



# WORKING PAPER

## On the Relationship between Financial Inclusion and Bank Performance

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### Abstract

We explore the relationship between different measures of financial inclusion and banks' performance across a global sample of countries, characterised by different institutional and regulatory environments and income levels. We employ principal component analysis to construct an aggregate bank performance index, composed of a set of key indicators summarised by the CAMEL rating system, including banks' solvency, asset quality, efficiency, profitability, and liquidity. Our main findings suggest that different inclusion measures can have a different association with bank performance. Specifically, there seems to be a trade-off between bank performance and increased financial deepening, particularly in high income countries. In contrast, greater financial inclusion, measured as deposits to GDP, number of deposits, and number of borrowers, does not seem to adversely affect bank performance in low income countries. In fact, we find that banks in low income countries could achieve significant gains from improving financial access and enhancing the regulatory environment.

**Keywords:** Financial Inclusion; Bank Performance; CAMEL Ratios; Cross-Country Analysis; High and Low Income Countries.

**JEL Classification:** G21, G28, O57

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## INTRODUCTION

Financial inclusion refers to individuals and businesses' ability to access useful and affordable financial products and services that meet their needs. In recent years, financial inclusion has become a key objective for national governments, policy-makers, and development agencies as it is considered an important enabler for eight of the Sustainable Development Goals (SDGs) 2030, including lower poverty and higher development. The relative importance of financial inclusion has also been further emphasized by the COVID-19 pandemic which imposed significant restrictions on movement and business operations, making remote access to financial services essential. During this pandemic, banks played an important role in reaching out to individuals and small businesses in need, through channelling government disbursements and transmitting monetary actions (such as lowering costs of lending and providing credit guarantees). However, the reach of such measures to vulnerable groups is conditional on their ability to access formal financial services. In particular, digital financial services are of utmost importance in time of limited movement and interaction (Ayadi and Shaban, 2020). Without doubt, this is very challenging, as the World Bank Group reports that around 1.7 billion people worldwide do not even have a formal transaction account and has set a global goal to reach Universal Financial Access (UFA) by 2020<sup>5</sup> (World Bank, 2018).

Particularly in emerging economies, national governments have been encouraging banks to take a proactive role in enhancing access to financial services. For example, in 2010 the Reserve Bank of India (RBI) adopted a bank-led model to improve financial inclusion (in terms of deposit and loan accounts) which led to significant developments in setting up bank branches and ATMs in remote regions.<sup>6</sup> While this strategy requires initial investments, there are also many benefits, as banks reach new customers in their local communities. If and to what extent greater financial inclusion impacts bank profitability and soundness is an important empirical research question. The relationship is multi-faceted and it is reasonable to expect a significant variation in the impact of financial inclusion on banking sectors across countries. The level of income is important in determining the relationship, as literature reveals that the contribution of financial development towards stability and other macro-

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<sup>5</sup> There is no update from the World Bank if this goal has been achieved. The level of improvement would be clear when they launch the Findex database 2020.

<sup>6</sup> In particular, the Pradhan Mantri Jan Dhan Yojana (PMJDY) has been a game changer in the bank's role in financial inclusion in India (Markose et al., 2020).

indicators differs across income levels, suggesting that high income countries may have reached the stage of diminishing benefits from further development (De Gregorio and Guidotti, 1995; Sahay et al., 2015a). Hence, it is important to investigate whether this applies to the relationship between financial inclusion and bank performance.

The literature on the relationship between financial inclusion and bank performance is relatively scarce; it focusses mainly on the stability dimension of performance and generally provides mixed evidence. One view is that financial inclusion can enhance banks' stability as broader financial access to bank deposits improves diversification in the funding base, mitigating correlated deposit withdrawals during times of crisis (Han and Melecky, 2013); however, the economic viability of providing deposit accounts to the poor is still questionable (Markose et al., 2020). On access to credit, some studies, such as Adasme et al. (2006) and Morgan and Pontines (2018) find that increased lending to small businesses can cause the decreased probability of default and lower non-performing loans, thanks to greater diversification. In a more recent study, Le et al. (2019) show that, although increased financial inclusion negatively affects bank profitability, it positively influences financial stability. However, when credit growth is rapid or obtained by lowering the loan portfolio's quality, the relationship between financial inclusion, in terms of credit expansion and stability, can be negative (Mehrotra and Yetman, 2015, Sahay et al., 2015b, Beck et al., 2018). This has been witnessed during the global financial crisis of 2008, when rapid growth in credit provision led to high growth in defaults and caused instability in the banking system. Finally, there is also a view that the relationship between financial inclusion and stability is determined and moderated by country characteristics, such as the level of income and the regulatory environment (Sahay et al., 2015a, Dabla-Norris et al., 2015, Čihák et al., 2016).

Against this background, this paper sets out to explore the link between CAMEL-based<sup>7</sup> bank performance (hereafter referred to as bank performance) and financial inclusion.<sup>8</sup> Additionally, we check for potential differences across banks operating in countries characterised by different levels of income. We attempt to answer two key research questions: Is greater financial inclusion accompanied by an improvement or a decline in bank performance? Will the relationship between

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<sup>7</sup> Specifically, CAMEL analysis relates to five important dimensions of performance; (C) Capital, (A) Asset quality, (M) Management, (E) Earnings, and (L) Liquidity.

<sup>8</sup> Although microfinance institutions and other Fintech providers have a significant role in advancing financial inclusion, we focus on banks as these institutions are the most capable in terms of infrastructure and outreach, in addition to being highly regulated and transparent.

financial inclusion and performance be different for banks operating in high income countries compared to low income countries?

With this paper, we make several contributions to the existing literature. First, we are the first, to our knowledge, to construct an aggregate index of banks' performance based on CAMEL ratings using principle component analysis. We then use the index to examine the relationship between financial inclusion and bank performance at the country level. The CAMEL rating framework is a method used by supervisory authorities in many countries around the world, which provides a comparable measure of different aspects of bank performance that is not focussed solely on profitability and margins. The main advantage is that it allows addressing the interrelation between multiple dimensions of bank performance (Sahajwala and Van den Bergh, 2000). In terms of data, we rely on the IMF's Financial Access Survey (FAS)<sup>9</sup> and obtain financial inclusion data for a sample of 131 countries (including 88 high and upper middle income and 43 low and lower middle income countries) over the period 2005-2014. We focus on indicators related to penetration and usage of financial services that are usually considered when measuring financial inclusion: number of borrowers from commercial banks per 1000 adults, number of deposit accounts with commercial banks per 1000 adults, deposits to GDP, and loans to GDP (the last two can also be considered as financial depth measures). Our chosen methodology is panel regression models with time and country fixed effects.

Second, we examine the relationship between financial inclusion and bank performance for different countries based on their income, distinguishing between high and low income countries (where the former includes high and upper middle income countries and is referred to as "high income countries" hereafter, and the latter includes lower middle and low income countries and is referred to as "low income countries" hereafter).<sup>10</sup> Additionally, we explore the relationship for different economies based on their level of income inequality. Research has shown a strong correlation between inequality in using formal accounts and general income inequality (Demirguc-Kunt and Klapper, 2012). Countries with lower income inequality and more equal opportunities may enhance borrowers' ability to repay credit and, consequently, improve the relationship between financial inclusion and bank

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<sup>9</sup> The FAS is the source of global supply-side data on access to and use of financial services by households and firms. The indicators are grouped by the geographic outreach and use of financial services.

<sup>10</sup> The World Bank classifies economies based on estimates of gross national income (GNI) per capita. As of 1 July 2016, low income economies are defined as those with a GNI per capita of \$1,025 or less in 2015; lower middle income economies are those with a GNI per capita between \$1,026 and \$4,035; upper middle income economies are those with a GNI per capita between \$4,036 and \$12,475; high income economies are those with a GNI per capita of \$12,476 or more.

performance. We also perform additional tests, distinguishing between countries by the level of financial exclusion, the incremental effect of the regulatory environment, crisis, and testing alternative measures of financial inclusion related to the geographical outreach aspect of inclusion.

Our evidence suggests that different inclusion measures relate differently to CAMEL-based bank performance measures. For the full sample, there seems to be a trade-off between bank performance and increased credit deepening<sup>11</sup>. A focus on improving financial inclusion through excessive credit growth can lead to a deterioration in banks' soundness. We find evidence that the benefits of financial inclusion for bank performance seem to arise in low income countries, where banks, on average, hold higher capital and liquidity. In high income countries, on the contrary, performance gains from financial inclusion seem to be exhausted, which may be due to the fact that high levels of financial inclusion have already materialized in these countries (Ahamed et al., 2018). Our results show that banks operating in countries characterised by adequate capital supervision and/or low income inequality levels, could gain more from financial inclusion. Hence, it is recommended that promoting financial inclusion should be associated with improvements in regulatory supervision and inequality. Finally, we find that financial inclusion does not seem to adversely affect bank performance during times of crisis that are country specific; relating this to the findings of Han and Melecky (2013), it seems that the number of depositors or borrowers has a diversification effect in reducing bank risk. In terms of geographical outreach, we find a positive relationship between the number of ATMs and bank performance in high income countries and between the number of branches and bank performance in low income countries. Overall, our findings support the efforts to increase financial inclusion, particularly in low income countries and improvements in regulation and inequality should accompany these efforts.

The remainder of the paper is structured as follows. Section 2 provides a selected literature review on financial inclusion and develops the main hypotheses. Section 3 presents the data and descriptive statistics. Section 4 presents the empirical model. Section 5 presents and discusses the results. Finally, Section 6 provides the conclusion.

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<sup>11</sup> Defined as outstanding loans from commercial banks as a percent of GDP.



## SELECTED LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

In this section, we first focus on the literature related to the importance of financial inclusion and its impact on social and economic indicators and then move to studies on the relationship between financial inclusion and bank performance, in order to build our hypotheses.

### Selected literature: Importance of financial inclusion

We link the importance of financial inclusion to its role in the overall development and inclusive growth of a country. The Consultative Group to Assist the Poor (CGAP)<sup>12</sup> identified financial inclusion as a key enabler for a number of SDGs. Generally, access to financial services creates opportunities for starting up new businesses and improving poor household income which, in turn, is beneficial for GDP and productivity (Kuada, 2019, Duvendack and Mader, 2020).

This is also indicated by empirical studies highlighting financial inclusion's positive impact on social and economic indicators. For example, Demir et al. (2020), using a global sample of countries, find that financial inclusion is a key channel through which FinTech<sup>13</sup> decreases income inequality at all quantiles of the inequality distribution, with the effect being mostly significant in higher income countries. Bruhn and Love (2014) use a natural experiment in Mexico to show that access to financial services significantly impacts labor market activity and income levels, particularly amongst low income individuals and those located in areas with lower pre-existing bank penetration. Moreover, Dupas and Robinson (2013), in a field experiment in Kenya, show that market vendors (who are mostly women) could increase their savings significantly when provided with a savings account and, as a result, increase their expenditures and business investment. On a macro-level, Burgess and Pande (2005) provide evidence of a decrease in rural poverty as a result of an expansion of bank branches in rural areas in India. Sahay et al. (2015b) also show a

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<sup>12</sup> The CGAP is a global partnership of more than 30 leading development organizations that works to advance the lives of poor people through financial inclusion. CGAP identifies financial inclusion as an enabler for reducing poverty, reducing hunger, improving health and wellbeing, achieving gender equality, promoting economic growth and decent jobs, supporting industry, innovation and infrastructure, fostering quality education, and reducing inequality.

