, growing remittances increase bank deposits and available credit, but loans are not necessarily granted efficiently. Moreover, they assume that this negative coefficient may capture the nonlinear effect of financial development on growth, since interaction between remittances and financial indicators can also be interpreted as the marginal effect of the latter.

In contrast, Nyamongo et al. (2012) provide evidence of opposite findings by reporting a positive sign of the coefficient on the interaction term between remittances and financial depth. According to them, a more comprehensive financial system helps strengthen the growth-enhancing impact of remittances since migrants' transfers can be deposited in banks and effectively allocated. Simultaneously, a large share of the population is connected with financial institutions, expanding the availability of credit and savings products (Aggarwal et al., 2011). Benmamoun and Lehnert (2013), while comparing the effects of ODA, FDI, and international remittances on receiving countries, conclude that remittance inflow is a great contributor of economic growth, especially in countries with lower income levels.

To date, literature on financial development has focused on measuring and assessing the impact of financial size (i.e., Nyamongo et al., 2012), financial depth (i.e., Giuliano & Ruiz-Arranz, 2009), financial efficiency (i.e., Bettin & Zazzaro, 2012), or a combination of these indicators (i.e., Sobiech, 2019) in materializing the developmental effect of remittances. However, a large or comprehensive financial system does not necessarily coincide with easy access and actual use

of financial services by financial market participants (Turegano & Herrero, 2018). The financial reforms of the 1980s and the 1990s that occurred in most of the world contributed to improvement in financial depth (Arun & Kamath, 2015). However, the degree of access to and use of formal financial services remains low. While some countries (i.e., Russia or China) have a comparatively developed financial system, but they remain to be reported as low in financial inclusion (Wang & Guan, 2017). In particular, in the developing world, almost 40% of adults are financially excluded and struggle with their financial problems because of the unavailability of financial services (Demirguc-Kunt et al., 2020). Financial market imperfections, such as informational asymmetries and transaction costs, due to lack of connections, collateral, and credit histories, hinder poor households and small and medium enterprises (SMEs) from accessing and using formal financial services (Beck et al., 2007). Consequently, credit constraints make financing difficult, reducing the efficiency of resource allocation and adversely impact economic growth (Galor & Zeira, 1993). Therefore, expanding the reach of financial services to the largest part of the population is necessary for socioeconomic development (Beck et al., 2007).

Being aware of the importance of an inclusive financial system, we argue that financial inclusion is instrumental in strengthening the positive impact of remittances on growth. First, when people have access to banking services, parking their money in the form of remittances in formal financial institutions instead of consuming or investing in unproductive assets is beneficial for them (Mehrotra et al., 2009). The global economy could be fueled with additional savings of up to \$157 billion if “unbanked” remittance-receiving households save through microfinance programs (Allan et al., 2013). Banks, in turn, could alleviate these transfers into borrowing agents with investment needs. This translates into high economic growth through the multiplier effect and increase in per capita GDP

(Ghosh, 2011). Second, financial inclusion allows remittance recipients to eliminate or reduce the need for self-financing of investments and enjoy lower lending interests. Receiving households choose to deposit their money in and maintain regular contact with banks, or other financial institutions, which could lower risks of asymmetric information and adverse selection perceived by banks (Roa, 2015). This encourages these lenders to enhance the creditworthiness of their clients and lend out with more favorable lending rates (Orozco & Fedewa, 2006). Apart from this broad access and use, each remittance receiver must self-insure against unpredictable liquidity needs and even liquidate their projects in case an adverse liquidity shock occurs. The larger the number of self-financed projects, the more detrimental these premature liquidations may be imposed on the economy (Mundaca, 2009).

### 3. Empirical analysis

#### 3.1. Data and sample

Our panel dataset covers 60 low-and middle-income countries around the world. The data spans from 1996 to 2017. All of the variables, unless otherwise stated, are collected from the World Development Indicators database provided by the World Bank. Description of all variables is provided in Table 1. For countries in our samples, see the Supplementary Material (Table S1).

##### 3.1.1. Measuring financial inclusion

In this study, we follow Sarma (2008) and construct an index of financial inclusion (FII), including three constructs: accessibility, availability, and banking services usage. However, in Sarma’s (2008) construct, accessibility is measured via penetration of banking proxied by the number of bank accounts per 1000 people. An essential drawback of this indicator is that it is inclined to overestimate the “banked”

Table 1  
Variable definitions.

