Does financial inclusion improve bank performance in the Asian region?

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World Bank considers financial inclusion a fundamental and practical mechanism for reducing poverty and boosting prosperity in developing and emerging markets. However, the direct benefits of financial inclusion to bank performance appear to have been largely ignored in the academic literature, in particular in the emerging markets in the Asian region. Unlike previous studies, both bank and country characteristics are considered in this paper. The financial inclusion index is estimated using four sub-indices that can be classified into two groups: the penetration and utilisation of financial products and services. Principal component analysis and dynamic generalized method of moments (GMM) are used on a sample of 1507 banks in emerging markets in Asia for the 2008–17 period. Findings indicate that, across various scenarios, financial inclusion provides a positive and significant contribution to bank performance in the Asian region. In addition, a larger distance to the bankruptcy of banks and higher national economic growth will enhance bank performance.

Introduction

Financial inclusion is generally seen as when individuals and businesses, especially low-income and vulnerable groups, are provided with access to useful financial products and services at affordable prices. Financial inclusion is initiated to create livelihoods and rotate investment flows and savings (Fungacova and Weill 2014). In recent years, many governments and international organisations see the promotion of financial inclusion as one of the central goals in the overall socioeconomic development plan. Since 2010, more than 55 countries have made comprehensive financial commitments on developing national financial inclusion strategies (Demirgüç-Kunt et al. 2018). Individuals can use financial services, such as credit and insurance, to expand their businesses, invest in health, manage risk, and minimise financial shocks. Financial inclusion can help in managing financial emergencies, such as job losses or crop failures, which can expose families to poverty (Swamy 2014).

Many different approaches to financial inclusion can be used. One is to develop financial services that can serve multiple purposes, such as accounts for income or account transfers, savings accounts for safe deposit storage, personal or business loans, and insurance products. Another approach, from the

financial services provider's perspective, posits that financial inclusion can be achieved through enlarging the number and variety of financial services and products offered. Finally, from the user's perspective, financial inclusion refers to the number of businesses and investors who receive credit from banks. Financial inclusion can also be measured as the percentage of people using accounts at financial institutions by gender and by income category. It can also represent the proportion of people using accounts to receive and transfer money or borrow money, and the extent to which they use insurance products (Jahan et al. 2019).

As beneficial as financial inclusion appears to be, a few scholars have raised the suspicion that financial inclusion can exert a negative impact on the health of the banking sector. Their arguments focus on the potential risks associated with low-income segments of the population, whose participation in the banking sector is considered to incur higher information and transaction costs, due to deficiencies in collateral and credit history. Moreover, weak governance and regulatory systems may expose domestic financial institutions to financial risks. Several empirical studies have validated this proposition. For instance, Mendoza et al. (2009), studying international financial integration during the 1980s, find a negative relationship between financial access and non-performing loans in countries with deep financial market borrowing. Similarly, Bhattacharyya et al. (2020) confirm no association between financial inclusion and market-based banks' performance in India between 2015 and 2017.

The notion of financial inclusion causing harm to the banking sector is particularly relevant in the Asian region, where banks are increasingly gaining importance (Vo et al. 2020a, b). Asia has been the world's largest regional banking market for a decade, generating pre-tax profits of over US$700 billion and accounting for 37 per cent of global banking profits in 2018 (Dahl et al. 2020). More than 40 of the world's 100 largest banks by assets are located in Asia. Together they account for approximately 50 per cent of the markets capitalisation globally.

However, since the Global Financial Crisis (GFC) 2008/2009, the Asian banking industry's performance, while still healthy, has slowed considerably. The average banking return on equity in Asia declined from 12.4 per cent in 2010 to 10.1 per cent in 2018. Revenue growth has decelerated from double digits in the early years of the decade to 5 per cent per annum for the period 2014 to 2018 (Dahl et al. 2020).

