

## Economic Integration and Financial Inclusion: Evidence from Middle-Income Countries

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**Abstract** The study examines the impact of economic integration on financial inclusion, focusing on thirty-two middle-income countries worldwide from 2006 to 2018. Using the coefficient of variance's weighting methodology, we construct a composite financial inclusion index from six underlying indicators. Meanwhile, economic integration indices at both global and regional levels are created based on the combination of trade and financial openness indicators. The empirical results confirm a positive relationship between economic integration and financial inclusion, with global integration exposing a stronger impact than regional one. Our finding still holds when we divide the sample into three subregions as well as when several robustness checks are performed.

**Keywords:** Financial Inclusion, Economic Integration, Middle-Income Countries

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### I. Introduction

According to the World Bank (WB), financial inclusion "means that 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." Although financial inclusion is a global social-economic challenge, it would have a greater effect on developing countries than developed ones as financial inclusion is considered a key enabler to reducing extreme poverty and boosting shared prosperity. Andrianaivo and Kpodar (2012), Huang et al. (2021), Kim (2016), and Kim et al. (2018) have claimed that higher degrees of financial inclusion are correlated with faster GDP growth and less income inequality. Other benefits of financial inclusion are strengthening financial stability (Malik et al., 2022; Neaime and Gaysset, 2018), promoting renewable energy consumption (Dai et al., 2022), reducing the

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unemployment rate (Mehry et al., 2021), providing food security (Arshad, 2022), and more. However, despite significant efforts to increase financial inclusion, WB data shows that until 2021, 24% of adults worldwide, approximately 1.2 billion people, have remained unbanked (having no account at a bank or regulated institution such as a credit union, microfinance institution, or a mobile money service provider), according to its latest Global Findex report (Demirguc-Kunt et al., 2022). This figure is higher for developing countries at 29%. Given that financial inclusion's significance is well acknowledged, detecting the potential factors that could contribute to achieving an all-inclusive financial system is crucial, especially for developing economies.

It should be noted that financial inclusion consists of two key components: the supply and demand for financial products and services. The supply side relates to the availability of financial services, such as the number of bank branches and ATMs. The supply side eventually influences the demand side, which relates to the ownership of bank accounts and the use of financial services. This interconnected nature of financial inclusion has provided scholars with numerous opportunities to discover financial inclusion determinants (Ozili, 2021). Yangdol and Sarma (2019) examined the demand-side factors of financial inclusion, using data from 142 countries globally, and found that being a man, richer, more educated, and older favors financial inclusion, as stated similarly in the earlier study by Zins and Weill (2016). Capital formation, bank credit, broad money, population growth, remittances, and institutional factors such as regulatory quality have also been identified as important underlying factors for financial inclusion (Evans, 2018; Nkoa and Song, 2020; Owen and Pereira, 2018). Additionally, there is a stream of financial literature that has emphasized the vital role of financial innovation and technology, including the studies by Allen et al. (2014), Amer et al. (2020), and Fonté (2012), in promoting inclusive finance. Fonté (2012), for example, argued that in the US, the mobile payment system might help individuals gain access to a broader range of financial services at lower costs. Likewise, Allen et al. (2014) showed evidence that mobile banking, one of the recent innovations in financial services, might assist in overcoming infrastructural problems and improving financial accessibility in Africa. Differentiated from these studies, Liaqat et al. (2022) investigated how national culture affects financial inclusion in eighty-one Belt and Road economies. They found that financial inclusion is lower in countries where uncertainty avoidance and power distance are high and that the opposite is true for individualism and masculinity.

Among these economic, political, and social-demographic factors, there is a potentially crucial factor that has received little attention: economic integration. Balassa (2013) defined economic integration as a process and a state of affairs. As a process, economic integration encompasses measures designed to eliminate discrimination between economic units that belong to different national states. As a state of affairs, it represents the absence of various forms of discrimination between national economies. Economic integration can occur between countries in a specific region, *i.e.*, regional integration (regionalization), or between countries in various parts of the