Variables	Variable definitions	Sources
<i>LnGDPPC</i>	5-year moving average of real GDP per capita, PPP (current international \$) in natural logarithm	World Bank (WDI)
<i>REMITTANCE</i>	Personal remittances received to GDP (%)	
<i>FII</i>	Financial Inclusion Index constructed from 4 following financial indicators (using PCA technique): - Number of commercial bank branches per 100,000 adults - Number of automated teller machines (ATMs) per 100,000 adults - Number of depositors from commercial banks per 1000 adults - Number of borrowers from commercial banks per 1000 adults	World Bank (WDI) World Bank (WDI) World Bank (WDI) World Bank (WDI)
<i>LLGDP</i>	Liquid liabilities to GDP (%)	World Bank (FDSD)
<i>INSLIFE</i>	Life insurance premium volume to GDP (%)	World Bank (FDSD)
<i>INNONLIFE</i>	Non-life insurance premium volume to GDP (%)	World Bank (FDSD)
<i>FDGDP</i>	Financial system deposits to GDP (%)	World Bank (FDSD)
<i>INFLATION</i>	Consumer Price Index (annual %)	World Bank (WDI)
<i>TRADE</i>	Trade Imports plus Exports in commodities (% of GDP)	World Bank (WDI)
<i>PRIENROL</i>	School enrollment for primary education (%)	World Bank (WDI)
<i>ELECTRICITY</i>	The percentage of population with access to electricity (%)	World Bank (WDI)
<i>UNEMPLOYMENT</i>	Share of unemployed labor force to total labor force (%)	World Bank (WDI)
<i>GOV_EXPENDITURE</i>	General government final consumption expenditure as a share to GDP (%)	World Bank (WDI)
<i>IQ</i>	Institutional quality, constructed by simple averaging of 6 World Bank Governance Indicators	World Bank (GI)

WDI: World Bank Development Indicators; WGI: World Governance Indicators.



population because one person may own multiple bank accounts. Instead, the number of persons having a bank account would be more appropriate and accurate. Unfortunately, data on this figure is unavailable for several countries over long enough periods and are inaccessible to us. Furthermore, in [Sarma \(2008\)](#), the dimension “accessibility” is similar to “availability,” which possibly results in multicollinearity in the calculations. Thus, in our study, we create a financial inclusion index from two constructs: availability and usage. Since commercial banks lead role in providing financial services, we mostly depend on the penetration of the banking system for our calculations.

Availability measures financial services outreach and is proxied by two indicators: the number of commercial bank branches per 100,000 adults, and the number of ATMs per 100,000 adults. The usage dimension reflects the regularity and frequency with which customers use financial services. Consistent with the literature, we examine two key banking services: savings and borrowings. The two proxies used for this are the number of depositors from commercial banks per 1000 adults and the number of borrowers from commercial banks per 1000 adults.

We then create a composite financial inclusion index (FII) using the PCA technique, which is widely used in the literature (i.e., [Ozkok, 2015](#); [Le et al., 2017](#); [Le et al., 2019](#)). PCA is a simple and effective method that reduces the dataset to lower dimensions while retaining as much information from the original set as possible. It also helps mitigate the multicollinearity problem in modeling.

The FII's formulated using principal component analysis ([Guihuan & Yu, 2014](#)) is as follows.

$$FII_t = \sum_i w_i F_{it},$$

where  $F_{it}$  is the principal component  $i$ 's value at time  $t$  and  $w_i$  is the principal component  $i$ 's weight.

[Table 2](#) provides information on the PCA technique for the financial inclusion index. In this analysis, we use the first component criterion to decide how many components to retain. The component with an eigenvalue higher than 1 is selected.

The eigenvalues in [Table 2](#) indicate that the first principal component significantly measures financial inclusion. Thus, only information related to the first component is considered for forming a composite indicator. [Table 3](#) shows the loadings of each variable on component 1.

The financial inclusion index (FII) is obtained by averaging the component finance indicators corresponding to the factor score coefficient.

### 3.1.2. Measuring remittance inflow

Remittances (*REMITTANCE*) in this study refers to the ratio of personal remittances received to GDP. Personal remittances comprise personal current and capital transfers between resident and nonresident households and employee compensation after tax. These data are most popular in

Table 2  
Principal component analysis for Financial Inclusion Index (1996–2017).

Principal Component	Eigenvalue	Cumulative (%)
Component 1	1.9977	0.4994
Component 2	0.9565	0.7385
Component 3	0.5700	0.8810
Component 4	0.4760	1.0000

Note: Extraction method: Principal component analysis (PCA).  
Source: Authors' calculation.

Table 3  
Components score coefficient matrix (1996–2017).

Variables	Component 1 (factor score coefficient)
Number of automated tell machines (ATMs) per 100,000 adults	0.5272
Number of commercial bank branches per 100,000 adults	0.4966
Number of depositors from commercial banks per 1000 adults	0.4948
Number of borrowers from commercial banks per 1000 adults	0.4803

Note: Extraction method: Principal component analysis (PCA).  
Source: Authors' calculation.

literature on remittances-growth (i.e., [Nyamongo et al., 2012](#); [Sobiech, 2019](#)). Thus, they are used in our paper.

### 3.1.3. Measuring economic growth

Consistent with literature on development economics (i.e., [Guiliano & Ruiz-Arranz, 2009](#); [Sobiech, 2019](#)), in this study, economic growth is measured via a 5-year moving average of real GDP per capita and PPP (current international US dollars) and is expressed in logarithmic form ( $\ln GDPPC$ ).<sup>1</sup> This indicator is more preferred to proxy for growth than GDP because of its more stationary nature. Therefore, they are more popular in the literature.

