Financial Inclusion: New Measurement and Cross-Country Impact Assessment

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ABSTRACT

This paper introduces a new index of financial inclusion for 151 economies using principal component analysis to compute weights for aggregating 9 indicators of access, availability, and usage. Using the index, this paper investigates factors influencing financial inclusion. The results show that while higher output growth significantly covaries with greater financial inclusion for high and middle low-income economies, financial sector development and policies promoting financial inclusion play an important role in improving financial inclusion for low income economies. It then assesses the impact of financial inclusion on poverty, income inequality, higher entrepreneurship, and higher female empowerment. Using a cross-sectional approach, the results provide robust evidence that economies with high financial inclusion have significantly lower poverty rates, higher entrepreneurship, and higher female empowerment. However, the impacts of financial inclusion on poverty and other social goals are heterogeneous across country income groups, with the unit increase in financial inclusion associated with the largest reduction in poverty for low income economies.

Keywords: financial inclusion, poverty, income inequality

JEL Classification: G18, O11, O16

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I. INTRODUCTION

Financial inclusion aids inclusive growth, economic development, and financial deepening. More practically, it can increase poor people’s access to financial services, thereby reducing poverty and lowering income inequality. The empirical evidence supports this view. Indeed, simply having a bank account increases savings, empowers women, boosts household consumption, and raises productive investment (Allen et al. 2012, Beck, Demirgüç-Kunt, and Honohan 2009, and Ramahan 2011). In recent years, G20 leaders have recognized financial inclusion as one of the main pillars of the global development agenda, while policy makers around the world have pursued it as a major policy goal.

However, empirical literature on the macro-level impact of financial inclusion remains limited. The World Bank has recently made available the Global Financial Inclusion (Global Findex) database to measure and track the progress of financial access across member countries. Prior to this database, some earlier studies focus on cross-country aggregate trends and impacts of financial inclusion by using an indicator for financial access or creating their own financial inclusion indexes.

Honohan (2008) introduced a composite measure for financial access to find that a set of country specific structural variables matter for financial access. For example, more aid as percent of gross domestic product, higher age-dependency ratio, and higher population density significantly reduce financial access; while more mobile phone subscriptions and higher quality of institutions significantly increase financial access. Aid dependency suggests more poverty and age dependency implies more children who many not have access to financial services. The negative correlation between population density and financial access in his paper is rather counterintuitive, but its significance disappears when the two largest outliers, Hong Kong, China and Lebanon, are excluded from the dataset. Looking at the cross-country link between poverty and financial access, his results also show that financial access significantly reduces poverty, but the result is valid only when financial access is the sole regressor. In an earlier version of his paper, Honohan (2007) tested the significance of financial access in reducing income equality. His results show that higher financial access significantly reduces income inequality. However, the link between the two variables depends on the specification used.

Rojas-Suarez (2010) also used the same financial access indicator as Honohan (2008) to test the significance of various macroeconomic and country characteristics on financial access among a group of emerging economies. The results show that economic volatility, weak rule of law, higher income inequality, and social underdevelopment and regulatory constraints significantly lower financial inclusion. Park and Mercado (2016 and 2018) later confirmed these earlier findings, showing that per capita income, rule of law, and demographic characteristics are significantly positively correlated with financial inclusion for both global and Asian samples. They also find that financial inclusion is significantly correlated with lower poverty for both global and developing Asia samples. Although their results point to a significant covariation between income inequality and financial inclusion in their full sample, no such covariance is found in the developing Asia sample.

On the other hand, due to limited data availability at the macro-level financial inclusion, recent studies consider individual and household impacts and determinants of financial inclusion using field experiments. Burgess and Pande (2005), for example, report that state-led expansion of rural bank branches in India has helped reduce poverty. Specifically, the authors find robust evidence that opening bank branches in rural unbanked locations in India is associated with lower poverty in those areas. Similarly, Brune et al. (2011) show that increased financial access through savings accounts in rural Malawi improves the well-being of poor households, which were able to keep their savings for agricultural inputs and funds for lean periods. Allen et al. (2013) illustrate that by tapping underprivileged households, commercial banks can help improve the financial access of the poor in
Kenya. While the experimental literature for financial inclusion is growing rapidly, new papers focus on more specific evidence from randomized control trials or quasi-randomized impact evaluations. For example, Burlando and Canidio (2017) in a randomize experiment in Uganda find that inclusion of ultra-poor households in a savings group makes loanable funds initially scarce and borrowing is rationed. But overtime, such savings group can meet the demand for loans of their vulnerable members. This illustrates one dynamics of financial inclusion.