world, *i.e.*, global integration (globalization). The European Union (EU) and the Association of Southeast Asian Nations (ASEAN) are examples of regionalization. Meanwhile, the Japan-EU Economic Partnership Agreement or ASEAN-Australia-New Zealand Free Trade Area are representations of global economic integration. Economic integration is a crucial factor influencing financial development and economic growth (Badinger, 2005; Fetai, 2015; Rivera-Batiz and Romer, 1991; Taghizadeh-Hesary et al., 2020; Tembo and Makina, 2020) which in turn, promotes financial inclusion (Bekele, 2023; Evans, 2015). Such relationships can be explained by supply-leading and demand-following hypotheses. According to the supply-leading view, financial development makes financial markets more competitive. The competitive pressure drives banks to concentrate on market competition by providing more efficient financial services and expanding access to those who do not have adequate access to finance themselves, contributing to increased financial inclusion and overall economic development (Bekele, 2023). On the contrary, the demand-following view argues that economic growth increases the demand for financial services, resulting in higher financial development, and thus financial inclusion (Evans, 2015). Apart from that, Beck et al. (2015) and Léon and Zins (2020) suggested that foreign banks contribute to better access to finance. Meanwhile, Owen and Pereira (2018) found that greater banking concentration is associated with better access to deposit accounts and loans. These findings imply the potential effect of economic integration on enhancing financial accessibility since the entry of foreign banks and the banking concentration are linked to economic liberalization (Ghosh, 2016; Lee et al., 2023; Yin et al., 2020). However, until now, empirical evidence on the economic integration-financial inclusion relationship has been limited. Our study is conducted to fill this gap.

Specifically, this research focuses on the relationship between economic integration, both global and regional levels, and financial inclusion using data from thirty-two middle-income countries in Asia, Africa, and Latin America during the period from 2006 to 2018. Using self-constructed financial inclusion and modified economic integration indices from public sources, our baseline regression results reveal a significantly positive impact of economic integration on financial inclusion. This study also demonstrates that while both globalization and regionalization promote financial inclusion, globalization has a greater influence. Besides, the heterogeneity analysis shows that economic liberalization has the strongest impact on fostering inclusive finance in Asia. In comparison, we do not observe such influence in Latin America. These findings are verified using an alternative financial inclusion index and regression techniques.

In general, our paper contributes to various streams of existing literature. First, by examining the impact of economic integration on financial inclusion, our work complements research on determinants of financial inclusion and offers another key factor that could promote inclusive finance. It also provides more evidence about the role of economic liberation in financial development and economic growth. Since these matters affect developing countries more

strongly than developed ones, we concentrate our research on developing countries. Second, by investigating economic integration at both global and regional levels and dividing our sample into three subregions, this study addresses some uncovered matters, including (i) Is regionalization or globalization a stronger influencer on financial inclusion? (ii) Is the economic integration-financial inclusion relationship similar or different across areas?

The remainder of this paper is structured as follows. Section II describes the definitions and measurements of all the used variables. The estimation methods applied to detect our investigated relationship are also depicted in this section. Section III presents and discusses the main empirical results. The findings and implications are summarized in the last section.

## II. Data and Methodology

### A. Data

#### 1. Sample

Our study covers all middle-income countries whose data is available from 2006 to 2018. Those countries are classified as middle-income countries based on the WB's ranking. The final sample comprises thirty-two countries belonging to three regions: Asia (AS), Africa (AF), and Latin America (LA).<sup>1)</sup> The list of countries is presented in online Appendix A.

#### 2. Variables

The dependent variable of this study is financial inclusion. Until now, there has been no consensus on measuring the degree of financial inclusion as different studies use different indicators and methods to establish a financial inclusion index (Liaquat et al., 2022). Therefore, in our research, we follow Bekele's (2023) and Wang and Guan (2017)'s approach to construct a composite index of financial inclusion (*FI*) from two dimensions: accessibility (*Access*) and usage (*Use*). The detailed construction is as follows:

First, we download data from the Financial Access Survey (FAS) of the International Monetary Fund (IMF). According to the IMF, FAS covers 189 countries spanning more than 15 years and contains 121 time series on financial access and use. We choose six indicators from these series to compute our *FI* index. They are as follows: (i) the number of commercial bank branches per 1,000 km<sup>2</sup>; (ii) the number of commercial bank branches per 100,000 adults; (iii) the number of ATMs per 1,000 km<sup>2</sup>; (iv) the number of ATMs per 100,000 adults; (v)

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1) We remove Bulgaria and Iran, even though their data is available because they are the only countries in Europe and the Middle East, respectively, whose data is insufficient for regional analyses. We also do not include low-income countries since only Madagascar, Mozambique, and Uganda have all the required data.

outstanding deposits with commercial banks (% of GDP); and (vi) outstanding loans from commercial banks (% of GDP) (Cull et al., 2014; Lenka and Bairwa, 2016). Since commercial banks play the leading role in providing financial services and have the most sufficient data for all countries, we mostly depend on the data of commercial banks for our calculations. Because these six indicators are in different scales, we use the min-max technique to create series that range from 0 to 1:

$$x_{ij} = \frac{a_{ij} - \min_{ij}}{\max_{ij} - \min_{ij}} \tag{1}$$

In which:  $a_{ij}$  is the actual value of indicator  $i$  of dimension  $j$ ;  $\min_{ij}$  is the minimum value of indicator  $i$  of dimension  $j$ ;  $\max_{ij}$  is the maximum value of indicator  $i$  of dimension  $j$ .