### 3.1.4. Other control variables

Following [Sobiech \(2019\)](#), we incorporate a set of control variables that may influence our investigated nexuses. They are inflation (INFLATION), infrastructure (ELECTRICITY), trade openness (TRADE), human capital (PRIENROL), unemployment (UNEMPLOYMENT), government expenditure (GOV\_EXPENDITURE), and institutional quality (IQ). Descriptive statistics for our main variables are reported in the [Supplementary Material \(Table S2\)](#). A correlation matrix is provided in the [Supplementary Material \(Table S3\)](#).

## 3.2. Methodology

In this paper, we hypothesize that financial inclusion can strengthen the growth-boosting effect of remittances. To investigate this relationship, we employ OLS regressions with

<sup>1</sup> We use a 5-year moving average data to control for business cycles fluctuations.

Table 4  
Remittances, Financial inclusion and GDP – fixed effects.

	Dependent variable: <i>LnGDPPC</i>		
	Interacted with FII	Interacted with AVAILABILITY	Interacted with USAGE
	(1)	(2)	(3)
<i>REMITTANCE</i> <sub><i>t-1</i></sub>	-0.00 (0.00)	0.01 (0.01)	-0.02* (0.01)
<i>FII</i> <sub><i>t-1</i></sub>	0.00 (0.03)		
<i>REMITTANCE</i> * <i>FII</i> <sub><i>t-1</i></sub>	0.00 (0.00)		
<i>AVAILABILITY</i> <sub><i>t-1</i></sub>		-0.00 (0.02)	
<i>REMITTANCE</i> * <i>AVAILABILITY</i> <sub><i>t-1</i></sub>		-0.00 (0.00)	
<i>USAGE</i> <sub><i>t-1</i></sub>			0.01 (0.02)
<i>REMITTANCE</i> * <i>USAGE</i> <sub><i>t-1</i></sub>			0.00** (0.00)
<i>IQ</i> <sub><i>t-1</i></sub>	0.29*** (0.06)	0.30*** (0.06)	0.28*** (0.05)
<i>ELECTRICITY</i> <sub><i>t-1</i></sub>	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
<i>PRIENROL</i> <sub><i>t-1</i></sub>	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
<i>TRADE</i> <sub><i>t-1</i></sub>	0.00** (0.00)	0.00** (0.00)	0.00** (0.00)
<i>INFLATION</i> <sub><i>t-1</i></sub>	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
<i>UNEMPLOYMENT</i> <sub><i>t-1</i></sub>	0.01 (0.01)	0.01 (0.00)	0.00 (0.01)
<i>GOV_EXPENDITURE</i> <sub><i>t-1</i></sub>	-0.00* (0.00)	-0.00* (0.00)	-0.00** (0.00)
<i>CONSTANT</i>	7.85*** (0.28)	7.90*** (0.25)	7.77*** (0.28)
Country Fes	YES	YES	YES
Year Fes	YES	YES	YES
<i>No. of Obs.</i>	986	986	986
Adjusted R2	0.88	0.88	0.88

Note: Dependent variable is GDP per capita in logarithm form. FII, AVAILABILITY, USAGE mean financial inclusion index, access and usage. REMITTANCE\**FII*<sub>*t-1*</sub>, REMITTANCE\**AVAILABILITY*<sub>*t-1*</sub>, and REMITTANCE\**USAGE*<sub>*t-1*</sub> are interaction terms between remittance and financial inclusion index, access, and usage respectively. Column (1) reports the interacted effect of remittance and financial inclusion index on economic growth. Columns (2) and (3) show the interacted impact of remittance with two constructs of financial index - AVAILABILITY and USAGE - on economic growth. All explanatory variables are lagged. Clustered Robust Standard errors are in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

fixed effects. Following the existing literature on remittance-growth (i.e., Sobiech, 2019), we propose an economic model in a panel setting as follows:

$$\begin{aligned}
 Y_{it} = & \delta_0 + \delta_1 REMITTANCE_{i,t-1} + \delta_2 FII_{i,t-1} \\
 & + \delta_3 (REMITTANCE * FII)_{i,t-1} + \delta_4^j X_{i,t-1}^j \\
 & + \lambda_t + \rho_i + \varepsilon_{it},
 \end{aligned}
 \tag{1}$$

where  $Y_{it}$  is the measure of economic growth and proxied as the natural logarithm of real GDP per capita of country  $i$  in year  $t$  of the period from 1996 to 2017.  $REMITTANCE_{i,t-1}$  is the variable of main interest capturing country  $i$  in year  $t$ .  $(REMITTANCE * FII)_{i,t}$  is an interaction term between remittances and the financial inclusion index.  $X_{it}^j$  = set of control variables for country  $i$  in year  $t$ , including inflation (INFLATION), infrastructure (ELECTRICITY), trade openness (TRADE), human capital (PRIENROL), unemployment (UNEMPLOYMENT), government expenditure (GOV\_EXPENDITURE), and institutional quality (IQ).  $\lambda_t$  and  $\rho_i$  are time fixed effects and country-specific fixed effects, respectively, while  $\varepsilon_{it}$  is an error term of the standard type. All variables are 5-year moving averaged.