Both macro- and micro-levels of empirical literature are equally relevant to policy making. With the availability of more comprehensive and globally consistent measures for financial inclusion such as the World Bank Global Findex database, the macro-level studies can offer useful policy insights through analysis of country panel data to establish the relationship between financial access and economic growth, poverty, and income inequality.

This paper aims to investigate the aggregate impact of financial inclusion on overall poverty, income inequality, entrepreneurship, and female empowerment, which is in line with the literature on the role of financial access on financial sector development such as those from Burgess and Pande (2005); Gimet and Lagoarde-Segot (2012); Honohan (2004); Perez-Moreno (2011); and Rewilak (2017). The paper is also related to the literature on the role of financial sector development on economic growth such as Bahadir and Valev (2015) and Cole, Moshirian, and Wu (2008) in that the effect of financial inclusion on poverty is highly heterogeneous across countries with varying degrees of financial development.

We ask two questions. First, what factors are relevant in explaining cross-country differences in the recent change in financial inclusion? Second, does financial inclusion lower poverty and income inequality, and improve entrepreneurship and female empowerment? But unlike previous macro-development studies on these topics, this study introduces new theoretical and methodological innovations. On theoretical motivation, we apply a neoclassical growth model with capital market imperfections, following Galor (1996), to demonstrate how financial inclusion could lessen capital market imperfections leading to varying country income levels, and hence; poverty and income inequality. On the methodological innovation, we use principal component analysis in constructing a new index of financial inclusion (IFI) for 151 economies based on measures of ease of access, availability, and usage from the most recent published data from World Bank Global Findex database.

This paper contributes to the literature in several ways. First, our new financial inclusion measure combines multidimension approach in identifying components of financial inclusion and the use of normalized weights from the principal component analysis in determining the level of contribution of each of the components to the aggregate indicator. Our new index shows that the indicators and dimension weights from the principal component analysis remain relatively stable across three survey periods, 2011, 2014 and 2017. Second, we find that higher output growth significantly covaries with financial inclusion. However, for low income economies, financial sector development and policy support play important roles in promoting financial inclusion while the role of output growth shows up insignificant. Third, we also find that higher financial inclusion is important for lower poverty in general, while there are varying degrees of interaction effects between financial inclusion and country income groups suggesting that for any given level of financial inclusion, additional increase in financial inclusion has the largest impact on poverty reduction for low income economies.

These results imply non-linearities in the relationship between financial inclusion and poverty subject to country specific development stage and income factors that may influence the effects of financial inclusion.\footnote{We define non-linearities as a case when the impact varies across country income groups such that it is relevant for certain income groups, and not for others. We do not mean non-linearities in functional form.} This finding is related to Rewilak (2013), who finds that financial development may...
alleviate poverty, but the effect is not universal across different regions e.g. financial development is successful in raising income of the lowest quintile in South Asia but the converse is true for Latin America and the Caribbean. In contrast, our findings suggest that financial inclusion has heterogeneous effects on poverty depending on the level of country incomes which may also reflect their varying degrees and stages of financial development.

The paper proceeds as follows. Section II presents the neoclassical growth model with capital market imperfections as an analytical framework in explaining how financial inclusion affects cross country income levels. Section III discusses conceptual and measurement issues on financial inclusion. Section IV explains the methodology in constructing a new financial inclusion index and provides stylized facts. Section V presents the empirical approach and discusses the results. Section VI concludes.

II. THEORETICAL FRAMEWORK

To demonstrate how financial inclusion can have vary impact on per capita income across countries, we frame our analysis using neoclassical growth model where output is determined by a Cobb-Douglas production function with constant returns to scale and diminishing returns to factor inputs.\(^2\) The production function takes the standard form:

\[ Y = F(N, K, H, A) \]

Equation (1)

where \( Y \) is the output of economy; \( N \) is labour; \( K \) is physical capital; \( H \) is human capital; and \( A \) is the level of technology. Following Galor and Moav (2004), we include human capital in the production function, which is subject to individual diminishing returns due to physiological constraints. Nonetheless, the aggregate stock of human capital will be greater if human capital accumulation is more widespread in the economy.