<sup>13</sup> Financial technology (FinTech) is the use of technology and innovation to improve and digitize the delivery and use of financial services.

positive correlation between financial inclusion and a number of macroeconomic outcomes, including economic growth, stability and equality. However, the relationship may depend on moderating factors, such as per capita income and quality of the regulatory environment.

On a more social level, Ashraf et al. (2010) examine the impact of a savings product in the Philippines on household decision-making power and find that the savings product leads to more decision-making power for women. In a study in Pakistan, Montgomery and Weiss (2011) find a positive impact of access to loans in rural areas on food expenditure and on other social indicators, including the health of children and female empowerment. Similarly, Karlan and Zinman (2010) reveal that consumer credit expansion can improve social and economic welfare of households, using a field experiment in South Africa. Financial inclusion can also play a role in combatting money-laundering and terrorist financing (Force, 2011).

There are also drawbacks to financial inclusion. Some studies have found that it may lead to over indebtedness for micro-borrowers with low returns on investments, in case of using loans for non-productive sources; this is particularly true for borrowers with low financial literacy (Schicks, 2014). In a study of 18 (OECD) developed economies over the period 1970–2007, Perugini et al. (2016) find that income inequality is positively related to private sector indebtedness and that is found to be a significant predictor of a financial crisis.

In a recent systematic ‘review of reviews’ on the impacts of financial inclusion on economic, social, gender and behavioural outcomes, Duvendack and Mader (2020) find that, overall, the effects are more likely to be positive than negative. In terms of economic outcomes, savings were found to lead to small but significant increases in income (Steinert et al., 2018) and microcredits were found to have a positive impact on financial wellbeing and consumption expenditures (Chiova et al., 2015). In terms of social outcomes, reviews show positive but small effects on nutrition and food security from microcredit (Stewart et al., 2010, Chiova et al., 2015) and from promoting savings (Steinert et al., 2018). As for gender outcomes, studies offer evidence of significant positive impacts of access to microcredit on women’s decision making and empowerment (Chiova et al., 2015, Orton et al., 2016).

Similarly, Barajas et al. (2020) provide a review of the main findings of empirical research on the effects of financial inclusion. In terms of financial depth, evidence has shown a positive and significant relationship with higher rates of long-term economic growth, capital accumulation, and productivity (Popov, 2018), besides lower income inequality and poverty (Beck et al., 2007). Other financial inclusion variables (such as ATMs and composite indicators) also seem to have a positive relationship with lower inequality and poverty (Cihák et al., 2020, Loukoianova and

Yang, 2018). Barajas et al.'s (2020) review indicates the need for encouraging bank competition and channelling government payments through bank accounts to foster financial inclusion; it also indicates the need to identify and impair frictions holding back financial inclusion, rather than targeting specific levels of inclusion.

Given the documented evidence of the advantages, financial inclusion has been prioritised by regulators and policy-making bodies and promoted through increased initiatives by national central banks and international agencies, including the World Bank's Financial Inclusion Support Framework (FISF) and Financial Inclusion Global Initiative (FIGI). Global organizations, including CGAP and the Center for Financial Inclusion aim to foster financial inclusion with the assistance of NGOs, such as the Bill and Melinda Gates Foundation; their 'Financial Services for the Poor' program works to broaden the reach of financial services for the world's poorest, partnering with governments and the private sector (Financial Services for the Poor, n.d.). Additionally, many countries launched effective financial inclusion strategies to accelerate the process, such as the The Pradhan Mantri Jan-Dhan Yojana (PMJDY) scheme in India and the mobile money innovation model in Kenya, where M-Pesa services spread rapidly and reached the majority of the adult population (Ahmad et al., 2020). These efforts mainly aim to improve the living conditions of the most vulnerable and underprivileged populations and protect them from financial problems related to the informal sector's high interest credit and lack of insurance. With regards to the causes of financial exclusion, the World Bank's Global Findex survey (Demirguc-Kunt et al., 2018) identified seven reasons (voluntary and involuntary) as most cited by respondents for not owning or using a formal bank account: lack of money, a family member has an account, high cost, distance from banks, lack of documentation, lack of trust in financial institutions, and religious reasons.

The policies promoting financial inclusion also target the inclusion of businesses that aims to provide financial services to all firms (regardless of their size, age, and other characteristics), and specifically improving MSMEs<sup>14</sup> access to finance. Regarding MSMEs credit, factors that play a role in limiting access to and use of finance include: information asymmetries, as these enterprises are more opaque than large firms, and lack of collateral (Barajas et al., 2020).

Banks play a major role in advancing financial inclusion, providing individuals and enterprises with the opportunity to deal with rule-based regulated financial institutions with greater transparency (Rahman, 2014). Microfinance institutions and other Fintech providers also have a role in advancing financial inclusion; however, the

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<sup>14</sup> MSMEs refers to Micro, Small, and Medium Enterprises.



micro-finance sector is displaying problems, including risk management and high interest rates (Ghosh, 2013).

While it is well documented in the literature that there is a positive link between financial inclusion and various development and social indicators, like economic growth and both gender and income inequality (as discussed previously in the section), theoretical and empirical studies have contradicting views on the relationship between financial inclusion and bank performance including profitability and solvency. The literature concentrates on one aspect of bank performance at a time (for example, stability or profitability), we are the first, to our knowledge, to construct an aggregate index of banks' overall financial condition and performance based on CAMEL ratings and use the index to examine the relationship.

### **Hypotheses development: Financial inclusion and bank performance**

To build an expectation on the potential relationship between financial inclusion and bank performance, we can assume that different financial services provided (deposits or loans in this case) might have a different association with bank performance. In terms of financial inclusion linked to deposits, policy papers provide arguments for the potential positive impact of inclusion in deposits on bank performance. The argument that seems to be agreed on in these papers, states that bank dependence on a diversified base of retail deposits can reduce volatility and lower the impact of a crisis and relates this to the steady behavior of depositors, compared to other providers of funding (Khan, 2011, Rahman, 2014, Mehrotra and Yetman, 2015). Empirically, Han and Melecky (2013) offer evidence of a positive effect of broader financial inclusion, in terms of access to bank deposits on financial stability measured by stability of deposit growth during the 2008 financial crisis. Ahamed and Mallick (2019) find that financial inclusion contributes to a more stable banking system, pronounced when banks are mostly funded by deposits and operating within a strong institutional environment, rule of law, and political stability. Another argument, provided by the literature, states that financial inclusion can be a means for financial institutions to enhance performance by achieving scale efficiency and earning higher returns (Prasad, 2010, Khan, 2011, Deng and Elyasiani, 2008). The empirical research by Dietrich and Wanzenried (2014) provides evidence that banks can increase their profits by increasing deposits; they show that faster growing banks, in terms of deposits, are better able to expand their business and convert deposits to high earning assets. Hence, we hypothesize that a higher degree of financial inclusion,

in terms of deposits, is likely to be associated with better performance of the banking system. This hypothesis can be formulated as follows:

*H1. The relationship between financial inclusion, in terms of deposit accounts and bank performance, is positive and significant.*

In terms of financial inclusion linked to lending, the literature provides mixed arguments. On the one hand, financial inclusion through lending could expose banks to additional risks from low income groups (Hannig and Jansen, 2010). If financial institutions lower their credit standards to increase financial inclusion by excessive credit expansion, it might reduce the quality of their lending portfolio and negatively affect their asset quality, profitability, and solvency (Khan, 2011, Mehrotra and Yetman, 2015, Dell'Ariccia and Marquez, 2006). Empirically, Sahay et al. (2015b) find a negative relationship between an increased number of borrowers and banks' stability; crucially, however, the relationship depends on the quality of bank regulation and supervision. Demirgüç-Kunt and Detragiache (2005) show that countries with high credit exposure, or high lagged credit growth, are more vulnerable to a banking crisis related to risky assets and solvency issues. Similarly, Dabla-Norris et al. (2015) indicate that lowering collateral requirements and costs of monitoring to increase firms' financial inclusion, in terms of credit access, can result in higher non-performing loans in the banking business, posing the risk of instability. Schularick and Taylor (2012) also find that rapid expansions in credit are often precursors to financial crises. In terms of the relationship between profitability and financial inclusion, the literature is limited and quite recent. Issaka Jajah et al. (2020), using a composite index of financial inclusion and different measures of profitability for banks in Sub-Saharan Africa, find that the relationship is positive and significant; however, when using a "full world" sample, the results are negative and significant. The literature provides more evidence related to financial depth measures. Specifically, Demirgüç-Kunt and Huizinga (1999) conclude that countries with high financial development (measured by credit deepening) also have a high level of competition, which may be associated with lower profitability, as banks have lower prices in competitive markets. Acharya et al. (2009) provide evidence of a negative relationship between financial development and banks' liquidity, as financial development is accompanied by greater ease in sourcing external finance, which lowers the attractiveness of holding high levels of liquid assets.

On the other hand, some argue that financial inclusion through lending also improves the assets side of bank balance sheets by establishing a diversified loan base. Small, frequent loans are less likely to cause aggregate loan losses, or threaten the systemic health compared to large infrequent ones and banks can earn profits by reaching out to the poor with small size loans (Cull et al., 2012, Rahman, 2014, Cull

and Morduch, 2007). Morgan and Pontines (2018) and Adasme et al. (2006) provide empirical evidence to support this argument, with a focus on SMEs. They show that increased lending to SMEs results in decreased probability of defaults and lower NPLs. In this paper, we do not focus on SMEs' lending and, typically for banks to increase financial inclusion (in terms of lending), credit standards and collateral requirements might be reduced, which might have a negative impact on different aspects of bank performance. Hence, we conjecture that a higher degree of financial inclusion, in terms of lending, is likely to be negatively associated with bank performance. This hypothesis can be formulated as follows:

*H2. The relationship between financial inclusion, in terms of loan accounts and bank performance, is negative and significant.*

We are also interested in assessing the relationship between financial inclusion and bank performance by countries with different income levels. We expect that the impact of financial inclusion differs across countries with different characteristics (in terms of development, income, existing level of financial inclusion, education, etc.), and that these characteristics might play an intermediate role in the relationship (Čihák et al., 2016). Sahay et al. (2015a) find that emerging economies can benefit from higher financial development (including financial deepening, access, and efficiency) to enhance financial stability and growth; however, in developed economies further financial access and development can increase the banking system's instability. Other studies suggest that the relationship between inclusion and bank performance depends on the income group that the country belongs to. Dietrich and Wanzenried (2014) show that the determinants of banks' profitability vary significantly across countries with different income levels. They also find that deposits growth and financial development positively impact banks profitability, mainly in low income countries. Hence, our third hypothesis is that the relationship between financial inclusion and bank performance differs across different income countries.

*H3. The relationship between inclusion and bank performance differs significantly across income regions and other country characteristics.*

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## DATA, VARIABLES, AND DESCRIPTIVE STATISTICS

Our sample period spans 2005 to 2014. To construct the sample, we start with 184 countries with available data on aggregate bank performance indicators from the Global Financial Development Database (GFDD). We then drop countries with missing data on financial inclusion, and arriving at the final sample of 131 countries. Of those, 88 countries are classified by the World Bank as high income or upper middle income countries and 43 countries as low income or lower middle income.<sup>15</sup> Our final sample contains 1,124 country-year observations.