In the next step, we estimate the weight of each indicator by dividing its coefficient of variation ( $CV$ ) by the total  $CV$  of all indicators within a dimension.  $CV$  of each indicator is measured by the ratio of its standard deviation to its mean. Then, two dimensions of the  $FI$  index, *Access* and *Use*, are constructed using this formula:

$$FI_j = 1 - \frac{\sqrt{w_{1j}^2(1 - x_{1j})^2 + w_{2j}^2(1 - x_{2j})^2 + \dots + w_{ij}^2(1 - x_{ij})^2}}{\sqrt{w_1^2 + w_2^2 + \dots + w_i^2}} \tag{2}$$

In which:  $w_{ij}$  is the weight of indicator  $i$  of dimension  $j$ ;  $FI_j$  is either *Access* or *Use* dimension. *Access* reflects the financial services outreach and is calculated by the number of commercial bank branches and ATMs per 1,000 km<sup>2</sup> and per 100,000 adults, respectively. Meanwhile, *Use* indicates the frequency of locals using financial services and is calculated by outstanding deposits and loans (% of GDP). Finally, these two dimensions are combined to get the  $FI$  index:

$$FI = 1 - \frac{\sqrt{w_1^2(1 - FI_1)^2 + w_2^2(1 - FI_2)^2}}{\sqrt{w_1^2 + w_2^2}} \tag{3}$$

In which:  $w_1$  is the weight of the first dimension (*Access*) in the  $FI$  index;  $w_2$  is the weight of the second dimension (*Use*) in the  $FI$  index.  $w_1$  and  $w_2$  are calculated using a similar  $CV$  estimation.

The financial inclusion indices from our calculation range between 0 and 1 where a higher value indicates a higher level of financial inclusion and vice versa. In our subsequent analyses, we use both  $FI$  and two individual dimensions as representations for financial inclusion.

Regarding the independent variables, we employ two specific datasets to measure the economic integration of each country in our sample. The first one is the KOF Globalization Index (KOFGI), introduced by Dreher (2006) and revised by Gygli et al. (2019). The second one is the Asia-Pacific Regional Cooperation and Integration Index (ARCII) developed by the Asia Regional Integration Center (ARIC) in 2017.

KOFGI measures the globalization's economic, social, and political dimensions for 203 countries, starting from 1970 (Gygli et al., 2019). This dataset is available on the KOF Swiss Economic Institute's website. Since our research focuses on economic integration, we obtain economic dimension series only. The economic index, constructed from the equal-weighted average of trade and financial globalization, gets values from 0 to 100, with lower values indicating lower integrated levels and vice versa. We use this series to represent global economic integration (*GEI*).

In contrast, according to ARIC, ARCI is a composite index that measures progress on relevant dimensions of regional integration and identifies strengths and weaknesses within regional, subregional, and national contexts. This index covers data for 173 economies and is accessible from the ARIC's website. Based on the series construction, ARCI does not have a specific economic dimension but includes two related dimensions, *i.e.*, trade and investment integration and money and finance integration. Consequently, we construct an economic index from the equal-weighted average of these two indicators. This simple method aims to make our regional economic integration (*REI*) indicator comparable to *GEI*. Unlike *GEI*, *REI* gets values from 0 to 1. Values near 1 imply high integrated levels and vice versa.

Finally, following Aymar and Fabrice-Gilles (2021), Chuc et al. (2022), and Nkoa and Song (2020), we include a set of macroeconomic variables that may affect our examined relationship. They are as follows: (i) economic growth (*GDPC*) as measured by GDP per capita; (ii) institutional quality (*IQ*) as measured by the average of six governance dimensions; (iii) technology development (*MS*) as measured by the number of mobile subscriptions; and (iv) education (*SY*) as measured by the average years of schooling. *GDPC*, *MS*, and *IQ* data are obtained from the WB's World Development Index (WDI) and World Governance Indicators (WGI) series, respectively. Meanwhile, *SY* is one of the Human Development Index (HDI) indicators which is accessible from the website of the United Nations Development Program (UNDP).

The brief definitions, data sources, and descriptive statistics for all the used variables are presented in Table 1.