The increasing vulnerability of the banking system in Asia post-GFC, coupled with financial inclusion aspirations in the region, poses an interesting question about their connection. Thus, this study was conducted to examine the impact of financial inclusion on bank performance in Asia. We make contributions to the literature in three ways. First, the paper focuses on the emerging markets in the Asian region, which has largely been neglected in the financial inclusion literature. Second, we take into account both bank characteristics and the countries' characteristics to ensure the robustness of the findings. Finally, while most papers appear to ignore the potential endogeneity in the relationship between financial inclusion and bank performance, a highly recommended generalized method of moments (GMM) estimation technique is employed to tackle this issue.

The structure of the paper is as follows. The next section discusses the literature review with a focus on the relationship between financial inclusion and the bank performance. The third section discusses the data and research methodology. In this section, we focus on the construction of a financial inclusion index for countries across the Asian region using principal component analysis (PCA). Empirical analyses and discussions, including pre- and post-tests before the adoption of the GMM, are presented and discussed in the fourth section. The last section provides conclusions and policy implications.

Literature review

Interactions between finance and growth have been of great interest to researchers and

policymakers because of their implications for the macroeconomy. There are two schools of thought explaining the mechanism by which one affects the other. First, the neoclassical theory of growth (Solow 1956; Swan 1956) concludes that the aggregated product is determined solely by a function that contains only real variables, which are the accumulative stock of human and physical capital. Long-run growth is primarily subjected to technological progression. As such, finance in neoclassical economic theory is the handmaiden to the economy, which adapts passively to changes in the production factors (King and Levine 1993). Second, the Schumpeterian view argues that finance not only affects national aggregated products by reallocating resources and optimising their use but also explains the divergence in country-wise growth (Schumpeter 1912; McKinnon 1973; Shaw 1973). The debate stemming from this strand circles around four channels through which finance provides its spurring effects on growth. First, financial development narrows the income gap between different cohorts in society by providing them opportunities to consider non-convex investments such as increasing human capital through education, expanding the scale of production, or adopting advanced technologies (Pagano 1993; Wu et al. 2010). Second, the financial sector ensures the optimal use of resources by reallocating them to imminent growth opportunities so that none of them can be neglected (Rajan and Zingales 2003; Beck and Demirguc-Kunt 2009). This mechanism also gives rise to the efficiency of financial intermediaries (Arestis et al. 2001). Third, the financial market minimises the asymmetry and information cost of firms that have previously been privatised or financed by bringing corporate governance into play (Jensen and Meckling 1976; Levine 1997). Four, the financial system nurtures the specialisation in entrepreneurship and improves overall productivity (Greenwood et al. 2013).

Many empirical studies have been conducted examining the effects of financial inclusion on bank performance, their competitive attitudes, the concentration, and the profitability of the banking sector. These studies can be generally categorised into two strands of research. The first strand focuses on improving bank profits, which can be achieved by the implementation of financial inclusion. Studies in this strand of research are involved with the enhancement of profitability by cost reduction for providing banking products and services and by promoting an inclusive financial system. By contrast, the second strand of research argues that extensive financial inclusion will reduce the profitability of the banking sector. We briefly discuss selected academic papers in each of these strands in the following text.

Findings from various studies support the view that financial inclusion enhances a bank's performance (see, for example, Ahamed et al. 2018; Chauvet and Jacolin 2017; Akhisar et al. 2015; Bose et al. 2017; Shihadeh et al. 2018). Ahamed et al. (2018) argue that financial inclusion has positive effects on bank performance. Using a sample of 55,596 firms in 79 countries covering the period 2006–14, Chauvet and Jacolin (2017) suggest that a low level of financial inclusion would be detrimental to the expected benefits from the development of the banking system in emerging countries. Akhisar et al. (2015) argue that technological innovations would increase the opportunity for banks to have advantageous pricing power in the money market. This analysis concludes that several products from banks have their effects on profitability. Shihadeh et al. (2018) confirm the impact of financial inclusion on Jordanian banks' performance from 2009 to 2014.