### Bank performance index

We start by constructing an index that represents the overall banks' performance using the principal component analysis (PCA)<sup>16</sup>. The performance index we construct (*Bank performance index*) uses selected quantitative indicators from the CAMEL ratios. The choice of indicators is based on the previous literature (e.g., Ginevičius and Podvieszko, 2013, Mishra et al., 2013) and represents the following five aspects of bank performance: (i) profitability (*Profitability*) measured by return on assets; (ii) solvency (*Solvency*) proxied by the regulatory capital to risk weighted assets ratio; (iii) asset quality (*Asset Quality*) captured by the non-performing loans to gross loans ratio; (iv) liquidity (*Liquidity*) measured by the liquid assets to deposits and short-term funding ratio; and (v) efficiency (*Efficiency*) proxied by the cost to income ratio.<sup>17</sup>

### Financial inclusion indicators

We alternatively use four indicators of financial inclusion from the Financial Access Survey: (i) outstanding deposits with commercial banks as a percent of GDP (*Deposits to GDP*), (ii) outstanding loans from commercial banks as a percent of GDP (*Loans to GDP*)<sup>18</sup>, (iii) number of deposit accounts with commercial banks per 1000

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<sup>15</sup> The countries included in the sample and their income classifications are listed in Appendix A.

<sup>16</sup> The details of the construction of the bank performance index are in Appendix B.

<sup>17</sup> When constructing the performance index, the indicators that have an opposite direction with performance (i.e., asset quality and efficiency) are adjusted by taking the reciprocal value, so that a higher value means better performance.

<sup>18</sup> The first two inclusion variables, namely outstanding deposits to GDP and outstanding loans to GDP, are also considered to be financial deepening and financial development measures.

adults (*Number of deposits*), and (iv) number of borrowers from commercial banks per 1000 adults (*Number of borrowers*).

We expect the financial inclusion indicators related to deposits to have a positive relationship with bank performance (*H1*); by widening the deposit base, banks will have a more stable funding source derived from diversification and might benefit from greater scale economies, posing positive effects on banks' solvency, efficiency and profitability. Conversely, we expect financial inclusion indicators related to lending, to have a negative relationship with bank performance, as increased credit access can result in higher credit risk in the banking business, posing negative effects on banks' asset quality, solvency, and profitability.

## Control variables

A set of country-specific variables is included as controls in all models. Specifically, we include GDP growth (*GDP growth*) to account for economic fluctuations. It is expected to have a positive relationship with bank performance, as banks face less risk and generate higher profits when economic growth is high (Pasiouras and Kosmidou, 2007). Benign economic conditions increase the demand for banks' services; however, adverse economic conditions can increase poor quality loans and negatively affect bank performance (Albertazzi and Gambacorta, 2009). We also include inflation (*Inflation*) as an economic indicator. The effect of inflation on bank performance depends on the banks' ability to anticipate future inflation and adjust their interest rates accordingly (Perry, 1992).

To consider banking market characteristics, we use the Lerner index (*Lerner index*) as a measure of market power and competition. This indicator has an ambiguous effect on bank performance, as the empirical literature provides evidence of two streams: the traditional competition-fragility view states that banks in competitive markets have lower pricing power that leads to lower profitability, higher risk-taking and, hence, lower performance (Keeley, 1990, Marcus, 1984); the competition-stability view suggests that lower competition and higher market power allow banks to become 'too-big-to-fail' and, thus, increase their risk-taking motivated by government safety nets (Boyd and De Nicolo, 2005).

We also control for a country's population density (*Population density*). The indicator's effect can be positive if higher population increases banks' business opportunities, and hence increases profitability. On the contrary, it can be negative if these business opportunities attract higher competition and, hence, lower profit margins (Dietrich and Wanzenried, 2009). This indicator is usually linked to the



banking sector capacity and might influence the distribution costs of financial services (Beck and Feyen, 2013).<sup>19</sup>

## Descriptive statistics

Table 1 provides descriptive statistics for the main variables used in the study for the full sample, by income region and the difference in means tests.

< Insert Table 1 about here >

The data shows a relatively high variation in bank performance and financial inclusion indicators in the sample. In terms of performance, the sample mean for the performance index is 54.6%. Banks generate around 1.4% after tax returns on their assets, they are reasonably efficient (their costs, on average, account for 58% of their income), well capitalized (their mean regulatory capital ratio is 16.8%) and liquid (they hold, on average, 37% of their deposits and short-term funding as liquid assets), while their non-performing loans constitute around 6% on average.<sup>20</sup>

As for the financial inclusion indicators, the largest variation is observed in deposits to GDP, with a minimum value of around 2% (Congo) and the maximum value of around 480% (Luxembourg), followed by loans to GDP, with a minimum value of around 0.74% (Liberia) and a maximum value of around 319% (Hong Kong, China). The same applies to the other financial inclusion indicators: the number of deposit accounts per 1000 adults varies from only 1.6 (Cameroon) to 7000 (Japan), with an average of 1138; the number of borrowers in the banking system is, on average, lower than that of depositors but still shows a relatively large variation amongst the countries in the sample. The macroeconomic and banking market characteristics also show a high variation across the sample countries.

Table 1 shows that, although the difference in means in the bank performance index is insignificant, banks headquartered in low income countries seem to have higher profitability, capital and liquidity, whilst banks in high income countries show better asset quality and efficiency. High income countries seem to have, on average, significantly higher financial inclusion. As for the control variables, low income group have a higher GDP growth, which is expected, as these economies have the potential

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<sup>19</sup> Appendix C displays the definition of the variables, as well as the data sources used in the study.

<sup>20</sup> The NPLs to gross loans maximum value of 45% belongs to Mauritania in 2010.

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to grow faster utilising mechanisms and technologies already provided and utilised by developed countries.<sup>21</sup>

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<sup>21</sup> Appendix D reports the results of the correlation analysis.

## EMPIRICAL MODEL

To analyse the link between financial inclusion and bank performance at a country level (*H1* and *H2*), we use the following baseline regression model:

$$\begin{aligned}
 PI_{ct} = & \beta_0 + \beta_1 \text{Financial inclusion}_{ct-1} + \beta_2 \text{GDP growth}_{ct} + \beta_3 \text{Inflation}_{ct} \\
 & + \beta_4 \text{Lerner index}_{ct} + \beta_5 \text{Population density}_{ct} + c_c + c_t + u_{ct}
 \end{aligned}
 \tag{1}$$

where the dependent variable *PI* is the bank performance index of country *c* at time *t*. Our main variable of interest, *Financial inclusion*, is measured alternatively as: (i) deposits to GDP, (ii) loans to GDP, (iii) number of deposits, and (iv) number of borrowers, lagged by one year to control for endogeneity issues. Control variables include GDP growth, inflation, Lerner index, and population density. The model includes country and time fixed effects ( $c_c$  and  $c_t$ , respectively) to account for heterogeneity across time and regions, which may be correlated with the independent variables. Standard errors are clustered at the country level to control for serial correlation of errors and heteroscedasticity (Petersen, 2009). The model is estimated using ordinary least squares (OLS).

Next, we divide the countries into high income and low income groups, to examine whether there are differences in the relationship between financial inclusion and bank performance across the two groups (*H3*). To test this relationship, we estimate the baseline regression in Equation (1), replacing the financial inclusion indicator with two interaction terms: (i) between the financial inclusion indicator (lagged by one year) and high income dummy ( $\text{Financial inclusion}_{ct-1} * \text{High income dummy}_{ct}$ ) and (ii) between the financial inclusion indicator (lagged by one year) and the low income dummy ( $\text{Financial inclusion}_{ct-1} * \text{Low income dummy}_{ct}$ ). This specification allows financial inclusion to have a different association with bank performance in high and low income countries. We estimate the following regression specification:

$$\begin{aligned}
PI_{ct} = & \beta_0 + \beta_1 \text{Financial inclusion}_{ct-1} * \text{High income dummy}_{ct} \\
& + \beta_2 \text{Financial inclusion}_{ct-1} * \text{Low income dummy}_{ct} \\
& + \beta_3 \text{GDP growth}_{ct} + \beta_4 \text{Inflation}_{ct} + \beta_5 \text{Lerner index}_{ct} \\
& + \beta_6 \text{Population density}_{ct} + c_c + c_t + u_{ct}
\end{aligned} \tag{2}$$

We perform a number of additional tests as part of  $H3$ . First, we examine the impact of the level of income inequality in the country on the financial inclusion and bank performance relationship. We use the Gini index (obtained from the World Bank data) that measures the extent to which the distribution of income amongst individuals or households within an economy deviates from a perfectly equal distribution. To distinguish between countries with high and low levels of income inequality, we create a low inequality dummy variable that is equal to 1, if the country's Gini index is below its sample mean value and zero otherwise (*Low inequality dummy*).<sup>22</sup> We then use the baseline model in Equation (1), adding an interaction term between the financial inclusion indicator (lagged by one year) and the low inequality dummy variable (*Financial inclusion*<sub>ct-1</sub> \* *Low inequality dummy*<sub>ct</sub>).

In the second additional test, we examine if there are differences in the relationship between financial inclusion and bank performance, depending on the level of financial inclusion already existing in the country. In other words, we test whether the relationship is different when distinguishing between countries with high and low level of inclusion. We do so, by constructing a dummy variable for the high level of financial inclusion that is equal to one if the value of the indicator is above the mean value for the full sample and zero otherwise (*High financial inclusion dummy*), and another dummy variable for the low level of financial inclusion that is equal to one if the value of the indicator is below the mean value for the full sample and zero otherwise (*Low financial inclusion dummy*). We use the baseline regression Equation (1), replacing the financial inclusion indicator with two interaction terms: (i) between the financial inclusion indicator (lagged by one year) and high level of financial inclusion dummy (*Financial inclusion*<sub>ct-1</sub> \* *High financial inclusion dummy*<sub>ct</sub>), (ii) between the financial inclusion indicator (lagged by one year) and the low level of financial inclusion dummy (*Financial inclusion*<sub>ct-1</sub> \* *Low financial inclusion dummy*<sub>ct</sub>). We estimate the model for the full sample and separately for the high income and low income sub-samples, to test if the existing level

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<sup>22</sup> Gini index ranges between 0 (perfect income equality) and 100 (perfect income inequality).

of financial inclusion has a different impact on the relationship between financial inclusion and bank performance across countries with different levels of income.

In the third additional test, we are interested in the impact of the regulatory environment of the country on the relationship between financial inclusion and bank performance. The main regulatory variable we use is the bank capital regulation index, constructed by Barth et al. (2012)<sup>23</sup>. To distinguish between countries with high and low levels of capital regulation, we create a dummy variable that is equal to 1 if the country's capital regulation index is above its mean value and zero otherwise (*High quality capital regulation dummy*). We then use the baseline model in Equation (1), adding an interaction term between the financial inclusion indicator (lagged by one year) and the capital regulation dummy variable ( $Financial\ inclusion_{ct-1} * High\ quality\ capital\ regulation\ dummy_{ct}$ ).

In our fourth additional test, we consider the impact of banking crisis on the relationship between financial inclusion and bank performance. We use a crisis dummy variable for the years of banking crisis<sup>24</sup> for each country, using the data from the World Bank's Global Financial Development Database (*Crisis dummy*). We then augment the baseline model in Equation (1) with an interaction term between the financial inclusion indicator (lagged by one year) and the crisis dummy variable ( $Financial\ inclusion_{ct-1} * Crisis\ dummy_{ct}$ ).