**Table 1.** *Definitions, Sources, and Descriptive Statistics of Used Variables*

Variables	Definitions/Measurements	Sources	Obs.	Mean	SD.	Min	Max
Access	The weighted index of four following indicators: (i) the number of commercial bank branches per 1,000 km <sup>2</sup> ; (ii) the number of commercial bank branches per 100,000 adults; (iii) the number of ATMs per 1,000 km <sup>2</sup> ; and (iv) the number of ATMs per 100,000 adults.	FAS (IMF)	416	0.130	0.136	0.001	0.773
Use	The weighted index of the two following indicators: (i) outstanding deposits with commercial banks (% of GDP) and (ii) outstanding loans from commercial banks (% of GDP).	FAS (IMF)	416	0.212	0.165	0.002	0.749
FI	The weighted index of <i>Access</i> and <i>Use</i>	FAS (IMF)	416	0.155	0.129	0.004	0.763
GEI	The average index of two economic globalization indicators: (i) trade globalization and (ii) financial globalization.	KOFGI (KOF SEI)	416	53.726	15.695	22.198	89.022
REI	The average index of two regional integration indicators: (i) trade and investment integration and (ii) money and finance integration.	ARCII (ARIC)	416	0.281	0.108	0.066	0.591
GDPC	The natural logarithm of GDP per capita (current US dollars).	WDI (WB)	416	8.229	0.773	6.234	9.590
IQ	The average index of six governance indicators: (i) voice and accountability; (ii) political stability and absence of violence; (iii) government effectiveness; (iv) regulatory quality; (v) rule of law; and (vi) control of corruption.	WGI (WB)	416	-0.268	0.498	-1.181	0.854
MS	Mobile cellular subscriptions (per 100 people)	WDI (WB)	416	91.393	37.225	13.576	180.493
SY	Mean years of schooling	HDI (UNDP)	416	7.933	2.106	4	12.8

Table 2 presents the correlation matrix. As is shown in the table, the coefficients between financial inclusion, both the composite index (*FI*) and two dimensions (*Access* and *Use*), and the independent variables are mostly positive and significant, indicating our studied relationships preliminary. Besides that, all coefficients between independent and control variables are under 0.7, implying that multicollinearity is not a problem in our analysis models.<sup>2)</sup>

2) We also calculate the variance inflation factor (VIF) for all independent and control variables. None of VIF exceeds 3, confirming the declaration that our models do not suffer from the multicollinearity issue.

**Table 2.** Correlation Matrix

	Access	Use	FI	GEI	REI	GDPC	IQ	MS	SY
Access	1.000								
Use	0.580***	1.000							
FI	0.949***	0.805***	1.000						
GEI	0.330***	0.586***	0.465***	1.000					
REI	0.163**	0.064	0.139***	0.157***	1.000				
GDPC	0.211***	0.280***	0.259***	0.270***	-0.079	1.000			
IQ	0.404***	0.516***	0.493***	0.453***	0.216***	0.639***	1.000		
MS	0.267***	0.284***	0.302***	0.260***	0.162***	0.589***	0.455***	1.000	
SY	0.092*	-0.006	0.060	0.460***	0.116**	0.489***	0.435***	0.540***	1.000

\*, \*\*, and \*\*\* are significant levels at 10%, 5%, and 1%, respectively.

## B. Methodology

The underlying model is applied to investigate the relationship between economic integration and financial inclusion:

$$FI_{i,t} = \alpha_i + \beta_1 GEI_{i,t-1} + \beta_2 REI_{i,t-1} + \sum_{k=1}^4 \beta_{k+2} CV_{k,i,t-1} + \epsilon_{i,t-1} \quad (4)$$

Where  $FI_{i,t}$  represents the financial inclusion of country  $i$  at time  $t$ ;  $GEI_{i,t}$  and  $REI_{i,t}$  represent global and regional economic integration of country  $i$  at time  $t$ , respectively;  $CV_{k,i,t}$  is a vector of  $k$  control variables of country  $i$  at time  $t$ .

To begin with, we apply the pooled ordinary least squares (POLS) with cross-country fixed effects and Huber-White standard error as our baseline regression. All right-hand-side variables are lagged for one period to reduce the concern about reverse causality issues (Canh et al., 2020). Additionally, we use the generalized method of moments (GMM) technique to verify our results.

Besides all countries' regressions, we wonder whether the economic integration-financial inclusion relationship differs across regions. Therefore, based on the ARCI classification, we divide our studied countries into three subregions,  $AS$ ,  $AF$ , and  $LA^3$ ), and execute Equation (4) for each.

3) The descriptive statistics for three subregions are presented in online Appendix B.