As regards the link between financial inclusion and bank stability, empirical findings are mixed. From analysis of a sample of 87 countries over the period 2004–12, Ahamed and Mallick (2017) conclude that the adaption of an inclusive financial system provides banks with more stable sources of retailed deposits and savings rather than needing reliance on expensive funding. A similar finding was made in López and Winkler (2019) and Vo et al. (2019), studies that argued that financial inclusion often accompanied the more resilient banking systems during the crisis.

In contrast, Kacperczyk and Schnabl (2013) argue that the inclination for banks to chase

profits would gradually change their risk-taking attitude and make them more vulnerable to financial shocks. Using a data set of 5708 banks in Europe over the period 1996–2007, Poghosyan and Cihak (2011) reveal that the more concentrated the banking system, the more likely and the more severe the financial distress. Demirgüç-Kunt and Huizinga (2010) argue that banks associated with a higher ratio of non-deposits funding, non-interest return in their capital structure, and income experience a faster growth rate and also a higher risk.

We now focus on studies whose findings indicate that financial inclusion reduces a bank's profitability. A fundamental basis for this view is that extending financial inclusion will lead to potential bankruptcy because providing bank products and services to underprivileged companies or clients is very risky. Selected studies with findings that support this view include Čihák et al. (2016), Dabla-Norris et al. (2015), Sarma and Pais (2011), Bhattacharyya et al. (2020), Vo et al. (2020a,b), and Uddin et al. (2017). In particular, Čihák et al. (2016) consider that the inclusiveness causes banks to be more vulnerable to noncreditworthy groups of firms and households. Similarly, Dabla-Norris et al. (2015) and Sarma and Pais (2011) conclude that adverse effects can be found from financial inclusion on bank's non-performing loans and that non-performing assets are inversely associated with financial inclusion, indicating that greater financial inclusion has not contributed to the performance of the banking system. No link between expenditure on corporate social responsibility, financial inclusion, and market-based bank's performance was found in Bhattacharyya et al.'s (2020) study using a sample of Indian banks covering the period 2015–17.

Our literature review on financial inclusion and bank performance highlights several issues that are important in our empirical investigation. First, existing academic papers appear to ignore the important role of financial inclusion in bank performance in the Asian region. We consider that this paper, with its exclusive focus on the Asian region—one of the most dynamic economic regions in the world—will provide direct evidence and policy implications for the governments in the region, in particular for emerging markets. Second, the formation of the estimation equations used appears to ignore the important roles of both bank characteristics and countries' characteristics. This inclusion is particularly important for the Asian region due to the differences between countries in the region. Third, empirically, most existing research appears to ignore the potential endogeneity in the data, which is generally considered inevitable in studies that use panel data sets containing macroeconomic variables. For this reason the GMM estimation technique is used in this paper.

Data and research method

The construction of the financial inclusion index

Financial inclusion is considered a multifaceted phenomenon that varies in its computational method. The financial inclusion index, a proxy for measuring the extent of financial inclusion, is computed from two different dimensions. Each of the two illustrates one side of comprehensive financial integration.

The financial inclusion index developed is estimated using four sub-indices that can be classified into two groups. The groups represent the penetration dimension and the utilisation dimension of financial inclusion. The penetration dimension denotes the financial approachability of banks and other financial institutions. This dimension could also be known as the supply-side dimension. The utilisation dimension represents the absorption of financial products and services, which belong to the demand side. We employ two indicators to account for the degree of penetration of financial inclusion: (1) the number of ATMs per 100,000 people; and (2) the number of bank outlets per 100,000 adults. For the utilisation dimension, we use another two indicators: (3) the number of credit cards; and (4) the number of debit cards per 1000 adults.