We also test additional measures of financial inclusion in the fifth additional test, using the baseline model Equation (1). Specifically, we examine the geographical outreach aspect of financial inclusion measured by the number of ATMs and branches in the country.<sup>25</sup>

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<sup>23</sup> This index measures the stringency of capital regulation in the country and ranges from 0 to 10. The data available is for 2003, 2007 and 2011; we, therefore, fill in the missing years in our sample with the index data of the preceding date. For example, if the index score for a certain country was 4 in 2003, we fill in the years 2004-2006 with the same score (i.e., 4).

<sup>24</sup> The banking crisis dummy is country-specific and equal to one in the presence of a banking crisis, that is, when there are significant signs of financial distress in the banking system, or when there are significant policy interventions in response to significant losses in the system (Laeven and Valencia, 2013).

<sup>25</sup> As an additional test, we decompose the performance index into its component indicators to analyse the relationship between each indicator and financial inclusion. To do so, we estimate Equation (1), alternatively using return on assets, regulatory capital to risk weighted assets, gross loans to non-performing loans, and income to cost ratio as the dependent variable. The results are reported in Appendix E.



## RESULTS

### Financial inclusion and bank performance index

Table 2 reports the results of estimating Equation (1). Models (1), (3), (5), and (7) test the relationship between financial inclusion measured by deposits to GDP, loans to GDP, number of deposit accounts, and number of borrowers, respectively, and bank performance measured by the aggregate performance index. Models (2), (4), (6), and (8) additionally control for a set of country-specific variables. All models are estimated on the full sample, using ordinary least squares (OLS) with country and time fixed effects; in all regression estimations, we use standard errors clustered at the country level.

We find that deposits to GDP, number of deposits, and number of borrowers have no significant effect on our aggregated measure of bank performance. However, Models (3) and (4) show a significant negative association between banks' loans to GDP and the performance index (confirming *H2*). These results indicate that there might be a trade-off between the level of credit provided by banks and their profitability and stability. The trade-off could arise when higher financial inclusion is achieved through excessive credit growth and lower credit standards and, hence, asset quality, as witnessed in the global financial crisis when high growth in credit (mortgages) led to high growth in default (this was linked to expanding the pool of loans to sub-prime borrowers in the US) causing instability. Increased informational inefficiencies and operating costs could accompany increased lending and lead to a deterioration in bank performance, as suggested by Khan (2011) and Dabla-Norris et al. (2015). Demirgüç-Kunt and Detragiache (2005) and Sahay et al. (2015b) also find evidence suggesting a trade-off between increased credit / number of borrowers and bank performance.

As for the control variables, in line with our expectations, GDP growth is positively and significantly related to bank performance, as banks face lower risks and increase their activity, in terms of customer deposits and loans granted when the economic growth is high which, in turn, positively impacts their interest margins, profitability, and stability (Pasiouras and Kosmidou, 2007, Petria et al., 2015). Model (8) shows a negative association between inflation and bank performance, which is only expected if banks are unable to anticipate future inflation and adjust their interest rates accordingly (Perry, 1992). There is a highly positive and significant relationship between the Lerner index and bank performance, providing evidence for the competition-fragility theory, where greater market power enables banks to generate monopoly profits (Molyneux and Thornton, 1992, Beck et al., 2006); this result can also be explained by the assumption that larger banks with greater market

power are better able to exploit economies of scale and to pass on to customers potential inefficiencies (Flamini et al., 2009). The population density variable is mostly insignificant, except for Model (6) where the inclusion variable is measured by the number of deposit accounts.

< Insert Table 2 about here >

## High versus low income countries

In this section, we test whether there are differences in the relationship between financial inclusion and bank performance depending on the country's income group. We estimate the regression in Equation (2), where we replace the financial inclusion indicator with two interaction terms: (i) between the financial inclusion indicator and high income dummy and (ii) between the financial inclusion indicator and the low income dummy. Table 3 reports the estimation results.

< Insert Table 3 about here >

The results show that high income countries mainly drive the estimated negative relationship between financial inclusion and bank performance. Specifically, Model (2) shows a significant negative association between loans to GDP and the performance index in high income countries. This financial inclusion measure is also a proxy for financial deepening and financial development; well-developed economies already have high rates of financial inclusion, so it might be suboptimal for banks in these countries to increase their financial inclusion, as this might require lowering their credit standards. Hence, it seems that in high income countries, bank performance gains from financial inclusion might be exhausted. On the other hand, banks in low income countries could achieve some performance gains from further financial inclusion, by extending the number and volume of deposits and the number of loans, as shown by the positive and significant coefficients on the corresponding variables with the low income dummy.

The results suggest that the country income level has an important impact on the relationship between financial inclusion and bank performance (confirming  $H3$ ). We find that financial inclusion is positively related to bank performance in low income countries. These economies have the need and scope for greater financial inclusion that, in turn, would have a positive impact on the banking system. This is consistent with Sahay et al. (2015a), who find that emerging economies can benefit from greater financial inclusion and development, in terms of enhancing financial

stability and growth, and with Dietrich and Wanzenried (2014), who show that the determinants of banks' profitability vary significantly across countries with different income levels and with Dabla-Norris et al. (2015), who find that the impact of financial inclusion on macroeconomic indicators, such as economic growth and income inequality, depends on country characteristics and differs between high, middle, and low income countries.

## Additional tests

### Income inequality

As an additional test, we examine whether the inequality of income in a country has an impact on the relationship between financial inclusion and bank performance. We estimate the baseline regression, adding an interaction term between each financial inclusion indicator and low inequality dummy, where the low inequality dummy is equal to one if the Gini index score for a country in a given year is below the mean value of the index for the full sample.

Table 4 reports the estimations results. Model (2) shows that low income inequality in a country lowers the negative association between credit deepening (measured by loans to GDP) and bank performance. Model (4) shows a stronger positive effect of the number of borrowers on bank performance in countries with lower income inequality.

< Insert Table 4 about here >

We suggest, therefore, that improvements in a country's income inequality can enhance the relationship between financial inclusion and bank performance and that banks operating in countries with low income inequality can benefit more from financial inclusion. This could be due to borrowers' enhanced ability to repay credit in countries with lower levels of income inequality, as these countries will offer more equal opportunities and healthier social and economic conditions.

### High versus low financial inclusion

Next, we examine whether there are differences in the relationship between financial inclusion and bank performance, depending on the country's existing financial inclusion level. We estimate the baseline regression, replacing the financial inclusion indicator with two interaction terms: (i) between the financial inclusion

indicator and high level of financial inclusion dummy and (ii) between the financial inclusion indicator and the low level of financial inclusion dummy, where the financial inclusion threshold is determined as the mean value of the respective indicator for the full sample. We also estimate the model for the sub-samples of high and low income countries, resetting the financial inclusion threshold as the mean for the respective sub-sample.

Table 5 reports the estimation results. The results for the full sample (Models (1)-(4)) are similar to the baseline regression results (Table 2), with a negative and significant relationship between bank loans to GDP and bank performance for both high and low levels of financial inclusion. The results by income level show that, whilst the negative relationship between financial inclusion in terms of lending and bank performance holds for high income countries regardless of their prevailing inclusion level (Models (5)-(8)), it is the low income countries with low financial inclusion (Models (9)-(12)) that drive the estimated positive relationship between financial inclusion and bank performance for low income countries (Table 3). Hence, banks in these countries might achieve gains from increased financial inclusion.

< Insert Table 5 about here >

### Quality of capital regulation

To test whether the quality of capital regulation impacts the relationship between financial inclusion and bank performance, we estimate the baseline regression adding an interaction term between each financial inclusion indicator and high quality capital regulation dummy. The high quality capital regulation dummy is equal to one, if the capital regulation index score for a country in a given year is above the mean value of the full sample's capital regulation index.

Table 6 reports the estimation results. We find that the country's capital regulatory environment has a positive impact on the relationship between financial inclusion and bank performance. Specifically, Models (1) and (2) show that high quality capital regulation in a country lowers the negative association between financial depth and bank performance. This suggests that the negative impact of financial depth on bank performance can be counteracted with the impact of high quality regulation. Additionally, the results in Models (3) and (4) indicate a stronger positive effect of the number of depositors and borrowers on bank performance when the quality of capital regulation is high. This is consistent with Sahay et al. (2015b) who find a positive relationship between financial inclusion and bank stability only in countries with high quality regulation. The results imply that banks operating in

countries with strong capital supervision could achieve more gains from financial inclusion. This is mainly due to the fact that capital buffers can mitigate the risks associated with increased expansion of banking services (particularly credit risk). As suggested by Sahay et al. (2015b), it is recommended that promoting financial inclusion be associated with improvements in regulatory supervision.

< Insert Table 6 about here >

### **Banking crisis**

As discussed in Section 2, increased financial inclusion is expected to moderate the impact of a crisis, as retail depositors and borrowers are expected to behave steadily regardless of the economic situation. Therefore, we test the relationship between financial inclusion and bank performance in crisis years. We estimate the baseline regression, adding an interaction term between each financial inclusion indicator and a country-specific crisis dummy equal to one in crisis years and zero otherwise.

Table 7 reports the estimation results. We find a positive and statistically significant association between the number of borrowers interacted with the crisis dummy and bank performance (Model (4)), suggesting that an increased number of borrowers can enhance bank performance during crisis periods. This might be explained by the diversification effect of having a larger number of borrowers in reducing bank risk and is consistent with Han and Melecky (2013), who find that broader access to bank deposits can enhance the deposit funding base of banks and make them more resilient (in terms of mitigating deposit growth declines) in times of crisis. Overall, it is important to highlight that financial inclusion does not seem to adversely affect bank performance during crises.

< Insert Table 7 about here >

### **Additional measures of financial inclusion**

We next consider alternative measures of financial inclusion, by focussing on its geographical outreach aspect. We estimate the baseline regression (Equation (1)), replacing the previous four inclusion measures with: (i) bank branches per 1000 km<sup>2</sup> and (ii) ATMS per 1000 km<sup>2</sup>. We then test whether there are differences in the relationship between these measures and bank performance, depending on the country's income group.



Table 8 reports the estimation results. The results reinforce our baseline results, where financial inclusion measures relate differently to bank performance and the country income level has an important impact on the relationship. Specifically, we find that, whilst the number of banks' branches per 1000 km<sup>2</sup> has no significant effect on bank performance for the full sample (Model (1)), it is positively and significantly associated with bank performance in low income countries (Model (3)). Turning to the number of ATMs per 1000 km<sup>2</sup>, we find that it is positively related to bank performance for the full sample (Model (2)) and that this result is driven by high income countries (Model (4)). Overall, this evidence suggests that banks can benefit from expanding geographical outreach, by increasing the number of branches in low income countries and the number of ATMs in high income countries.

< Insert Table 8 about here >

Overall, our results suggest that country characteristics, such as the level of income, income inequality, level of financial inclusion, and quality of capital regulation impact the relationship between financial inclusion and bank performance. We also show that the type of financial service used to improve financial inclusion matters.

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## CONCLUSIONS

This paper examines the relationship between financial inclusion and bank performance, proxied by an index constructed using PCA and quantitative indicators related to CAMEL ratios. We use alternative measures of financial inclusion and find that different indicators provide different results. Specifically, we find that there seems to be a trade-off between bank performance and credit deepening (confirming *H2*). At the same time, other financial inclusion indicators show no significant association with bank performance for the full sample. Furthermore, we examine whether this relationship is impacted by a country's income level. We find evidence to suggest that benefits from financial inclusion for bank performance seem to arise in low income countries where banks, on average, hold greater capital and liquidity, whereas in high income countries bank performance gains from financial inclusion appear to be exhausted.