### III. Results

#### A. Economic Integration and Financial Inclusion

Table 3 presents the regression results of Equation (4) about the effect of economic integration on financial inclusion. The first four columns show the results for two dimensions of financial inclusion, i.e., accessibility and usage. The results for the aggregate *FI* index are presented in the last two columns. We run Equation (4) with and without control variables to check the sensitivity and robustness.

**Table 3.** *Economic Integration and Financial Inclusion*

	Access		Use		FI	
	(1)	(2)	(1)	(2)	(1)	(2)
GEI	-0.002 (0.044)	0.084*** (0.027)	0.258*** (0.054)	0.311*** (0.040)	0.083* (0.044)	0.159*** (0.025)
REI	0.065*** (0.021)	0.041*** (0.014)	-0.020 (0.032)	-0.042 (0.029)	0.041** (0.020)	0.017 (0.013)
GDPC		0.279*** (0.046)		0.141** (0.071)		0.235*** (0.037)
IQ		0.100*** (0.036)		0.298*** (0.045)		0.166*** (0.029)
MS		0.046*** (0.016)		0.026 (0.025)		0.039*** (0.013)
SY		0.197*** (0.049)		0.206*** (0.065)		0.195*** (0.041)
Const.	0.030 (0.027)	-0.220*** (0.036)	0.047 (0.033)	-0.111** (0.046)	0.032 (0.027)	-0.188*** (0.030)
Obs.	384	384	384	384	384	384
Prob > F	0.0000	0.000	0.000	0.000	0.000	0.000

Variables are described in Table 1. The study period is from 2006 to 2018. Standard errors are in parentheses. \*, \*\*, and \*\*\* are significant levels at 10%, 5%, and 1%, respectively.

As seen in the fifth column, the coefficients of *GEI* and *REI* are 0.083 and 0.041 with a significant level of 10% and 5%, respectively. However, after adding the control variables, while the coefficient of *GEI* increases considerably to 0.159, that of *REI* decreases to 0.017 and is no longer significant. These outcomes imply a significantly positive impact of economic liberation on financial inclusion with global integration being more dominant than regional one.

The relationship between economic integration and financial inclusion can be explained by looking at the results for two individual dimensions. The accessibility dimension shares a similar pattern with the *FI* index, albeit in the model without control variables, only the *REI*'s coefficient is positive and significant. On the other hand, globalization is the only factor that influences

the usage dimension as *GEI*'s coefficients are positively significant while *REI*'s coefficients are negatively insignificant. Our empirical results for individual dimensions suggest that global integration can enhance financial inclusion by increasing financial services outreach and usage. In contrast, regional integration only affects financial inclusion by improving the accessibility to financial services.

Overall, our findings support earlier studies, such as Badinger (2005), Fetai (2015), and Taghizadeh-Hesary et al. (2020), which have claimed the positive impact of economic integration on financial development.

## B. Economic Integration and Financial Inclusion by Region

Table 4 presents the results of Equation (4) when our sample is divided into three subregions. For brevity, we only report the results of models with control variables.

**Table 4.** *Economic Integration and Financial Inclusion by Region*

	Access			Use			FI		
	AS	AF	LA	AS	AF	LA	AS	AF	LA
GEI	0.129** (0.057)	0.069*** (0.026)	-0.046 (0.044)	0.471*** (0.079)	0.326*** (0.071)	0.122** (0.048)	0.241*** (0.055)	0.150*** (0.029)	0.012 (0.039)
REI	0.003 (0.033)	0.020* (0.012)	0.016 (0.017)	-0.027 (0.040)	-0.077 (0.077)	-0.018 (0.019)	-0.003 (0.027)	-0.003 (0.022)	0.006 (0.014)
GDPC	0.456*** (0.095)	0.066** (0.026)	0.062 (0.051)	0.254** (0.100)	0.118 (0.134)	0.101 (0.068)	0.373*** (0.075)	0.095** (0.045)	0.072 (0.050)
IQ	0.035 (0.067)	0.015 (0.041)	0.101** (0.040)	0.191*** (0.060)	0.510*** (0.141)	0.233*** (0.061)	0.089* (0.053)	0.169*** (0.052)	0.145*** (0.041)
MS	0.026 (0.033)	0.009 (0.015)	0.064*** (0.018)	-0.001 (0.036)	-0.009 (0.052)	0.039* (0.020)	0.024 (0.028)	0.001 (0.020)	0.057*** (0.015)
SY	0.525** (0.212)	0.209*** (0.059)	0.155*** (0.042)	0.167 (0.115)	0.330* (0.181)	0.153** (0.064)	0.399** (0.154)	0.238*** (0.082)	0.159*** (0.043)
Const.	-0.550*** (0.132)	-0.067** (0.030)	-0.181*** (0.050)	-0.487*** (0.087)	-0.121 (0.079)	-0.312*** (0.047)	-0.523*** (0.097)	-0.092** (0.037)	-0.231*** (0.041)
Obs.	132	132	120	132	132	120	132	132	120
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Variables are described in Table 1. The study period is from 2006 to 2018. Standard errors are in parentheses. \*, \*\*, and \*\*\* are significant levels at 10%, 5%, and 1%, respectively.