### 3.3. Empirical results

#### 3.3.1. Main regression results

Table 4 presents the estimation outcomes from our main regression model. The coefficient on the interaction term between remittances and financial inclusion ( $\delta_{3it}$ ) can be

interpreted as follows. Given the level of financial development, if the share of remittance inflows to GDP in country  $i$  at time  $t$  increases by 1 percentage point, real GDP per capita will change by  $100 * \delta_{3it} \%$ . Thus, a positive (negative) sign of the coefficient on the remittance-finance interaction term indicates that inclusive financial system can strengthen (diminish) the growth-enhancing impact of remittances. In addition, to gain more insight into two dimensions of financial inclusion, we also examine the interaction terms between remittance and changes in two constructs of financial inclusion index: availability<sup>2</sup> ( $REMITTANCE * \Delta AVAILABILITY$ ) and usage<sup>3</sup> ( $REMITTANCE * USAGE$ ) into the model specification (1). Columns (1), (2), and (3) report comparable estimates for Equation (1b), with financial inclusion, access, and usage as regressors, respectively.

The coefficient on the interaction terms of remittances with the financial inclusion index is positive, indicating that under a more financially inclusive financial system, the developmental benefits associated with remittances tend to increase. Furthermore, the coefficient on the interaction term between remittances and availability being insignificant reveals that the availability of financial products is not important for materializing the growth-enhancing impact of remittances. However,

<sup>2</sup> Availability is constructed by averaging the number of automated machines (ATMs) per 100,000 adults and the number of bank branches per 100,000 adults, following Sarma and Pais (2011).

<sup>3</sup> Usage is constructed by averaging the number of depositors from commercial banks per 1000 adults and the number of borrowers from commercial banks per 1000 adults, following Sarma and Pais (2011).

robustly positive signs on the interaction term between remittances and usage demonstrates that the actual usage of financial services by citizens in a country could enhance the positive effect of remittances on growth. Therefore, our results confirm our hypotheses and corroborate the findings of Nyamongo et al. (2012).

When we include the effects of financial inclusion quintiles and income levels, interesting findings, which are presented in Table 5, are revealed. First, we divide our full sample into four quintiles of financial inclusion and rerun specification (1). Given the opposing signs of the coefficient estimates for different levels of financial inclusion, countries in our sample clearly enjoy different growth effects of remittances. The impact of remittances on economic growth is positive and statistically significant for financial inclusion up to the 25th percentile (1st quintile) in the sample. The developmental impact of remittances deteriorates when countries reach the upper ladders of financial inclusion. Finally, countries with a relatively highly inclusive financial systems do not seem to benefit from remittance inflows, as evidenced by a robustly negative sign of the coefficient on the interaction term. These findings are as per those of Sobiech (2019) study. Second, to investigate the income level effect, we divide our sample into low- and middle-income subsample. Moreover, both groups of countries could enjoy the positive interaction effects of remittances and financial inclusion. However, the magnitude of the effect is statistically robust and stronger in the low-income group.

The positive marginal effect of remittances on economic growth for countries with low financial inclusion can imply that binding liquidity constraints exist in these countries. In a financial system that is not yet highly inclusive, provision of loans to lower-income households remains restricted and

insufficient. Remittances from migrants can help overcome these constraints. On the other end of the financial inclusion distribution, for countries with relatively well-functioning financial markets (i.e., Malaysia, China, and South Africa), access to capital for investment purposes from formal financial institutions is much easier. Thus, money received from overseas family members is not necessarily spent most productively to contribute to economic prosperity (Sobiech, 2019). In such countries, financial development and remittances can be considered substitutes as economic growth progresses.

Our findings imply that in middle- and low-income countries, policies for attracting more inward remittances and improving the inclusiveness of the local financial sector are efficient in fostering economic growth. However, these countries are better off avoiding excessive provisions of financial infrastructure as part of financial inclusiveness improvement policies, as this would bring them no benefits. Instead, schemes encouraging remittance-receiving households to use formal financial products, either savings or borrowings, are key to boosting economic growth. Interestingly, these effects do not always hold true for countries of every ladder of financial inclusion distributions. The lower their financial inclusion level, the more benefits they can enjoy from remittances. Thus, policymakers in these countries should closely monitor their financial inclusion level to have appropriate modifications in their national development schemes to achieve economic prosperity.

### 3.3.2. Robustness checks

To assess the robustness of the results obtained, we experiment on several alternative specifications. First, we use

Table 5  
Remittances, Financial inclusion and GDP: partial quintile and income level effects.