These indicators are highly correlated with each other. For this reason, the study uses PCA to retain the most important information from each indicator and to address the potential correlation among them. The PCA approach takes the first component as the factor that possibly has the highest variation to explain most of the variation in the data set. The successive components/determinants in conjunction with the first component form an orthonormal basis and capture the remaining unexplained fluctuations. The calculation is as follows.

$$PC_m = \sum_{n=1}^{4} loading_n \times determinant_n$$

$$FD_{i,t} = \sum_{m=1}^{M_i} PC_m \times IVC_m$$

where PC_m denotes the number of selected components for each country; determinants, respectively, stands for the number of ATMs per 100,000 people, the numbers of bank outlets per 100,000 adults, the number of credit cards per 1000 adults, and the number of debit cards per 1000 adults. Loading stands for the factor loadings of the corresponding indicators. IVC_m stands for the individual variance contribution of the corresponding component. Table 1 reports the IVC and several components selected for each country using the PCA method.

Results in Table 1 indicate that the number of principal components for each emerging country in Asia varies from one to two. To develop a single index for each country, an 85 per cent threshold, which was highly favourable in previous studies such as He et al. 2017 and Vo et al. (2021), is selected. The corresponding IVCs of principal components are used as the weights. Thirteen emerging countries in Asia with sufficient data are included in the final sample.

Data

To capture the effects of financial inclusion on bank performance in emerging markets in the

Table 1
The individual variance contribution (IVC) for 13 emerging markets in the Asian region, 2008–17

Country name	Country code	IVC	Number of components
Armenia	ARM	0.9911	2
Azerbaijan	AZE	0.8650	1
Bangladesh	BGD	0.9492	1
Georgia	GEO	0.8582	1
Indonesia	IDN	0.9692	2
India	IND	0.9905	2
Kazakhstan	KAZ	0.9564	2
Malaysia	MYS	0.9202	2
Nepal	NPL	0.9889	2
Pakistan	PAK	1.0000	2
The Philippines	PHL	0.9488	2
Thailand	THA	0.9593	1
Vietnam	VNM	0.8604	1

Notes: The IVC is the variation proportion that is captured by those principal components. The study only takes into account those vectors with cumulative explanatory variation up to 85 per cent.

Asian region, we use data from various sources, including: (1) information from balance sheets and income statements of various banks in the Asian region; (2) macroeconomic indicators for income level, the economic freedom index, and the degree of financial market development from the World Bank Key Indicators and the World Economic Freedom website, and (3) data from the Financial Access Survey of the International Monetary Fund. We only include banks located in countries where the financial inclusion index for the country over the period 2008–17 can be calculated using available data. As such, our sample covers 1507 banks in the Asian region over the 2008–17 period. Data from the balance sheets and income statements are deflated by the US dollar at the end of the year. Table 2 presents the descriptive statistics of the variables included in the analysis.

Research methodology

We begin the regression analysis by examining the relationship between financial inclusion

Table 2
Descriptive statistics of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Z-score	5560	5.788	11.31	−29.40	226.19
Bank size	5862	14.34	2.52	4.96	21.76
ROA	5622	0.86	5.52	−223.61	57.39
Market power	4087	3.90	0.77	−3.26	9.69
GDP growth	5975	3.86	2.85	−5.41	10.59
Financial inclusion	5975	0.20	0.10	0.06	0.57
Economic Freedom index	5975	7.16	0.62	5.84	8.69
Financial market development	5975	6.36	0.74	4.72	8.35
No. of banks: 1507					

Notes: Z-score represents the index of stability, which is calculated by the ratio $\frac{\text{ROA+EQA}}{\text{sd(ROA)}}$. Bank size is used to capture the effect of size, which is derived by taking the natural logarithm of total assets. GDP growth is used to capture the country-wise heterogeneity. The Economic Freedom index is used to capture the institutional differences and was collected from Heritage. The index of financial market development was collected from the World Economic Forum, which captures the extent of efficiency and trustworthiness of financial intermediaries.

and bank performance in the Asian region using the following equation.

$$\text{ROA}_{it} = f(\text{Bank characteristics})_{it} \\ + f(\text{Macroeconomics})_{it} \\ + f(\text{Financial inclusion})_{it} + e_{it}$$

Each of these groups of variables is discussed in turn as follows:

• $f(\text{Bank characteristics})_{it}$ represents bank characteristics that can potentially affect performance. These characteristics include bank size; Z-score, and market power. As there is a significant difference in scale between banks across the region, we take the natural log of bank total assets to normalise for size. Market power or bank competitiveness power is measured using the following equation:

$$\text{Market power}_{it} = \\ \frac{(\text{Gross loan}_{it} - \text{NPL}_{it}) \times \text{NIM}_{it} + \text{NII}_{it}}{\text{Operation revenues}_{it}}$$

where NPL stands for the non-performing loans in the same period. NIM and NII are the net interest margin and the net interest income of banks, respectively. The control variable Z-score is presumably capturing

bank stability. It is often used to link a bank's capitalisation with its return on assets (ROA) and risk. The Z-score indicates the number of standard deviations of a bank's asset returns declines before the bank becomes insolvent. On the basis of previous studies such as Han and Melecky 2013, Ahamed and Mallick (2019), and Vo et al. (2020a,b), the banking sector stability is measured as:

$$\text{Bank's Z} - \text{score}_{it} = \frac{\text{ROA} + \text{EQA}}{\text{sd(ROA)}}$$

where ROA denotes the return on assets, EQA is defined as the ratio between the bank's total equity and the bank's total assets. The abovementioned equation of Z-score implies the extent to which the ROA would have decreased before the bank's equity depletes. The Z-score denotes the attitude of a bank for every unit of systematic and unsystematic risk measured in terms of the variation of the ROA. As such, the higher the Z-score, the more stable and resilient the bank becomes.

• $f(\text{Macroeconomics})_{it}$ includes the set of macroeconomic factors that can potentially affect a bank's performance. Economic growth, financial development index, and economic freedom are three

variables that capture the macroeconomic heterogeneity in the data. Empirical studies from Levine (1997) and Ferreira (2012) confirm that financial developments exert a positive effect on growth and that they Granger-cause each other. La Porta et al. (1999), Chinn and Ito (2002), and Laeven (2003) ascertain that institutional quality explains the differences in the different level of financial development.

In the analysis, we use the level of economic freedom and financial market development as instruments for the GMM regression.

- $f(\text{Financial inclusion})_{it}$ is an index calculated from four sub-indices, including (1) the number of ATMs per 100,000 adults; (2) the number of bank branches per 100,000 adults; (3) the number of credit cards per 1000 adults; and (4) the number of debit cards per 1000 adults.

Empirical findings

The financial inclusion index of selected countries in the Asian region

PCA is often used for exploring relationships that lie underneath data and common tests. Following the procedure described in section The Construction of the Financial Inclusion Index, Table 3 presents the descriptive statistics of the financial inclusion index observed in the emerging markets in the Asian region.

Prior to the application of the PCA technique, we normalise four input indicators in order to receive more robust results. Additionally, as previously noted, the first components always take the majority of the variation among the dataset using the threshold of 85 per cent.

The pre-test checks

As presented in Table 4, our analyses indicate that the multicollinearity problem among independent variables is weak or non-existent.

Table 3
Financial inclusion index, by country, in the Asian region, 2008 to 2017

Country	Mean	Standard deviation	Min	Max
Armenia	0.2463	0.0373	0.1757	0.2803
Azerbaijan	0.1575	0.0225	0.1264	0.1884
Bangladesh	0.0713	0.0057	0.0648	0.0775
Georgia	0.4112	0.1371	0.1983	0.5739
Indonesia	0.1778	0.0214	0.1449	0.2012
India	0.1153	0.0409	0.0648	0.1832
Kazakhstan	0.1975	0.0256	0.1586	0.2211
Malaysia	0.0901	0.0386	0.0221	0.1242
Nepal	0.0817	0.0106	0.0717	0.0961
Pakistan	0.0921	0.0039	0.0879	0.0957
The Philippines	0.0773	0.0060	0.0689	0.0839
Thailand	0.3369	0.0685	0.2156	0.4190
Vietnam	0.1071	0.0369	0.0468	0.1480

We perform the Wooldridge test for autocorrelation analysis. The *p*-values from this test indicate that all four models exhibit autocorrelation. Therefore, we apply the robust standard error option to deal with the variance–covariance matrix estimator. With regard to the existence of heteroscedasticity, we use a modified Wald test and the Breusch–Pagan test to examine the group-wise heteroscedasticity. Table 5 presents the results confirming that heteroscedasticity exists in all four models used in this paper.