As we can see, in most specifications, *GEI*'s coefficients are large and significant, while *REI*'s coefficients are small and insignificant. These outcomes share the same pattern as those of all countries' estimations, proving the dominant impact of global integration on financial inclusion. In detail, the globalization-financial inclusion relationship is strongest in Asia since a 1% improvement in global integration leads to a 0.241% improvement in financial inclusion.

The powerful impact of globalization on this region comes from the great enhancement in both financial access and usage (*GET*'s coefficient is 0.129 on *Access* and 0.471 on *Use*). Similar outcomes are observed in Africa with the weaker effect of global integration. In particular, Africa is the only region where regionalization positively affects financial services outreach.

In contrast to these two regions, economic integration does not influence financial inclusion in Latin America. Although globalization increases the use of financial services in Latin America, such impact alone cannot lead to higher inclusive finance in this region in general.

### C. Robustness Tests

In this section, we introduce some robustness checks to confirm our findings. First, we use another method to construct our *FI* indices. Second, we use other regression techniques to run our baseline model.

#### 1. An alternative method to construct FI

In the first robustness test, we follow Ahamed and Mallick (2019), Cámara and Tuesta (2014), and Tram et al. (2023) approach in adopting the two-step principal component analysis (PCA) to estimate *FI* from two dimensions: *Access* and *Use*. We use the same six underlying indicators as described in Section II.A.2.

We first apply PCA to construct two dimensions of financial inclusion, i.e., *Access* and *Use*. Similarly, *Access* is composed based on the number of commercial bank branches and ATMs per 1,000 km<sup>2</sup> and 100,000 adults, respectively, whereas *Use* is calculated by outstanding deposits and loans (% of GDP). Finally, PCA is employed again to get *FI* from *Access* and *Use*.

The regression results with our new *FI* indices are presented in Tables 5 and 6.

**Table 5.** *Economic Integration and Financial Inclusion - New FI Indices*

	Access		Use		FI	
	(1)	(2)	(1)	(2)	(1)	(2)
GEI	0.039 (0.055)	0.132*** (0.030)	0.265*** (0.055)	0.317*** (0.041)	0.138*** (0.051)	0.213*** (0.028)
REI	0.080*** (0.023)	0.048*** (0.015)	-0.014 (0.032)	-0.036 (0.028)	0.040* (0.023)	0.012 (0.016)
GDPC		0.264*** (0.044)		0.127* (0.076)		0.207*** (0.043)
IQ		0.196*** (0.039)		0.303*** (0.047)		0.244*** (0.031)
MS		0.088*** (0.017)		0.029 (0.027)		0.063*** (0.017)

**Table 5.** *Continued*

	Access		Use		FI	
	(1)	(2)	(1)	(2)	(1)	(2)
SY		0.148*** (0.054)		0.241*** (0.074)		0.190*** (0.048)
Const.	0.045 (0.034)	-0.209*** (0.037)	0.037 (0.034)	-0.116** (0.048)	0.037 (0.032)	-0.175*** (0.033)
Obs.	384	384	384	384	384	384
Prob > F	0.0000	0.000	0.000	0.000	0.000	0.000

Independent and control variables are described in Table 1. The study period is from 2006 to 2018. Standard errors are in parentheses.

\*, \*\*, and \*\*\* are significant levels at 10%, 5%, and 1%, respectively.