	Dependent variable: $LnGDPPC$					
	Partial quintile effects for financial inclusion				Income level effects	
	1st Quintile (1)	2nd Quintile (2)	3rd Quintile (3)	4th Quintile (4)	MICs (5)	LICs (6)
$REMITTANCE_{t-1}$	-0.01* (0.00)	0.03 (0.03)	0.02 (0.06)	0.24*** (0.07)	0.00 (0.01)	-0.02* (0.01)
$FII_{t-1}$	-0.04 (0.02)	-0.11 (0.09)	0.02 (0.11)	0.40*** (0.07)	0.02 (0.02)	-0.12 (0.08)
$REMITTANCE * FII_{t-1}$	0.00** (0.00)	-0.01 (0.01)	-0.00 (0.01)	-0.05*** (0.01)	0.00 (0.00)	0.00** (0.00)
$IQ_{t-1}$	0.24*** (0.07)	0.47*** (0.09)	0.31*** (0.10)	-0.05 (0.08)	0.28*** (0.07)	0.59*** (0.11)
$ELECTRICITY_{t-1}$	-0.00 (0.00)	0.00 (0.00)	0.01** (0.00)	-0.02*** (0.00)	0.00 (0.00)	-0.00 (0.01)
$PRIENROL_{t-1}$	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.01*** (0.00)
$TRADE_{t-1}$	-0.00 (0.00)	0.00** (0.00)	-0.00 (0.00)	0.01*** (0.00)	0.00* (0.00)	0.00 (0.00)
$INFLATION_{t-1}$	-0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.00* (0.00)	0.00 (0.00)	0.00 (0.01)
$UNEMPLOYMENT_{t-1}$	0.00 (0.00)	0.01 (0.02)	0.01* (0.01)	-0.00 (0.01)	0.00 (0.01)	0.01 (0.01)
$GOV\_EXPENDITURE_{t-1}$	-0.00*** (0.00)	-0.01	-0.00 (0.01)	0.01 (0.01)	-0.00 (0.00)	-0.01 (0.01)
CONSTANT	8.04*** (0.20)	8.40*** (0.57)	7.09*** (0.52)	6.51*** (0.501)	7.48*** (0.27)	9.52*** (0.77)
Country Fes	YES	YES	YES	YES	YES	YES
Year Fes	YES	YES	YES	YES	YES	YES
No. of Obs.	323	311	204	148	731	216
Adjusted R2	0.91	0.879	0.96	0.98	0.91	0.88

Note: Dependent variable is GDP per capita in logarithm form. FII means financial inclusion index. REMITTANCE\*FII is an interaction term between REMITTANCE and FII. Columns (1) to (4) report the estimation result for 1st, 2nd, 3rd and 4th quintile subgroups. Columns (5) and (6) show the estimation outcomes for Middle income and Low income countries respectively. All explanatory variables are lagged. Clustered Robust Standard errors are in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

Table 6  
Remittances, Financial inclusion and GDP — system GMM.

	Dependent variable: $LnGDPPC$		
	Interacted with FII	Interacted with AVAILABILITY	Interacted with USAGE
	(1)	(2)	(3)
$REMITTANCE_{t-1}$	-0.12* (0.06)	-0.09 (0.07)	-0.37* (0.21)
$FII_{t-1}$	-0.48** (0.19)		
$REMITTANCE*FII_{t-1}$	0.02 (0.01)		
$AVAILABILITY_{t-1}$		-0.35*** (0.13)	
$REMITTANCE*AVAILABILITY_{t-1}$		0.02 (0.01)	
$USAGE_{t-1}$			-0.74* (0.44)
$REMITTANCE*USAGE_{t-1}$			0.05* (0.03)
$IQ_{t-1}$	0.54* (0.30)	0.54*** (0.20)	0.77* (0.44)
$ELECTRICITY_{t-1}$	0.02*** (0.00)	0.02*** (0.00)	0.02*** (0.00)
$PRIENROL_{t-1}$	-0.00 (0.00)	0.00 (0.00)	-0.00 (0.01)
$TRADE_{t-1}$	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
$INFLATION_{t-1}$	-0.00 (0.00)	-0.00 (0.00)	0.01 (0.01)
$UNEMPLOYMENT_{t-1}$	-0.08** (0.03)	0.01 (0.01)	-0.12** (0.06)
$GOV\_EXPENDITURE_{t-1}$	0.06** (0.02)	-0.01 (0.01)	0.07** (0.03)
CONSTANT	8.62*** (1.41)	8.25*** (0.83)	12.85*** (4.18)
AR (1)	0.003	0.00	0.01
AR (2)	0.001	0.003	0.01
No. of Obs.	1054	1054	799
Hansen test p-value	0.32	0.02	0.46