We perform a number of additional tests to gain more insights into the conditions that underlie the relationship between financial inclusion and bank performance. We find that banks operating in countries with lower levels of income inequality and financial inclusion and higher capital stringency, can achieve more gains from financial inclusion. These results confirm that certain country characteristics impact the relationship between financial inclusion and bank performance (confirming *H3*).

Additionally, we test alternative measures of financial inclusion related to the geographical outreach aspect. We find that the number of ATMs is positively associated with bank performance, particularly in high income countries. Banks in low income countries could achieve gains, in terms of performance from the further geographical expansion of branches.

In terms of policy implications, our results suggest that the benefits of advancing financial inclusion in low income countries are not limited to economic and social development improvements, but can also affect banks' performance. Hence, we recommend that policy-makers focus on promoting basic banking activities in these countries, that is, deposits and borrowing. A strong focus on credit deepening in high income countries might increase banks' risk and lead to a deterioration in performance. Therefore, in these countries financial inclusion can be carried out by non-profit organisations, such as credit unions, or by utilizing existing post offices. We argue that the relationship between financial inclusion and bank performance is sensitive to several country characteristics, including the level of income, inequality, and quality of regulation. Therefore, these characteristics should be taken into consideration when setting policies for promoting financial inclusion.

## References

1. ACHARYA, V. V., SHIN, H. S. & YORULMAZER, T. 2009. Endogenous choice of bank liquidity: the role of fire sales. Working Paper No. 376, Bank of England.
2. ADASME, O., MAJNONI, G. & URIBE, M. 2006. Access and risk: friends or foes?: lessons from Chile. Policy Research Working Paper 4003. World Bank, Washington, D.C..
3. AHMAD, A.H., GREEN, C. AND JIANG, F., 2020. Mobile money, financial inclusion and development: A review with reference to African experience. *Journal of Economic Surveys*. doi:10.1111/joes.12372.
4. AHAMED, M.M. AND MALLICK, S.K., 2019. Is financial inclusion good for bank stability? International evidence. *Journal of Economic Behavior & Organization*, 157, pp.403-427.
5. AHAMED, M.M., HO, S.J., MALLICK, S. AND MATOUSEK, R., 2018. Inclusive Banking, Financial Regulation and Bank Performance: Cross-country Evidence. In DECRG Kuala Lumpur Seminar Series. World Bank Kuala Lumpur.
6. ALBERTAZZI, U. & GAMBACORTA, L. 2009. Bank profitability and the business cycle. *Journal of Financial Stability*, 5(4), pp.393-409.
7. ASHRAF, N., KARLAN, D. & YIN, W. 2010. Female empowerment: Impact of a commitment savings product in the Philippines. *World development*, 38(3), pp.333-344.
8. AYADI, R. AND SHABAN, M., 2020. Digital financial inclusion: a pillar of resilience amidst covid-19. EMEA policy paper
9. BARAJAS, A., BECK, T., BELHAJ, M. AND NACEUR, S.B., 2020. Financial inclusion: What have we learned so far? What do we have to learn? (Vol. 157). IMF Working Paper WP/20.
10. BARTH, J., CAPRIO, G., LEVINE, R., 2013. Bank regulation and supervision in 180 countries from 1999 to 2011. *Journal of Financial Economic Policy* 5, 111–220.
11. BECK, T., DEMIRGÜÇ-KUNT, A. & LEVINE, R. 2006. Bank concentration, competition, and crises: First results. *Journal of Banking & Finance*, 30(5), pp.1581-1603.
12. BECK, T., DEMIRGÜÇ-KUNT, A. AND LEVINE, R., 2007. Finance, inequality and the poor. *Journal of economic growth*, 12(1), pp.27-49.
13. BECK, T. & FEYEN, E. 2013. Benchmarking financial systems: introducing the financial possibility frontier. The World Bank Working Paper Series No: 6615.

14. BECK, T., PERIA, M., OBSTFELD, M. & PRESBITERO, A. 2018. Financial inclusion: Drivers and real effects. [online] VOX EU. Available at: <https://voxeu.org/article/financial-inclusion-drivers-and-real-effects> [Accessed 9 Oct. 2020].
15. BOYD, J. H. & DE NICOLO, G. 2005. The theory of bank risk taking and competition revisited. *The Journal of finance*, 60(3), pp.1329-1343.
16. BRUHN, M., & LOVE, I., 2014. The real impact of improved access to finance: Evidence from Mexico. *The Journal of Finance*, 69(3), 1347-1376.
17. BURGESS, R., & PANDE, R., 2005. Do rural banks matter? Evidence from the Indian social banking experiment. *American Economic Review*, 95(3), pp. 780-795.
18. CHLIOVA, M., BRINCKMANN, J. AND ROSENBUSCH, N., 2015. Is microcredit a blessing for the poor? A meta-analysis examining development outcomes and contextual considerations. *Journal of business Venturing*, 30(3), pp.467-487.
19. ČIHÁK, M., MARE, D. S. & MELECKY, M. 2016. The nexus of financial inclusion and financial stability: A study of trade-offs and synergies. Policy Research Working Paper; No. 7722. World Bank, Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/24639> License: CC BY 3.0 IGO.
20. CIHAK, M., SAHAY, R., BARAJAS, A., CHEN, S., FOUEJIEU, A. & XIE, P., 2020. Finance and inequality. Staff Discussion Note 20/01 (Washington, DC: International Monetary Fund).
21. CULL, R., DEMIRGÜÇ-KUNT, A. & LYMAN, T. 2012. Financial Inclusion and Stability: What Does Research Show?. CGAP Brief 71305, CGAP, Washington, DC.
22. CULL, R. & MORDUCH, J. 2007. Financial performance and outreach: A global analysis of leading microbanks. *The Economic Journal*, 117(517), pp.F107-F133.
23. DABLA-NORRIS, M. E., JI, Y., TOWNSEND, R. & UNSAL, D. F. 2015. Identifying constraints to financial inclusion and their impact on GDP and inequality: A structural framework for policy (No. 15-22). International Monetary Fund.
24. DE GREGORIO, J. & GUIDOTTI, P.E., 1995. Financial development and economic growth. *World development*, 23(3), pp.433-448.
25. DE LA TORRE, A., PERÍA, M. S. M. & SCHMUKLER, S. L. 2010. Bank involvement with SMEs: Beyond relationship lending. *Journal of Banking & Finance*, 34(9), pp.2280-2293.

26. DELL'ARICCIA, G. & MARQUEZ, R. 2006. Lending booms and lending standards. *The Journal of Finance*, 61(5), pp.2511-2546.
27. DEMIR, A., PESQUÉ-CELA, V., ALTUNBAS, Y. AND MURINDE, V., 2020. Fintech, financial inclusion and income inequality: a quantile regression approach. *The European Journal of Finance*, pp.1-22.
28. DEMIRGÜÇ-KUNT, A. & DETRAGIACHE, E. 2005. Cross-country empirical studies of systemic bank distress: a survey. *National Institute Economic Review*, 192(1), pp.68-83.
29. DEMIRGÜÇ-KUNT, A. & HUIZINGA, H. 1999. Determinants of commercial bank interest margins and profitability: some international evidence. *The World Bank Economic Review*, 13(2), pp. 379-408.
30. Demirguc-Kunt, A. and Klapper, L., 2012. Measuring financial inclusion: The Global Findex Database. The World Bank.
31. Demirguc-Kunt, A., Klapper, L., Singer, D., Ansar, S. and Hess, J., 2018. The Global Findex Database 2017: Measuring financial inclusion and the fintech revolution. The World Bank.
32. DENG, S. E. & ELYASIANI, E. 2008. Geographic diversification, bank holding company value, and risk. *Journal of Money, Credit and Banking*, 40(6), pp.1217-1238.
33. DIETRICH, A. & WANZENRIED, G., 2009. What determines the profitability of commercial banks? New evidence from Switzerland. In 12th conference of the Swiss society for financial market researches, Geneva (pp. 2-39).
34. DIETRICH, A. & WANZENRIED, G. 2014. The determinants of commercial banking profitability in low-, middle-, and high-income countries. *The Quarterly Review of Economics and Finance*, 54(3), pp.337-354.
35. DUPAS, P. and ROBINSON, J., 2013. Savings constraints and microenterprise development: Evidence from a field experiment in Kenya. *American Economic Journal: Applied Economics*, 5(1), pp.163-92.
36. DUVENDACK, M. AND MADER, P., 2020. Impact of financial inclusion in low-and middle-income countries: A systematic review of reviews. *Journal of Economic Surveys*, 34(3), pp.594-629.
37. FINANCIAL SERVICES FOR THE POOR: STRATEGY OVERVIEW n.d., The Bill & Melinda Gates Foundation, viewed 15 October 2020, <<https://www.gatesfoundation.org/what-we-do/global-growth-and-opportunity/financial-services-for-the-poor>>
38. FLAMINI, V., SCHUMACHER, M. L. & MCDONALD, M. C. A. 2009. The determinants of commercial bank profitability in Sub-Saharan Africa, (No. 9-15). International Monetary Fund.

39. FORCE, F. A. T. 2011. Anti-money laundering and terrorist financing measures and financial inclusion. *FATF, Paris*.
40. GHOSH, J., 2013. Microfinance and the challenge of financial inclusion for development. *Cambridge journal of economics*, 37(6), pp.1203-1219.
41. GINEVIČIUS, R. & PODVIEZKO, A. 2013. The evaluation of financial stability and soundness of Lithuanian banks. *Economic research-Ekonomska istraživanja*, 26(2), pp. 191-208.
42. HAN, R. & MELECKY, M. 2013. Financial inclusion for financial stability: access to bank deposits and the growth of deposits in the global financial crisis. Policy Research Working Paper No. 6577, The World Bank, Washington, DC
43. HANNIG, A. & JANSEN, S. 2010. Financial inclusion and financial stability: Current policy issues. ADBI Working Paper 259, Asian Development Bank Institute, Tokyo, Japan.
44. ISSAKA JAJAH, Y., ANARFO, E.B. AND AVEH, F.K., 2020. Financial inclusion and bank profitability in Sub-Saharan Africa. *International Journal of Finance & Economics*. <https://doi.org/10.1002/ijfe.2135>
45. KARLAN, D. & ZINMAN, J. 2010. Expanding credit access: Using randomized supply decisions to estimate the impacts. *The Review of Financial Studies*, 23(1), pp.433-464.
46. KEELEY, M. C. 1990. Deposit insurance, risk, and market power in banking. *The American Economic Review*, 1183-1200.
47. KHAN, H.R., 2011. Financial inclusion and financial stability: are they two sides of the same coin? Address by Shri HR Khan, Deputy Governor of the Reserve Bank of India, at BANCON.
48. KUADA, J., 2019. Financial Inclusion and the Sustainable Development Goals. In *Extending Financial Inclusion in Africa* (pp. 259-277). Academic Press.
49. LAEVEN, L. & VALENCIA, F. 2013. Systemic banking crises database. *IMF Economic Review*, 61, 225-270.
50. LE, T.H., CHUC, A.T. AND TAGHIZADEH-HESARY, F., 2019. Financial inclusion and its impact on financial efficiency and sustainability: Empirical evidence from Asia. *Borsa Istanbul Review*, 19(4), pp.310-322.
51. LOUKOIANOVA, E. AND Y. YANG. 2018. Financial Inclusion in Asia-Pacific. IMF Asia and Pacific Department Paper 17/18. International Monetary Fund: Washington, DC.
52. MARCUS, A. J. 1984. Deregulation and bank financial policy. *Journal of Banking & Finance*, 8(4), pp.557-565.