**Table 6.** *Economic Integration and Financial Inclusion by Region - New FI Indices*

	Access			Use			FI		
	AS	AF	LA	AS	AF	LA	AS	AF	LA
GEI	0.196** (0.058)	0.115*** (0.043)	-0.026 (0.057)	0.480*** (0.081)	0.318*** (0.071)	0.136*** (0.047)	0.321*** (0.057)	0.204*** (0.040)	0.044 (0.047)
REI	0.020 (0.031)	0.035* (0.019)	0.019 (0.024)	-0.028 (0.041)	-0.072 (0.074)	-0.022 (0.020)	-0.001 (0.027)	-0.011 (0.034)	0.002 (0.019)
GDPC	0.383*** (0.086)	0.112** (0.042)	0.098 (0.069)	0.211** (0.103)	0.089 (0.141)	0.112 (0.069)	0.311*** (0.072)	0.103 (0.069)	0.105* (0.060)
IQ	0.134** (0.061)	0.027 (0.066)	0.199*** (0.061)	0.185*** (0.060)	0.540*** (0.150)	0.230*** (0.060)	0.158*** (0.046)	0.251*** (0.075)	0.214*** (0.052)
MS	0.101*** (0.033)	0.014 (0.023)	0.082*** (0.024)	0.001 (0.037)	0.005 (0.056)	0.043** (0.020)	0.058* (0.030)	0.010 (0.030)	0.066*** (0.018)
SY	0.362* (0.192)	0.308*** (0.089)	0.083 (0.066)	0.324** (0.131)	0.315 (0.195)	0.140** (0.066)	0.349*** (0.122)	0.313*** (0.111)	0.109* (0.058)
Const.	-0.427*** (0.118)	-0.094* (0.048)	-0.151** (0.070)	-0.595*** (0.098)	-0.107 (0.082)	-0.319*** (0.048)	-0.508*** (0.083)	-0.105** (0.049)	-0.230*** (0.052)
Obs.	132	132	120	132	132	120	132	132	120
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Independent and control variables are described in Table 1. The study period is from 2006 to 2018. Standard errors are in parentheses.

\*, \*\*, and \*\*\* are significant levels at 10%, 5%, and 1%, respectively.

## 2. Alternative regression techniques

In the second robustness test, we consider the possibility that the previous level of financial inclusion can explain its current state. We then apply the system generalized method of moments (GMM) technique, developed by Roodman (2009) as an extension of Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998) to estimate the following dynamic model:

$$FI_{i,t} = \alpha_i + \beta_1 FI_{i,t-1} + \beta_2 GEI_{i,t} + \beta_3 REI_{i,t} + \sum_{k=1}^4 \beta_{k+3} CV_{k,i,t} + \epsilon_{i,t} \tag{5}$$

As stated by Davidson and Mackinnon (1993), in the presence of lagged variables, using the system GMM can help obtain unbiased and efficient estimators, along with other advantages, including considering unobservable factors and correcting the simultaneous bias between the variable of interest and control variables (Rodrik, 2003; Wooldridge, 2015). Consequently, the system GMM is preferred for our analyses. Besides, we choose a two-step rather than a one-step method, as it controls heteroskedasticity better (Malik et al., 2022). Two specific tests are executed to verify the consistency of our GMM estimators. The first is the Arellano-Bond for zero autocorrelation in second-differenced errors. The second one is the Hansen test of over-identifying restrictions, which examines the overall validity of the instruments.

Because GMM estimation does not work well for samples where the number of groups is smaller than the number of periods like our subsamples (Canh et al., 2020; Malik et al., 2022), for the regional regressions, we use feasible generalized least square (FGLS) estimation for Equation (4) to verify our results.

The results from GMM and FGLS estimations are reported in Tables 7 and 8.

**Table 7.** *Economic Integration and Financial Inclusion - GMM Estimation*

	Access		Use		FI	
	(1)	(2)	(1)	(2)	(1)	(2)
L. Access	0.974*** (0.044)	0.984*** (0.046)				
L. Use			0.898*** (0.091)	0.806*** (0.133)		
L. FI					0.990*** (0.027)	0.974*** (0.041)
GEI	0.034 (0.037)	0.041 (0.042)	0.092* (0.050)	0.146* (0.081)	0.035* (0.019)	0.043** (0.021)
REI	0.054** (0.027)	0.035** (0.018)	0.006 (0.013)	0.001 (0.027)	0.007 (0.007)	0.007 (0.008)
GDPC		-0.103*** (0.035)		-0.098 (0.099)		-0.068* (0.039)
IQ		0.014 (0.053)		0.063 (0.055)		0.036 (0.027)
MS		0.013 (0.032)		0.045 (0.055)		0.005 (0.019)
SY		-0.026 (0.041)		-0.119** (0.060)		-0.045 (0.052)
Const.	-0.024 (0.017)	0.041* (0.023)	-0.010 (0.014)	0.055 (0.048)	-0.010** (0.006)	0.035 (0.031)

**Table 7.** *Continued*

	Access		Use		FI	
	(1)	(2)	(1)	(2)	(1)	(2)
Obs.	384	384	384	384	384	384
Instruments	17	27	17	27	17	27
Prob > Chi <sup>2</sup>	0.000	0.000	0.000	0.000	0.000	0.000
AR (2)	0.752	0.980	0.792	0.698	0.864	0.975
Hansen	0.536	0.267	0.364	0.247	0.674	0.333

Variables are described in Table 1. The study period is from 2006 to 2018. Standard errors are in parentheses. \*, \*\*, and \*\*\* are significant levels at 10%, 5%, and 1%, respectively.