Note: Dependent variable is GDP per capita in logarithm. FII, AVAILABILITY, USAGE mean financial inclusion index, access and usage. REMITTANCE\*FII, REMITTANCE\*AVAILABILITY, and REMITTANCE\*USAGE are interaction terms between REMITTANCE and financial inclusion index, access, and usage, respectively. Columns (1) reports the interacted impact of remittance and financial inclusion on economic growth. Columns (3) and (4) show the interacted impact of remittance with two constructs of financial index: AVAILABILITY and USAGE on economic growth. All other independent variables are lagged. Standard errors are in parentheses. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively.

an endogeneity-robust system GMM estimation method to verify the outcomes of the fixed effects method. This version is preferred to difference GMM (Bond et al., 2001) because it mitigates small sample biases from the difference GMM and does not eliminate cross-country variations. Furthermore, instead of using the one-step system GMM, we employ an extension of the system GMM, which is a two-step system GMM developed by Roodman (2009) because of its robustness to heteroscedasticity and autocorrelation problems in econometrics research. The results of this test are provided in Table 6.

Alternatively, we use different measurements of financial inclusion and growth. Specifically, we use the annual percentage growth rate of GDP at market prices based on constant local currency (*GDP growth*) as an alternative for GDP per capita. This measure is also popular in the development economics literature. We also employ various financial ratios, including liquid liabilities to GDP, life insurance premium volume to GDP, nonlife insurance premium volume to GDP, and financial system deposits to GDP to capture impact of different components of the financial sector (i.e., bank, insurance, and capital markets). Data on these ratios are derived from the Financial Development and Structure Database provided by the World Bank and are 3-year rolling averaged. The corresponding results are reported in the supplementary material in Table S4.

As seen from Table 6 and Table S4, outcomes from the robustness test are generally similar to those presented in our mainstream analyses, further confirming our hypotheses.

As another robustness check, we excluded institutional quality and ran the regressions. The results are provided in Table S5–S8 in the supplementary material. As the results did not change significantly, we can justify our findings.

#### 4. Conclusion and discussion

This study assessed the combined impact of international remittances and financial inclusion on economic growth using a panel dataset of 60 low-and middle-income countries over the period from 1996 to 2017.

Instead of using a single indicator of financial inclusion, we construct a composite index capturing different financial inclusion aspects. This helps provide greater insight into the impact of this financial phenomenon on the remittances-growth relationship. Using different econometric methods, we document the results with important policy implications. First, our findings show that, financial inclusion in general could exacerbate the growth-boosting effect of remittances. Furthermore, an in-depth analysis of two constructs of the financial inclusion index also provides interesting outcomes. The availability of financial products may not materialize the growth-enhancing impact of remittances. Meanwhile, actual usage of financial services by local citizens is more important and could exacerbate the positive effect of remittances on growth. These findings confirm our hypotheses and corroborate the findings of Nyamongo et al. (2012).

Second, when splitting the sample relative to financial inclusion quintiles and income level, we find that remittances



are essential for financial inclusion up to the 25th percentile (1st quartile) in the sample and low-income countries with a higher level of financial inclusion. Interestingly, the positive interaction effects of remittances and financial inclusion seem to diminish and become negative in countries at the other end of financial inclusion distributions. Meanwhile, we do not have enough evidence to conclude that a high financial inclusion index has a different strengthening effect on the remittances-growth relationship in middle-income countries. Thus, our findings are in line with those in Nyamongo et al. (2012).

To this end, our study sheds light on policies for economic growth in migrant-sending and remittances-receiving countries. First, policies for attracting more remittances and establishing a highly inclusive financial system are worth considering for fostering economic growth in receiving countries, particularly low-income ones with capital constraints. While FDI and ODA inflows often come with binding conditions, remittances from migrants can be easier for receiving countries, especially for less-developed economies.

Second, to enhance the positive impact of remittances on growth, establishing an inclusive financial sector and lowering the number of the unbanked populations is recommended. This involves encouraging remittance recipients to use financial products as excessive provision of these products without actual usage is meaningless to growth and, in some cases, could be resource-consuming. This policy is especially recommended in low-income countries. A more inclusive and effective financial system helps migrants send money back easily with lower transaction costs and encourages recipients to save their money in banks. As remittances can be deposited in banks, they bring a larger share of the population into contact with the financial sector, expanding the availability of credit and savings products (Aggarwal et al., 2011). Simultaneously, these funds could be more efficiently channeled towards productive investment projects (Terry & Wilson, 2005), contributing to economic growth.

### Authors contribution

Conceptualization: Nguyet Thi Minh Phi, Farhad Taghizadeh-Hesary; Methodology: Anh Tu Chuc, Weiqing Li, Naoyuki Yoshino, Farhad Taghizadeh-Hesary; Supervision: Farhad Taghizadeh-Hesary, Administration: Anh Tu Chuc, Weiqing Li; Data Curation: Nguyet Thi Minh Phi, Quoc Tuan Le; Software: Nguyet Thi Minh Phi, Quoc Tuan Le, Formal analysis: Nguyet Thi Minh Phi, Quoc Tuan Le, Farhad Taghizadeh-Hesary, Writing-Original draft: Nguyet Thi Minh Phi, Quoc Tuan Le, Farhad Taghizadeh-Hesary; Writing - Review & Editing: Anh Tu Chuc, Weiqing Li, Nguyet Thi Minh Phi, Quoc Tuan Le, Farhad Taghizadeh-Hesary. Anh Tu Chuc and Weiqing Li are both the first authors. Farhad Taghizadeh-Hesary is the corresponding author.