In summary, our analyses indicate that all four models used suffer from autocorrelation and heteroscedasticity. We use GMM to overcome these problems. We note that the same approach has been used in previous studies (Sardo and Serrasqueiro 2017; Van et al. 2019; Vo et al. 2020a,b). Haris et al. (2019), Yao et al. (2018), and Arellano and Bond (1991) note that the GMM model uses the lagged dependent variable and the lag of all strictly exogenous variables. Roodman (2009) and Chan and Hameed (2006) also state that GMM estimation can be used to deal with the problems of serial correlation or unobservable heterogeneity.

The empirical results

We choose four different models corresponding to the following four scenarios. Model

Table 4
Pairwise correlation coefficients and the variance inflation factor (VIF) among variables

	Variables	VIF	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1)	ROA		1.000							
(2)	Z-score	1.05	0.132*	1.000						
(3)	Financial inclusion	2.02	0.025	0.004	1.000					
(4)	Bank size	1.28	0.048*	0.134*	0.058*	1.000				
(5)	Market power	1.00	−0.033	−0.018	0.008	0.018	1.000			
(6)	GDP growth	1.21	−0.070*	0.007	−0.254*	0.104*	0.026	1.000		
(7)	Economic Freedom	2.31	0.029	0.007	0.598*	−0.013	−0.002	−0.112*	1.000	
(8)	Financial development	1.58	0.009	0.098*	0.222*	0.347*	−0.006	0.046*	0.422*	1.000

Notes: * denotes the correlation coefficients with statistical significance at the 0.01% level.

1 considers the full 10-year period from 2008 to 2017 (where data are available). Model 2 considers the impact of the GFC using a dummy variable in 2008 and 2009. Model 3 assumes the GFC was only in 2008; as such, a dummy variable is used in 2008 only. Model 4 shortens the period of eight years from 2010 to 2017, that is, excluding 2008 and 2009, the two years of the GFC.

The results using the GMM are shown in Table 6. The evidence across the four models shows the positive effect of financial inclusion on bank performance in the emerging markets in the Asian region. In the ideal conditions of full financial inclusion, the bank's ROA increases five to eight percentage points with a one percentage point increase in the degree of financial inclusion. In addition, banking sector stability, as proxied by the Z-score is found to

contribute positively to bank performance. These findings are consistent with findings from Shihadeh et al. (2018), Ahamed and Mallick (2017), and López and Winkler (2019). Moreover, the coefficients of GDP per capita show that banks in emerging markets tend to outperform those in the developed countries. These empirical findings are consistent with Chauvet and Jacolin (2017) and Liang and Reichert (2006). Moreover, the positive effect of GDP on a bank's performance reconfirms the theory of Schumpeter (1912) and Levine (1997) that the financial market optimally allocates economic resources to investment opportunities and therefore promotes growth. The performance of financial systems in emerging markets also suggests the future convergence in incomes, the factor often excluded in the traditional growth model of Solow (1956) and

Table 5
Wooldridge autocorrelation test and modified Wald test

	Wooldridge test		Modified Wald test		Breusch–Pagan test	
	F-test	Existence of autocorrelation	χ^2 test	Existence of heteroscedasticity	χ^2 test	Existence of heteroscedasticity
Model 1	9.907 (0.0017)	Yes	1.8e+36 (0.0000)	Yes	2704.95 (0.0000)	Yes
Model 2	9.914 (0.0017)	Yes	6.0e+31 (0.0000)	Yes	3074.06 (0.0000)	Yes
Model 3	9.935 (0.0017)	Yes	3.7e+31 (0.0000)	Yes	2939.61 (0.0000)	Yes
Model 4	9.965 (0.0016)	Yes	2.6e+31 (0.0000)	Yes	3392.39 (0.0000)	Yes