**Table 8.** *Economic Integration and Financial Inclusion by Region - FGLS Estimation*

	Access			Use			FI		
	AS	AF	LA	AS	AF	LA	AS	AF	LA
GEI	0.042 (0.031)	0.023** (0.010)	-0.014 (0.027)	0.284*** (0.047)	0.113** (0.048)	0.052 (0.036)	0.108*** (0.037)	0.067*** (0.021)	-0.003 (0.030)
REI	-0.006 (0.010)	0.010** (0.005)	0.009 (0.007)	0.007 (0.020)	0.036* (0.020)	0.004 (0.011)	-0.004 (0.013)	0.013 (0.009)	0.010 (0.008)
GDPC	0.215*** (0.044)	0.032** (0.014)	0.075*** (0.027)	0.213*** (0.058)	0.222*** (0.062)	0.104** (0.045)	0.233*** (0.051)	0.116*** (0.026)	0.097*** (0.031)
IQ	0.089** (0.035)	-0.004 (0.015)	0.034 (0.023)	0.123** (0.053)	0.294*** (0.078)	0.085** (0.037)	0.114*** (0.040)	0.083*** (0.032)	0.043* (0.026)
MS	0.076*** (0.020)	0.025*** (0.009)	0.040*** (0.014)	0.009 (0.028)	0.005 (0.028)	0.024 (0.017)	0.057** (0.023)	0.019 (0.013)	0.032** (0.014)
SY	0.399*** (0.071)	0.134*** (0.033)	0.115*** (0.032)	0.167*** (0.061)	0.006 (0.086)	0.185*** (0.050)	0.326*** (0.067)	0.150*** (0.040)	0.121*** (0.036)
Const.	-0.297*** (0.061)	-0.013 (0.012)	-0.121*** (0.030)	-0.324*** (0.065)	-0.037 (0.053)	-0.248*** (0.037)	-0.322*** (0.058)	-0.049** (0.022)	-0.159*** (0.032)
Obs.	132	132	120	132	132	120	132	132	120
Prob > Chi <sup>2</sup>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Variables are described in Table 1. The study period is from 2006 to 2018. Standard errors are in parentheses. \*, \*\*, and \*\*\* are significant levels at 10%, 5%, and 1%, respectively.

As demonstrated, the results in Tables 5-8 indicate similar patterns that validate our previous findings.

## IV. Conclusions

Using data from thirty-two middle-income countries between 2006 and 2018, this paper investigates the impact of economic integration, at global and regional levels, on financial inclusion. The regression results for all countries show a positive relationship between the

economic integration and financial inclusion with global integration exposing a more substantial effect than the regional one. Regarding two individual dimensions of financial inclusion, our results reveal a significantly positive impact of *REI* on *Access* and *GEI* on both *Access* and *Use*. These results indicate that the increase in globalization level goes together with the growth in formal financial services outreach and usage, whereas regionalization enhances the accessibility of financial services only.

Furthermore, we divide our countries into three subsamples to detect whether the economic integration-financial inclusion relationship diversifies across regions. The results of the three regional regressions share the same conclusion as those of all countries. In detail, we find a strong and significant impact of global integration but a weak and insignificant impact of regional integration on financial inclusion, both in aggregate and disaggregate indices. Among these regions, economic integration has the most substantial influence in Asia. In contrast, we do not find evidence of such influence in Latin America.

Our findings remain unchanged after several robustness checks. Overall, this study reveals the crucial role of economic integration as one of the motivators for achieving an inclusive financial system in middle-income countries. It encourages governments and policymakers to find and apply suitable policies to promote trade and financial openness, as this will, in turn, enhance financial inclusion. Besides, our results suggest that a country should not focus on establishing economic cooperation with its neighbors only, but also on expanding its connections with countries in different parts of the world to exploit efficient economic integration's benefits.

One prospective extension of our study is to explore the effect of different quantiles of economic liberation on different quantiles of financial inclusion by applying the quantile-on-quantile (QQ) approach. This idea arises from recent studies that have confirmed that the QQ approach might give different results and more detailed explanations for the investigated relationship, compared to traditional ones (Atsalakis et al., 2021; Qureshi et al., 2020). We will address this matter in future work.

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