53. MARKOSE, S.M., ARUN, T. AND OZILI, P.K., 2020, March. Financial Inclusion, At What Cost?: Quantification of Economic Viability of A Supply Side Roll Out. In *At What Cost?*
54. MEHROTRA, A. N. & YETMAN, J. 2015. Financial inclusion-issues for central banks. BIS Quarterly Review March.
55. MISHRA, R. N., MAJUMDAR, S. and D. BHANDIA, 2013. Banking stability – a precursor to financial stability. Reserve Bank of India Working Paper Series no. WPS (DEPR): 01/2013.
56. MOLYNEUX, P. & THORNTON, J. 1992. Determinants of European bank profitability: A note. *Journal of banking & Finance*, 16(6), pp.1173-1178.
57. MONTGOMERY, H. & WEISS, J. 2011. Can commercially-oriented microfinance help meet the millennium development goals? Evidence from Pakistan. *World Development*, 39(1), pp.87-109.
58. MORGAN, P. & PONTINES, V. 2018. Financial stability and financial inclusion: The case of SME lending. *The Singapore Economic Review*, 63(01), pp.111-124.
59. ORTON, L., PENNINGTON, A., NAYAK, S., SOWDEN, A., WHITE, M. AND WHITEHEAD, M., 2016. Group-based microfinance for collective empowerment: a systematic review of health impacts. *Bulletin of the World Health Organisation*, 94(9), p.694.
60. PASIOURAS, F. & KOSMIDOU, K. 2007. Factors influencing the profitability of domestic and foreign commercial banks in the European Union. *Research in International Business and Finance*, 21(2), pp.222-237.
61. PERRY, P. 1992. Do banks gain or lose from inflation? *Journal of Retail Banking*, 14(2), pp.25-31.
62. PERUGINI, C., HOLSCHER, J., & COLLIE, S., 2016. Inequality, credit and financial crises. *Cambridge Journal of Economics*, 40(1), 227-257.
63. PETERSEN, M. A. 2009. Estimating standard errors in finance panel data sets: Comparing approaches. *The Review of Financial Studies*, 22(1), pp.435-480.
64. PETRIA, N., CAPRARU, B. AND IHNATOV, I., 2015. Determinants of banks' profitability: evidence from EU 27 banking systems. *Procedia economics and finance*, 20, pp.518-524.
65. POPOV, A., 2018. Evidence on finance and economic growth. In *Handbook of Finance and Development*. Edward Elgar Publishing.
66. PRASAD, E.S., 2010. Financial sector regulation and reforms in emerging markets: An overview (No. w16428). *National Bureau of Economic Research*.

67. RAHMAN, A., 2014. The Mutually-Supportive Relationship Between Financial Inclusion and Financial Stability. *Alliance for Financial Inclusion Viewpoints* No. 1.
68. SAHAJWALA, R. & VAN DEN BERGH, P. 2000. Supervisory risk assessment and early warning systems. Basel Committee on Banking Supervision Working Paper, No 4, Basel, December.
69. SAHAY, R., ČIHÁK, M., N'DIAYE, P. & BARAJAS, A. 2015a. Rethinking financial deepening: Stability and growth in emerging markets. *Revista de Economía Institucional*, 17(33), 73-107.
70. SAHAY, R., CIHAK, M., N'DIAYE, P., BARAJAS, A., MITRA, S., KYOBE, A., MOOI, Y. N. & YOUSEFI, S. R. 2015b. Financial inclusion: can it meet multiple macroeconomic goals? International Monetary Fund. Available at: <https://www.imf.org/external/pubs/ft/sdn/2015/sdn1517.pdf>.
71. SCHICKS, J. 2014. Over-indebtedness in Microfinance – an empirical analysis of related factors on the borrower level. *World development*, 54, pp.301-324.
72. SCHULARICK, M. & TAYLOR, A.M., 2012. Credit booms gone bust: Monetary policy, leverage cycles, and financial crises, 1870-2008. *American Economic Review*, 102(2), pp.1029-61.
73. STEINERT, J.I., ZENKER, J., FILIPIAK, U., MOVSISYAN, A., CLUVER, L.D. AND SHENDEROVICH, Y., 2018. Do saving promotion interventions increase household savings, consumption, and investments in Sub-Saharan Africa? A systematic review and meta-analysis. *World Development*, 104, pp.238-256.
74. STEWART, R., VAN ROOYEN, C., DICKSON, K., MAJORO, M. AND DE WET, T., 2010. What is the impact of microfinance on poor people?: a systematic review of evidence from sub-Saharan Africa. Technical Report, EPPI-Centre, Social Science Research Unit, University of London.
75. WORLD BANK 2018. Financial Inclusion Overview. Retrieved from: <http://www.worldbank.org/en/topic/financialinclusion/overview>

## APPENDIX A: SAMPLE COUNTRIES AND THEIR INCOME CLASSIFICATION

**Table A1: Sample countries and their income classification**

High income	Upper middle income	Lower middle income	Low income
<b>Argentina</b>	Albania	Armenia	Cambodia
<b>Australia</b>	Algeria	Bangladesh	Guinea
<b>Austria</b>	Azerbaijan	Bhutan	Mozambique
<b>Bahrain</b>	Belarus	Bolivia	Rwanda
<b>Belgium</b>	Bosnia and Herzegovina	Burundi	Sierra Leone
<b>Brunei Darussalam</b>	Botswana	Cameroon	Tanzania
<b>Canada</b>	Brazil	Congo, Rep.	Uganda
<b>Chile</b>	Bulgaria	Djibouti	
<b>Croatia</b>	China	Egypt, Arab Rep.	
<b>Cyprus</b>	Colombia	El Salvador	
<b>Czech Republic</b>	Costa Rica	Georgia	
<b>Denmark</b>	Dominican Republic	Ghana	
<b>Estonia</b>	Ecuador	Guatemala	
<b>Finland</b>	Gabon	Honduras	
<b>France</b>	Grenada	India	
<b>Germany</b>	Jordan	Indonesia	
<b>Greece</b>	Kazakhstan	Kenya	
<b>Hong Kong SAR, China</b>	Lebanon	Kyrgyz Republic	
<b>Hungary</b>	Macedonia, FYR	Lesotho	
<b>Iceland</b>	Malaysia	Mauritania	
<b>Ireland</b>	Maldives	Moldova	
<b>Israel</b>	Mauritius	Morocco	
<b>Italy</b>	Mexico	Nigeria	
<b>Japan</b>	Namibia	Pakistan	
<b>Korea, Rep.</b>	Panama	Philippines	
<b>Kuwait</b>	Paraguay	Samoa	
<b>Latvia</b>	Peru	Senegal	
<b>Lithuania</b>	Romania	Sri Lanka	
<b>Luxembourg</b>	Serbia	Swaziland	
<b>Macao SAR, China</b>	South Africa	Tajikistan	
<b>Malta</b>	St. Vincent and the Grenadines	Ukraine	
<b>Netherlands</b>	Thailand	Uzbekistan	
<b>New Zealand</b>	Tunisia	Vanuatu	
<b>Norway</b>	Turkey	Vietnam	
<b>Oman</b>	Turkmenistan	Yemen, Rep.	
<b>Poland</b>		Zambia	
<b>Portugal</b>			
<b>Qatar</b>			
<b>Russian Federation</b>			
<b>Saudi Arabia</b>			
<b>Seychelles</b>			
<b>Singapore</b>			
<b>Slovak Republic</b>			
<b>Slovenia</b>			
<b>Spain</b>			

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<b>Sweden</b>
<b>Switzerland</b>
<b>Trinidad and Tobago</b>
<b>United Arab Emirates</b>
<b>United Kingdom</b>
<b>United States</b>
<b>Uruguay</b>
<b>Venezuela, RB</b>

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## APPENDIX B: BANK PERFORMANCE INDEX CONSTRUCTION

All the performance indicators are normalised through empirical normalisation to have a common scale ranging from 0 to 1:

$$I_{itc}^n = \frac{I_{itc} - \text{Min}(I_{ic})}{\text{Max}(I_{ic}) - \text{Min}(I_{ic})} \quad (3)$$

where  $I_{itc}$  is the value of the indicator  $i$  in period  $t$  for country  $c$ .  $\text{Min}(I_{ic})$  is the minimum value for the indicator for a certain country for the analysed period and  $\text{Max}(I_{ic})$  is the maximum value for the indicator for a certain country for the analysed period. The normalised value represents the indicator's deviation from the minimum and maximum limit in each country. A higher value within the [0; 1] range indicates better bank performance.

Next, principal components are used to extract the factors that govern bank performance. To account for sample heterogeneity, in terms of the factors that could have an impact on the overall bank performance, the sample is split into high and low income countries. The results of PCA for high income and low income countries are presented in the table below. They show that component 1 has a contribution of two indicators, efficiency and profitability, for both sub-samples. However, solvency and asset quality contribute to the second component and liquidity contributes to the third component for high income countries, whilst the opposite is true for low income countries.

The scores of components are then estimated to construct the single index. As a final step, the index is normalised and converted into percentage.

**Table B1: Principle components' estimates**

	PCA high income countries			PCA low income countries		
	Component1	Component2	Component3	Component1	Component2	Component3
<b>Eigen value</b>	1.53	1.11	0.93	1.58	1.07	1.03
<b>% of variance</b>	25%	24%	23%	32%	22%	21%
<b>Variable</b>						
Profitability	<b>0.5757</b>		0.3545	<b>0.6452</b>		
Solvency		<b>0.8008</b>				<b>0.897</b>
Asset quality		<b>-0.5946</b>		0.4024	-0.4508	-0.4054
Liquidity			<b>0.8375</b>		<b>0.872</b>	
Efficiency	<b>0.7849</b>			<b>0.6411</b>		
Total explained variation = 72%				Total explained variation = 75%		

**Note:** The table reports results from using principal component analysis on sub-samples of high (and upper middle) income countries and low (and lower middle) income countries. The results for each component include Eigen values, share of explained variation and loadings from original variables. Bold figures show high loadings from the variable. A reciprocal of the asset quality and efficiency variables are used in the construction of the bank performance index.