Table 6
Empirical findings

	Difference GMM	Difference GMM controlled for crisis effect in 2008 and 2009	Difference GMM controlled for crisis effect in 2008 only	Difference GMM for the 2010–17 period
	Model 1 ROA	Model 2 ROA	Model 3 ROA	Model 4 ROA
Z-score	0.4364***	0.4461***	0.3057***	0.3197***
	(11.48)	(11.57)	(13.38)	(16.61)
Financial inclusion	5.1184*	5.0881*	8.1566***	8.9090***
	(1.92)	(1.81)	(3.13)	(4.59)
Bank size	−0.1265	−0.0937	0.0483	−0.063
	(−1.07)	(−0.75)	(0.61)	(−0.8)
Market power	−0.001**	−0.0011**	−0.0015***	−0.0026***
	(−2.00)	(−2.31)	(−2.78)	(−7.83)
GDP growth	0.0211*	0.0219**	0.0164*	0.0247***
	(1.72)	(2.08)	(3.53)	(3.05)
Economic freedom index	−0.2575***	−0.2949***	−0.5217***	−0.6202***
	(−2.59)	(−3.07)	(−5.40)	(−7.55)
Financial market development	0.2059***	0.1271***	0.2967***	0.2921***
	(7.38)	(4.51)	(12.29)	(10.51)

Notes: *t*-statistic are reported in parentheses. *, **, ***, represent statistical significance at the 10 per cent, 5 per cent, and 1 per cent levels. We use system GMM controlled for heteroscedasticity and robustness for our estimators. The instrumental variables in the IV-stage include financial market development and the economic freedom index. Second, third, and fourth lag orders of the Z-score, GDP growth, and financial inclusion are considered endogenous. Option collapse is specified for restricting the proliferation of the instruments.

Swan (1956). One possible explanation for the positive correlation between growth and bank performance is the need for minimalisation of the acquisition cost of investment opportunities.

Bank performance also positively correlates to the level of financial development in all four models (measured by trustworthiness and efficiency), which is consistent with findings from other studies (Levine 1997; Wu et al. 2007; Demirgüç-Kunt and Levine 2008). The coefficient of the economic freedom index, which is used to capture the degree of financial liberalisation, is negatively correlated to bank performance in the Asian region. Angkinand et al. (2010) argue that the financial liberalisation process is associated with the efficiency of banks only in countries whose legal system and contractual enforcement are adequately strong. The Asian region contains many countries whose legal origin is derived from colonisation (La Porta et al. 1999). Negative effects of financial liberalisation on bank performance are similarly found in other empirical studies such as Denizer et al. (2000) and Koeva (2003).

Lastly, our empirical results reconfirm the evidence that a higher level of financial penetration and use, meaning a higher degree of financial inclusion, induces better performance in the banking sector in the emerging markets of the Asian region.

The post-test checks

The results from Sargan, Hansen, and Arellano-Bond statistics confirm the validity of the instrumental variables in the GMM estimations. We note Haris et al. (2019) considered that the GMM model is still valid when AR (2) is absent, even if AR (1) exists. Neither AR is present here. Hence, we conclude that the findings using the GMM estimation technique are robust. Moreover, all four models pass the test for the exogeneity of instruments. The *p*-values of the

Table 7
Post-GMM estimation checks

	Model 1 ROA	Model 2 ROA	Model 3 ROA	Model 4 ROA
Sargan test	47.16	41.62	66.55	60.51
	(0.984)	(0.996)	(0.690)	(0.385)
AR(1) test in first differences	0.51	0.43	0.35	−0.04
	(0.612)	(0.668)	(0.725)	(0.966)
AR(2) test in first differences	−1.12	−1.14	−1.19	−1.23
	(0.263)	(0.255)	(0.235)	(0.220)
Hansen test	1.32	−0.29	0.1	0.92
	(0.517)	(1.000)	(0.952)	(0.631)

Hansen test of the four models are all below one, except for the second model; which confirms that our selected models do not suffer from the over-identification of the instruments, as suggested by Roodman (2007) (Table 7).