### Declaration of competing interest

The authors declare that there is no conflict of interest.

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### Appendix A. Supplementary data

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### References

- Abdih, Y., Chami, R., Dagher, J., & Montiel, P. (2012). Remittances and institutions: Are remittances a curse? *World Development*, 40(4), 657–666.
- Acosta, P., Calderon, C., Fajnzylber, P., & Lopez, H. (2008). What is the impact of international remittances on poverty and inequality in Latin America? *World Development*, 36(1), 88–114.
- Aggarwal, R., Demircuc-Kunt, A., Soledad, M., & Peria, M. (2011). Do emittances promote financial development? *Journal of Development Economics*, 96, 255–264.
- Akobeng, E. (2016). Out of inequality and poverty: Evidence for the effectiveness of remittances in Sub-Saharan Africa. *The Quarterly Review of Economics and Finance*, 60, 207–223.
- Allan, A., Massu, M., & Svarer, C. (2013). *Banking on change: Breaking barriers to financial inclusion*, barclays. Plan UK: CARE International.
- Arun, T., & Kamath, R. (2015). Financial inclusion: Policies and practices. *IIMB Management Review*, 27, 267–287.
- Azizi, S. (2017). Altruism: Primary motivation of remittances. *Applied Economics Letters*, 24(17), 1218–1221.
- Azizi, S. (2018). The impacts of workers' remittances on human capital and labor supply in developing countries. *Economic Modelling*, 75, 377–396.
- Azizi, S. (2019a). Why do migrants remit? *The World Economy*, 42(2), 429–452.
- Azizi, S. (2019b). The impacts of workers' remittances on poverty and inequality in developing countries. *Empirical Economics*, 1–23. <https://doi.org/10.1007/s00181-019-01764-8>
- Azizi, S. (2020). Impacts of remittances on financial development. *Journal of Economics Studies*, 47(3), 467–477. <https://doi.org/10.1108/JES-01-2019-0045>
- Ball, C. P., Lopez, C., & Reyes, J. (2013). Remittances, inflation and exchange rate regimes in small open economies. *The World Economy*, 36(4), 487–507.
- Barajas, A., Chami, R., & Yousefi, S. R. (2013). *The finance and growth nexus Re-examined: Do all countries benefit equally? IMF working paper no. WP/13/130*. Washington D.C: International Monetary Fund.
- Beck, T., Demircuc-Kunt, A., & Peria, M. S. M. (2007). Reaching out: Access to and use of banking services across countries. *Journal of Financial Economics*, 85(1), 234–266.
- Beck, T., Levine, R., & Loyaza, N. (2000). Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics*, 46, 31–77.
- Benmamoun, M., & Lehnert, K. (2013). Financing growth: Comparing the effects of FDI, ODA, and international remittances. *Journal of Economic Development*, 38(2), 43–65.
- Berdiev, A. N., Kimb, Y., & Chang, C. P. (2013). Remittances and corruption. *Economics Letters*, 118, 182–185.
- Bettin, G., & Zazzaro, A. (2012). Remittances and financial development: Substitutes or complements in economic growth? *Bulletin of Economic Research*, 64, 509–536.
- Bond, S., Hoeffler, A., & Temple, J. (2001). *GMM estimation of empirical growth models*. Oxford: University of Oxford.