## APPENDIX C: VARIABLE DEFINITIONS

Table C1: Variable definitions

Variables	Definition	Source
<i>Bank performance</i>		
<b>Bank performance index</b>	An aggregate banking performance indicator at country level ranging from 0 to 100. Higher value indicates better performance.	Author's calculations
<b>Profitability</b>	Commercial banks' after-tax net income to yearly averaged total assets (%).	GFDD
<b>Solvency</b>	Regulatory capital to risk weighted assets (%).	GFDD
<b>Asset quality</b>	Non-performing loans to gross loans (%). A reciprocal of the variable is used in the construction of the bank performance index.	GFDD
<b>Liquidity</b>	Liquid assets to deposits and short-term funding (%).	GFDD
<b>Efficiency</b>	Cost to income ratio calculated as operating expenses to the sum of net-interest revenue and other operating income (%). A reciprocal of the variable is used in the construction of the bank performance index.	GFDD
<i>Financial inclusion</i>		
<b>Deposits to GDP</b>	Outstanding deposits with commercial banks as a % of GDP	FAS
<b>Loans to GDP</b>	Outstanding loans from commercial banks as a % of GDP	FAS
<b>Number of deposits</b>	Number of deposit accounts with commercial banks per 1000 adults	FAS
<b>Number of borrowers</b>	Number of borrowers from commercial banks per 1000 adults	FAS
<i>Control variables</i>		
<b>GDP growth</b>	Annual percentage change of gross domestic product (%).	WDI
<b>Inflation</b>	Annual percentage change of consumer prices (%).	WDI
<b>Lerner index</b>	A measure of market power in the banking market that compares output pricing and marginal costs (%).	GFDD
<b>Population density</b>	Population divided by land area in square kilometres.	WDI
<b>High income dummy</b>	Dummy variable that is equal to 1 if the country is classified by the World Bank as high income or upper middle income and 0 otherwise.	Authors' calculations
<b>Low income dummy</b>	Dummy variable that is equal to 1 if the country is classified by the World Bank as low income or lower middle income and 0 otherwise.	Authors' calculations

**Note:** The table defines the variables used in the study and the source of the data. GFDD is the Global Financial Development Database, FAS is the Financial Access Survey, WDI is the World Development Indicators



## APPENDIX D: CORRELATION MATRIX FOR SELECTED AGGREGATED VARIABLES

**Table D1: Correlation matrix**

	Bank performance index	Deposits to GDP	Loans to GDP	Number of deposits	Number of borrowers	GDP growth	Inflation	Lerner index
<b>Deposits to GDP</b>	-0.038							
<b>Loans to GDP</b>	-0.031	0.658***						
<b>Number of deposits</b>	-0.014	0.615***	0.552***					
<b>Number of borrowers</b>	0.001	0.471***	0.583***	0.786***				
<b>GDP growth</b>	0.105***	-0.171***	-0.207***	-0.265***	-0.156***			
<b>Inflation</b>	0.021	-0.186***	-0.270***	-0.029	-0.035	-0.037		
<b>Lerner index</b>	0.165***	-0.014	-0.021	-0.074*	0.116***	0.228***	0.062**	
<b>Population density</b>	-0.048	0.267***	0.195***	0.287***	0.418***	0.080**	-0.005	0.174***

**Note:** The table presents the correlation between the bank performance index, inclusion variables, and control variables for the sample of 131 countries covering the period from 2005 to 2014. \*, \*\*, \*\*\* indicate significance at 10 percent, 5 percent, and 1 percent levels, respectively.

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## APPENDIX E: PERFORMANCE INDEX DECOMPOSITION AND FINANCIAL INCLUSION

In this section, we analyse the results derived from estimating Equation (1), replacing the performance index as the dependent variable with the variables used to construct the index. In other words, we test the relationship between the financial inclusion indicators and each measure of performance: profitability, solvency, asset quality, liquidity, and efficiency. The models are estimated using ordinary least squares (OLS) with country and time fixed effects; in all regression estimations, we use standard errors clustered at the country level.

Results indicate a negative and statistically significant association between loans to GDP and banks' profitability, a significant negative association between Loans to GDP and number of borrowers and banks' solvency, a negative association between deposits to GDP and asset quality, and a positive and significant association between the number of deposits and banks' efficiency.<sup>26</sup>

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<sup>26</sup> Full results are available with the authors.

## TABLES

**Table 1: Descriptive statistics for the full sample and by income region**

Variable						High income		Low income		Difference in means
	Obs.	Mean	Std. Dev.	Min.	Max.	Obs.	Mean	Obs.	Mean	
<b>Bank performance</b>										
Bank performance index (%)	1,124	54.598	31.733	0.000	100.000	787	54.960	373	53.752	1.208
Profitability (%)	1,767	1.425	1.415	-9.770	7.880	1,062	1.204	705	1.758	-0.554***
Solvency (%)	1,171	16.719	5.133	1.750	45.280	823	15.824	348	18.835	-3.011***
Asset quality (%)	1,156	5.932	5.989	0.010	45.300	810	5.062	346	7.968	-2.906***
Liquidity (%)	1,791	36.737	19.926	5.320	224.560	1,077	34.802	714	39.657	-4.853***
Efficiency (%)	1,777	58.254	18.643	20.000	166.250	1,071	56.351	706	61.141	-4.790***
<b>Financial inclusion</b>										
Deposits to GDP (%)	1,672	52.845	47.894	2.224	479.673	1,001	66.988	671	31.747	35.241***
Loans to GDP (%)	1,702	45.491	37.818	0.736	318.596	1,023	60.001	679	23.629	36.372***
Number of deposits (per 1000 adults)	997	1138.456	1171.312	1.633	7824.948	554	1633.172	443	519.781	1113.391***
Number of borrowers (per 1000 adults)	795	183.489	213.249	0.054	1156.048	419	290.279	376	64.486	225.793***
<b>Control variables</b>										
GDP growth (%)	1,796	4.050	5.343	-62.076	104.487	1,075	3.370	721	5.064	-1.694***
Inflation (%)	1,695	20.989	593.433	-35.837	24411.000	1,011	4.576	684	45.249	-40.673
Lerner index (%)	1,190	28.299	13.171	-17.335	93.866	768	28.313	422	28.273	0.040
Population density (people per square kilometre)	1,837	321.165	1491.267	1.626	19073.100	1,100	453.041	737	124.335	328.706***

**Note:** The table presents summary statistics for the full sample of 131 countries covering the period from 2005 to 2014. We categorize the variables in three groups: (i) the aggregate bank performance indicators; (ii) the aggregate financial inclusion indicators; and (iii) a set of country-level control variables. The table also presents the mean and number of observations statistics for the sub-samples of high income and low income countries covering the same period. The high income group is composed of high income and upper middle income countries and the low income group is composed of low income and lower middle income countries, as classified by the World Bank. The difference in means is calculated as the difference between high income countries and low income countries. \*, \*\*, \*\*\* indicate significance at 10 percent, 5 percent, and 1 percent levels, respectively

**Table 2: Financial inclusion and bank performance: Baseline results**

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)
L. Deposits to GDP	-0.1410 (-1.17)	-0.1851 (-0.97)						
L. Loans to GDP			-0.4682** (-3.01)	-0.4950** (-3.46)				
L. Number of deposits					-0.0056 (-0.58)	0.0121 (1.10)		
L. Number of borrowers							-0.0109 (-0.28)	0.0145 (0.35)
GDP growth		0.9848** (2.52)		0.8259** (2.12)		1.0324** (2.10)		1.2322** (2.41)
Inflation		0.1818 (0.45)		0.2390 (0.58)		0.7436 (1.37)		-0.6751** (-2.39)
Lerner index		1.7683** (7.32)		1.7328** (7.55)		1.5718** (6.05)		1.5215** (5.26)
Population density		-0.0116 (-0.59)		-0.0028 (-0.16)		0.5342** (5.40)		-0.0244 (-1.64)
Time fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Clustering	yes	yes	yes	yes	yes	yes	yes	yes
Observations	982	732	1,017	750	631	449	513	352
Adjusted R-squared	0.172	0.296	0.187	0.312	0.182	0.315	0.199	0.327

**Note:** The table reports the regression results of estimating the relation between financial inclusion and bank performance (Equation (1)). The dependent variable is the performance index. The main independent variables are lagged financial inclusion indicators: (i) deposits to GDP, (ii) loans to GDP, (iii) number of deposits, and (iv) number of borrowers. Control variables include a set of country-specific characteristics: (i) GDP growth, (ii) inflation, (iii) Lerner index, and (iv) population density. The regressions are run on the full sample of 131 countries covering the period 2005-2014. Robust t-statistics are reported under the coefficients in parentheses. Standard errors are clustered at the country level. \*, \*\*,\*\*\* indicate significance at 10 percent, 5 percent, and 1 percent levels, respectively.

**Table 3: Financial inclusion and bank performance: High income versus low income countries**

	Model (1)	Model (2)	Model (3)	Model (4)
L. Deposits to GDP * High income dummy	-0.2599 (-1.22)			
L. Deposits to GDP * Low income dummy	1.2156* (1.88)			
L. Loans to GDP * High income dummy		-0.6012** (-4.39)		
L. Loans to GDP * Low income dummy		0.2230 (0.62)		
L. Number of deposits * High income dummy			0.0072 (0.74)	
L. Number of deposits * Low income dummy			0.0330** (2.07)	
L. Number of borrowers * High income dummy				-0.0247 (-0.61)
L. Number of borrowers * Low income dummy				0.1294** (2.27)
GDP growth	0.8502** (2.20)	0.7768** (2.05)	0.9652** (2.02)	1.2447** (2.37)
Inflation	0.1812 (0.44)	0.2296 (0.55)	0.9060* (1.80)	-0.5708* (-1.86)
Lerner index	1.8157** (7.92)	1.7790** (7.89)	1.6244** (6.24)	1.5344** (5.23)
Population density	-0.0091 (-0.50)	0.0018 (0.11)	0.5152** (5.36)	-0.0137 (-0.88)
Time fixed effects	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes
Clustering	yes	yes	yes	yes
Observations	732	750	449	352
Adjusted R-squared	0.307	0.318	0.318	0.339

**Note:** The table reports the regression results of estimating the relation between financial inclusion and bank performance for high income versus low income countries (Equation (2)). The dependent variable is the bank performance index. The main independent variables are the interaction terms between lagged financial inclusion indicators - (i) deposits to GDP, (ii) loans to GDP, (iii) number of deposits, and (iv) number of borrowers - and high/low income dummies. Control variables include a set of country-specific characteristics: (i) GDP growth, (ii) inflation, (iii) Lerner index, and (iv) population density. The regressions are run on the full sample of 131 countries covering the period 2005-2014. Robust t-statistics are reported under the coefficients in parentheses. Standard errors are clustered at the country level. \*, \*\*, \*\*\* indicate significance at 10 percent, 5 percent, and 1 percent levels, respectively.

**Table 4: Financial inclusion and bank performance: Income equality**

	Model (1)	Model (2)	Model (3)	Model (4)
L. Deposits to GDP	-0.4516 (-1.58)			
L. Deposits to GDP * Low inequality dummy	0.2658 (1.33)			
L. Loans to GDP		-1.0353** (-3.19)		
L. Loans to GDP * Low inequality dummy		0.4190** (4.46)		
L. Number of deposits			0.0078 (0.54)	
L. Number of deposits * Low inequality dummy			0.0075 (0.81)	
L. Number of borrowers				0.0975* (2.01)
L. Number of borrowers * Low inequality dummy				0.1252** (4.41)
GDP growth	1.2881** (2.23)	0.9698* (1.71)	1.0595 (1.58)	0.9568 (1.03)
Inflation	0.0343 (0.14)	0.1700 (0.66)	1.0154 (1.12)	1.2882 (1.24)
Lerner index	2.1654** (7.23)	2.1611** (7.81)	1.7883** (5.27)	2.5072** (6.56)
Population density	0.0447 (0.04)	0.0762 (0.07)	0.5779 (0.45)	0.5638 (0.63)
Low inequality dummy	20.8485** (-3.77)	15.5208** (-3.68)	11.9479** (-2.04)	18.6124** (-2.80)
Time fixed effects	Yes	yes	yes	yes
Country fixed effects	Yes	yes	yes	yes
Clustering	Yes	yes	yes	yes
Observations	351	361	215	160
Adjusted R-squared	0.342	0.369	0.302	0.419

**Note:** The table reports the regression results of estimating the effect of income equality on the relationship between financial inclusion and bank performance. The dependent variable is the bank performance index. The main independent variables are lagged financial inclusion indicators: (i) deposits to GDP, (ii) loans to GDP, (iii) number of deposits, and (iv) number of borrowers; and the interaction terms between these variables and the low income inequality dummy. Control variables include a set of country-specific characteristics: (i) GDP growth, (ii) inflation, (iii) Lerner index, and (iv) population density. The regressions are run on the full sample of 131 countries covering the period 2005-2014. Robust t-statistics are reported under the coefficients in parentheses. Standard errors are clustered at the country level. \*, \*\*, \*\*\* indicate significance at 10 percent, 5 percent, and 1 percent levels, respectively.