Conclusions and policy implications

Financial inclusion is generally considered a key mechanism in driving human development by supporting inclusive growth, economic development, and financial deepening. Financial inclusion has become a key enabler in reducing poverty and boosting prosperity. Financial inclusion can provide millions of currently unbanked adults with access to and active use of affordable financial products and services for their needs in making transactions, payments, savings, credit, and insurance. The benefits of financial inclusion to society and the economy are widely recognised. However, the direct benefits of financial inclusion to bank performance appear to have largely been ignored in the academic literature, in particular for emerging markets in the Asian region.

This paper examined the contribution of financial inclusion to bank performance in the emerging markets in the Asian region. The paper exclusively focused on 13 emerging markets in the Asian region where the required data at the individual bank level were available for the period 2008–17. Bank's performance was proxied by the return on assets (ROA). A widely recognised dynamic GMM estimation technique for panel data was used to ensure the robustness of the findings. Various scenarios were considered including: (1) the entire period of 2008–17 (Model 1); (2) a dummy variable used to control for the effects of the financial crisis in 2008 and 2009 (Model 2); (3) a dummy variable used to control for the effects of the financial crisis in 2008 (Model 3); and (4) a shortened period of 2010–17, that is, excluding the potential effects of the financial crisis in 2008/2009 (Model 4).

The key findings can be summarised as follows. First, across all four scenarios/models, financial inclusion does contribute positively and significantly to bank performance in the emerging markets in the Asian region. This finding provides an incentive for banks to support government strategies on financial inclusion because doing so will enhance their profitability. Second, a larger distance to bank bankruptcy will also enhance bank performance. This finding implies that in the pursuit of profitability by extending the customer base using financial inclusion strategies, banks in the region are reminded that safe operations are important. Third, bank market power in the emerging markets in the Asian region has a negative effect on bank performance. This finding supports the view that while maintaining a market share is important, building a market share does not necessarily lead to increased profits for banks—a finding that can be partially explained by the observation that the banking sector is becoming very competitive in the

region, and the sector is generally considered to be heavily regulated.

Electronic transactions can only be conducted when both parties are financially included; which means that they both have bank accounts. Financial digitalisation reduces the amount of paperwork and time required for conducting traditional transactions. As a result, people can now make a transaction such as paying a bill, transferring money, and purchasing goods online at any time without going to banks or ATMs or service hubs; which saves considerable effort and frees up labour for more skill-based tasks. Financial innovation reduces the marginal cost of producing services for service providers and provides them competitive advantages. Financial technology also overcomes the low permeability of banks to geographically disadvantaged regions.

In conclusion, technological advancement changes the relationship between labour and capital needed for the operations of banks. To capture the impacts of the FinTech revolution, the number of bank accounts may not change in the future but a number of ATMs might be redundant since digitalisation reduces the number of cash payments.

Emerging countries in the Asian region should reform their institutions and legal frameworks to encourage the formation of multi-factor financial markets. As discussed earlier, increasing electronic transactions should be considered a key goal because they can increase financial coverage. Moreover, there should be policies to promote electronic transactions such as reducing transaction costs or account creation fees. Bank agent models should also be encouraged, whereby non-bank organisations such as grocery stores, gas stations, and post offices act as agents supplying banking products.

Banks should also develop more diversified financial products. This market in emerging countries in the Asian region has vast potential in generating revenue streams but remains relatively untouched. Traditional and non-traditional financial institutions should work together to create products tailored to the needs of both urban and rural peoples.

Governments should accelerate the construction of infrastructure for the financial sector. The current distribution networks in many emerging markets are largely unchanged, through the presence of branches, transaction offices, and transaction points. Channels for providing services via mobile devices and the Internet such as debit cards, credit cards, ATMs, Internet Banking, Mobile Banking, and SMS Banking should be exploited to their full potential.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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