- Brown, R. P. C., Carmignani, F., & Fayad, G. (2013). Migrants' remittances and financial development: Macro- and micro-level evidence of a perverse relationship. *The World Economy*, 36(5), 636–660.
- Clemens, M. A., & McKenzie, D. (2014). *Why don't remittances appear to affect growth? Policy research working paper 6856*. Washington, DC: World Bank.
- Cox Edwards, A., & Oreggia, E. R. (2009). Remittances and labor force participation in Mexico: An analysis using propensity score matching. *World Development*, 37(4), 1004–1014.
- Demirguc-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2020). The global finindex database 2017: Measuring financial inclusion and opportunities to expand access to and use of financial services. *The World Bank Economic Review*, 34(Supplement), S2–S8.
- Galar, O., & Zeira, J. (1993). Income distribution and macroeconomics. *The Review of Economic Studies*, 60, 35–52.
- Ghosh, S. (2011). Does financial outreach engender economic growth? Evidence from Indian states. *Journal of Indian Business Research*, 3(2), 74–99.
- Giuliano, P., & Ruiz-Arranz, M. (2009). Remittances, financial development, and growth. *Journal of Development Economics*, 90, 144–152.
- Guihuan, Z., & Yu, W. (2014). Financial condition index's construction and its application on financial monitoring and economic forecasting. *Procedia Computer Science*, 31, 32–39.
- Karim, M. R., Islam, M. T., & Talukder, B. (2020). COVID-19's impacts on migrant workers from Bangladesh: In search of policy intervention. *World Development*, 136, 105123.
- Le, T. (2011). Remittances for economic development: The investment perspective. *Economic Modelling*, 28, 2409–2415.
- Le, T.-H., Chuc, A.-T., & Taghizadeh-Hesary, F. (2019). Financial inclusion and its impact on financial efficiency and sustainability: Empirical evidence from Asia. *Borsa İstanbul Review*, 19(4), 310–322.
- Le, T.-H., Kim, J., & Lee, M. (2017). Institutional quality, trade openness, and financial sector development in asia: An empirical investigation. *Emerging Markets Finance and Trade*, 52, 1047–1059.
- Lucas, R. E. B., & Stark, O. (1985). Motivations to remit: Evidence from Botswana. *Journal of Political Economy*, 93(5), 901–918.
- Mehrotra, N., Puhazhendhi, V., Nair, G., & Sahoo, B. B. (2009). *Financial inclusion - an overview* (p. 48). Department of Economic Analysis and Research, National Bank for Agriculture and Rural Development (NABARD). Occasional Paper.
- Mundaca, B. G. (2009). Remittances, financial market development, and economic growth: The case of Latin America and the caribbean. *Review of Development Economics*, 13(2), 288–303.
- Nyamongo, E. M., Misati, R. N., Kipyegon, L., & Ndirangu, L. (2012). Remittances, financial development and economic growth in Africa. *Journal of Economics and Business*, 64, 240–260.
- Orozco, M., & Fedewa, R. (2006). *Leveraging efforts on remittances and financial intermediation*. INTAL-ITD: Inter-American Development Bank.
- Ozkok, Z. (2015). Financial openness and financial development: An analysis using indices. *International Review of Applied Economics*, 29(5), 620–649.
- Ramirez, M. (2013). Do financial and institutional variables enhance the impact of remittances on economic growth in Latin America and the caribbean? A panel cointegration analysis. *International Advances in Economic Research*, 19(3), 273–288.
- Rao, B. B., & Hassan, G. M. (2012). Are the direct and indirect growth effects of remittances significant? *The World Economy*, 35, 351–372.
- Ratha, D., De, S., Kim, E. J., Plaza, S., Seshan, G., & Yameogo, N. D. (2020). *Migration and development brief 33: Phase II: COVID-19 crisis through a migration lens*. Washington, DC: KNOMAD-World Bank.
- Roa, M. J. (2015). Financial inclusion in Latin America and the caribbean: Access, usage and quality. Research papers 19. CEMLA.
- Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *Stata Journal*, 9(1), 86–136.
- Sarma, M. (2008). *Index of financial inclusion*. ICRIER Working Paper 215.
- Sarma, M., & Pais, J. (2011). Financial inclusion and development. *Journal of International Development*, 23(5), 613–628.
- Senbeta, A. (2013). Remittances and the sources of growth. *Applied Economics Letters*, 20, 572–580.
- Sobiech, I. (2019). Remittances, finance and growth: Does financial development foster the impact of remittances on growth? *World Development*, 113, 44–59.
- Terry, D., & Wilson, S. (2005). *Beyond small change: Making migrant remittances count*. Washington, DC: Inter-American Development Bank.
- Turegano, D. M., & Herrero, A. G. (2018). Financial inclusion, rather than size, is the key to tackling income inequality. *Singapore Economic Review*, 63(1), 167–184.
- Wang, X., & Guan, J. (2017). Financial Inclusion: Measurement, spatial effects, and influencing factors. *Applied Economics*, 49(18), 1751–1762.
- World Bank. (2020). *“COVID-19 crisis through a migration lens.” migration and development brief 32*. Washington, DC: World Bank.
- Yoshino, N., Morgan, P. J., & Trinh, L. Q. (2017). *Financial literacy in Japan: Determinants and impacts*. ADBI Working Paper 796.
- Yoshino, N., Taghizadeh-Hesary, F., & Otsuka, M. (2018). International remittances and poverty reduction: Case of developing asia. *Global Solutions Journal*, 1(1), 90–96.
- Yoshino, N., Taghizadeh-Hesary, F., & Otsuka, M. (2019). International remittances and poverty reduction: Evidence from developing asia. *Journal of Comparative Asian Development*, 17(2), 21–42.
- Yoshino, N., Taghizadeh-Hesary, F., & Otsuka, M. (2020a). Determinants of international remittance inflow in Asia-Pacific middle-income countries. *Economic Analysis and Policy*, 68, 29–43.
- Yoshino, N., Taghizadeh-Hesary, F., & Otsuka, M. (2020b). Covid-19 and optimal portfolio selection for investment in sustainable development goals. *Finance Research Letters*, 101695. <https://doi.org/10.1016/j.frl.2020.101695>