Table 5: Financial inclusion and bank performance index: High versus low inclusion

	Full sample				High income sub-sample				Low income sub-sample			
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)	Model (8)	Model (9)	Model (10)	Model (11)	Model (12)
L. Deposits to GDP * High financial inclusion dummy	-0.1756 (-0.93)				-0.2313 (-1.06)				1.0049 (1.65)			
L. Deposits to GDP * Low financial inclusion dummy	-0.0607 (-0.25)				-0.2863 (-1.12)				1.3634* (1.79)			
L. Loans to GDP * High financial inclusion dummy		-0.5132** (-3.64)				-0.5356** (-3.72)				0.2321 (0.63)		
L. Loans to GDP * Low financial inclusion dummy		-0.6232** (-3.28)				-0.6433** (-3.35)				1.3627* (1.79)		
L. Number of deposits * High financial inclusion dummy			0.0121 (1.10)				0.0046 (0.45)				0.0421** (2.97)	
L. Number of deposits * Low financial inclusion dummy			0.0101 (0.80)				-0.0046 (-0.36)				0.0586** (2.30)	
L. Number of borrowers * High financial inclusion dummy				0.0029 (0.07)				-0.0246 (-0.59)				0.1600** (2.47)
L. Number of borrowers * Low financial inclusion dummy				-0.0416 (-0.53)				-0.0982* (-1.82)				0.4142 (1.48)
GDP growth	0.9957** (2.53)	0.8542** (2.21)	1.0340** (2.10)	1.2737** (2.44)	1.0260** (2.18)	0.9169* (1.96)	1.0678 (1.43)	1.0781 (1.63)	0.4879 (0.81)	0.6269 (1.02)	1.0500* (1.88)	1.1638 (1.11)
Inflation	0.1722 (0.43)	0.2329 (0.56)	0.7560 (1.38)	-0.6763** (-2.39)	0.6245 (1.31)	0.8012* (1.75)	1.9991** (2.60)	-0.5058 (-0.56)	-0.4506 (-1.15)	-0.5807 (-1.52)	0.5744 (0.91)	-0.4907 (-1.63)
Lerner index	1.7717** (7.34)	1.7342** (7.65)	1.5717** (6.05)	1.5304** (5.33)	1.9920** (6.68)	1.9551** (6.94)	1.7914** (6.05)	1.7382** (4.73)	1.4153** (3.63)	1.4478** (3.13)	1.3520** (2.56)	1.3597** (2.48)
Population density	-0.0115 (-0.58)	-0.0023 (-0.13)	0.5373** (5.39)	-0.0223 (-1.51)	-0.0111 (-0.61)	-0.0022 (-0.13)	0.4954** (4.14)	-0.0157 (-0.96)	0.2977 (0.88)	0.2163 (0.84)	0.5842** (2.35)	0.6526** (2.32)
Time fixed effects	Yes	Yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country fixed effects	Yes	Yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Clustering	Yes	Yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	732	750	449	352	534	544	285	226	198	206	164	126
Adjusted R-squared	0.296	0.312	0.313	0.326	0.350	0.371	0.353	0.404	0.212	0.236	0.258	0.272

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**Note:** The table reports the regression results of estimating the relation between financial inclusion and bank performance for high versus low financial inclusion countries. The dependent variable is the bank performance index. The main independent variables are the interaction terms between lagged financial inclusion indicators - (i) deposits to GDP, (ii) loans to GDP, (iii) number of deposits, and (iv) number of borrowers - and high-level/low-level of financial inclusion dummies. Control variables include a set of country-specific characteristics: (i) GDP growth, (ii) inflation, (iii) Lerner index, and (iv) population density. Models (1)-(4) the regressions are run on the full sample of 131 countries using the full sample threshold, Models (5)-(8) regressions are run on a sub-sample of high and upper-middle income countries, and Models (9)-(12) regressions are run on a sub-sample of low and lower-middle income countries (using sub-samples thresholds). The sample covers the period 2005-2014. Robust t-statistics are reported under the coefficients in parentheses. Standard errors are clustered at the country level. \*, \*\*,\*\*\* indicate significance at 10 percent, 5 percent, and 1 percent levels, respectively.

**Table 6: Financial inclusion and bank performance: Capital regulation**

	Model (1)	Model (2)	Model (3)	Model (4)
L. Deposits to GDP	-0.3331** (-2.48)			
L. Deposits to GDP * High quality capital regulation dummy	0.2226** (4.09)			
L. Loans to GDP		-0.5006** (-3.96)		
L. Loans to GDP * High quality capital regulation dummy		0.1306** (2.18)		
L. Number of deposits			0.0039 (0.32)	
L. Number of deposits * High quality capital regulation dummy			0.0076** (3.01)	
L. Number of borrowers				-0.0001 (-0.00)
L. Number of borrowers * High quality capital regulation dummy				0.0358** (2.48)
GDP growth	1.0720** (2.66)	0.9831** (2.45)	0.9731* (1.82)	0.3992 (0.73)
Inflation	0.5317 (1.23)	0.6439 (1.50)	1.1904* (1.96)	-0.2254 (-0.31)
Lerner index	1.8037** (6.45)	1.7936** (6.77)	1.6863** (5.80)	1.5282** (4.17)
Population density	-0.0062 (-0.29)	-0.0046 (-0.24)	0.5498** (4.83)	-0.0390** (-2.58)
Time fixed effects	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes
Clustering	yes	yes	yes	yes
Observations	623	637	368	286
Adjusted R-squared	0.344	0.346	0.336	0.343

The table reports the regression results of estimating the effect of capital regulation on the relation between financial inclusion and bank performance. The dependent variable is the bank performance index. The main independent variables are lagged financial inclusion indicators: (i) deposits to GDP, (ii) loans to GDP, (iii) number of deposits, and (iv) number of borrowers; and the interaction terms between these variables and the high quality capital regulation dummy. Control variables include a set of country-specific characteristics: (i) GDP growth, (ii) inflation, (iii) Lerner index, and (iv) population density. The regressions are run on the full sample of 131 countries covering the period 2005-2014. Robust t-statistics are reported under the coefficients in parentheses. Standard errors are clustered at the country level. \*, \*\*, \*\*\* indicate significance at 10 percent, 5 percent, and 1 percent levels, respectively.

**Table 7: Financial inclusion and bank performance: Banking crisis**

	Model (1)	Model (2)	Model (3)	Model (4)
L. Deposits to GDP	-0.3358 (-0.94)			
L. Deposits to GDP * Crisis dummy	-0.0789 (-1.47)			
L. Loans to GDP		-0.5780** (-2.35)		
L. Loans to GDP * Crisis dummy		-0.0472 (-0.59)		
L. Number of deposits			0.0139 (0.96)	
L. Number of deposits * Crisis dummy			-0.0015 (-0.38)	
L. Number of borrowers				-0.0264 (-0.39)
L. Number of borrowers * Crisis dummy				0.1117** (2.94)
GDP growth	1.3362** (3.20)	1.2583** (3.07)	0.8975* (1.91)	1.8855** (3.45)
Inflation	-0.1554 (-0.46)	-0.1055 (-0.31)	1.1302* (1.89)	-0.6415** (-2.36)
Lerner index	1.8201** (7.11)	1.7307** (7.11)	1.6891** (5.31)	1.8072** (5.12)
Population density	-0.0139 (-0.73)	-0.0252** (-2.27)	0.8004** (2.47)	-0.0243 (-1.64)
Time fixed effects	Yes	yes	yes	yes
Country fixed effects	Yes	yes	yes	yes
Clustering	Yes	yes	yes	yes
Observations	525	535	302	237
Adjusted R-squared	0.306	0.312	0.300	0.302

**Note:** The table reports the regression results of estimating the effect of crisis on the relation between financial inclusion and bank performance. The dependent variable is the bank performance index. The main independent variables are lagged financial inclusion indicators: (i) deposits to GDP, (ii) loans to GDP, (iii) number of deposits, and (iv) number of borrowers; and the interaction terms between these variables and the crisis dummy. Control variables include a set of country-specific characteristics: (i) GDP growth, (ii) inflation, (iii) Lerner index, and (iv) population density. The regressions are run on the full sample of 131 countries covering the period 2005-2014. Robust t-statistics are reported under the coefficients in parentheses. Standard errors are clustered at the country level. \*, \*\*, \*\*\* indicate significance at 10 percent, 5 percent, and 1 percent levels, respectively.

**Table 8: Financial inclusion and bank performance: Alternative measures of financial inclusion**

	Model (1)	Model (2)	Model (3)	Model (4)
L. Bank branches per 1000 km <sup>2</sup>	-0.006 (-0.04)			
L. ATMs per 1000 km <sup>2</sup>		0.0082** (5.91)		
L. Bank branches per 1000 km <sup>2</sup> * High income dummy			-0.0133 (-0.08)	
L. Bank branches per 1000 km <sup>2</sup> * Low income dummy			2.1025** (2.39)	
L. ATMs per 1000 km <sup>2</sup> * High income dummy				0.0083** (6.00)
L. ATMs per 1000 km <sup>2</sup> * Low income dummy				0.6301 (1.52)
GDP growth	0.9507** -2.46	1.0854** -2.84	0.9269** -2.42	1.0852** -2.86
Inflation	0.1307 -0.32	0.4681 -1.16	0.1482 -0.36	0.5299 -1.33
Lerner index	1.7584** -7.63	1.8085** -7.56	1.7969** -7.66	1.8557** -7.72
Population density	-0.0157 (-1.01)	-0.0341** (-2.93)	-0.0151 (-1.01)	-0.0335** (-2.99)
Time fixed effects	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes
Clustering	yes	yes	yes	yes
Observations	732	706	732	706
Adjusted R-squared	0.316	0.321	0.319	0.325

**Note:** The table reports the regression results of estimating the relation between financial inclusion and bank performance using the geographical outreach indicators (Equation (1)). The dependent variable is the performance index. The main independent variables are lagged alternative inclusion indicators: (i) branches per 1000 km<sup>2</sup>, and (ii) ATMS per 1000 km<sup>2</sup>; and the interaction terms between these indicators and high/low income dummies. Control variables include a set of country-specific characteristics: (i) GDP growth, (ii) inflation, (iii) Lerner index, and (iv) population density. The regressions are run on the full sample of 131 countries and for high income versus low income countries covering the period 2005-2014. Robust t-statistics are reported under the coefficients in parentheses. Standard errors are clustered at the country level. \*, \*\*, \*\*\* indicate significance at 10 percent, 5 percent, and 1 percent levels, respectively.



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