As technology is labour-augmenting,

\[ Y = F(AN, K, H) \]

Equation (2)

Output per effective labour is then given by:

\[ y = \frac{Y}{AN} = f\left(\frac{K}{AN}, \frac{H}{AN}\right) \]

Equation (3)

where output per effective labour depends on physical and human capital per effective labour. As in the case of neoclassical growth models, investment per effective labour depends on saving (s) such that:

\[ \frac{I}{AN} = sf\left(\frac{Y}{AN}\right) = sf\left(\frac{K}{AN} \cdot \frac{H}{AN}\right) \]

Equation (4)

and the level of investment is given by:

\(^2\)As our research interest lies on cross-country variation in financial inclusion, our theoretical framework is based on production function, rather than representative individual utility function and budget constraint, which is appropriate for assessing individual or household variation in financial inclusion.
\[ I = (\delta_k + g_A + g_N)K + (\delta_H + g_A + g_N)H \]  

Equation (5)

In the steady-state condition, saving is equal to required investment:

\[ sf\left( \frac{K}{AN}, \frac{H}{AN} \right) = (\delta_k + g_A + g_N)\frac{K}{AN} + (\delta_H + g_A + g_N)\frac{H}{AN} \]  

Equation (6)

where \( \delta_k \) is the depreciation rate of the physical capital; \( \delta_H \) is the depreciation rate of human capital due to physiological constraints; \( g_A \) is productivity growth; and \( g_N \) is the population growth.

Following Galor (1996), we decompose savings rate into wage income savings rate and interest income savings rate, which we interpret as savings from capital investments. The wedge between the two saving rates arises due to capital market imperfections where borrowing rate is higher than lending rate due to the likelihood of default, which varies across countries such that low income economies might have higher default likelihood due to their lower capacity to repay. Based on these assumptions, cross-country variation in per capita income also comes from differences in savings rate which determines investment per effective worker, such that:

\[ s^w f\left( \frac{K}{AN}, \frac{H}{AN} \right) + (s^r - s^w) f\left( \frac{K}{AN}, \frac{H}{AN} \right) \]  

Equation (7)

where \( s^w \) is the savings rate from wage and \( s^r \) is the savings rate from investment income; and \( s^w \neq s^r \). In this context, cross-country differences in financial access (or inclusion) impacts cross-country variation in per capita income through the saving rates.

The model mechanics is as follows. Financial inclusion leads to greater pool of savings in an economy, and, conversely, greater supply of loanable funds for credit. First, financial inclusion increases wage-based savings directly as a greater proportion of population have bank accounts. Second, financial sector development through the provision of greater financial services and development of capital markets increase available loanable funds and could efficiently channel savings into credit. This increases interest income savings rate. Moreover, lower likelihood of default—either through loan collateral, less information frictions, more sophisticated and deeper financial markets, and greater access and availability of credit—will attract more people to invest in financial savings products and earn higher interest incomes. As both types of savings increase, investment would go up, leading to faster accumulation of capital stock; which in turn accelerates growth, increases per capita income, and thereby lowering poverty and income inequality.

But this mechanics work more potently in economies with higher savings rate and less financial sector development characterized by limited financial services and more market imperfections. For instance, consider two high income economies. Both have high savings rates. However, one economy has more financial market imperfections compared to the other. All else the same, we expect per capita income to be higher and poverty level lower in the economy with less financial market imperfections.

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\( ^3 \) Savings rate pertain to the proportion of disposable income that is not used for consumption. It does not refer to the interest rate in savings.

\( ^4 \) Income inequality may decrease as higher savings rates allow lower income groups within a country to have greater access to financial services, such as more favourable savings returns or access to credit.
imperfections compared to the other. As financial inclusion can offset the negative impact of financial market imperfections by lowering adverse selection and moral hazards, one expects that the level of financial inclusiveness would positively influence national savings rate and hence per capita income and poverty levels. In other words, the effect of financial inclusion on per capita income and poverty may be nonlinear due to varying degrees of capital market imperfections and financial sector development.

Cole, Moshirian, and Wu (2008) present empirical evidence to support combined impact of financial sector development and bank’s role in addressing information asymmetry on economic growth. Using dynamic panel estimation, they find a positive and significant relationship between bank stock returns and future GDP growth. They also investigate the impact of country-specific and institutional characteristics on growth through banking stock returns, which is independent of the overall market index. In an efficient market, bank stock returns should contain additional information that captures country-specific and institutional information. Their findings suggest that efficient banking systems (financial sector development and less market imperfections) are more important to economic growth in emerging markets than in developed markets, which is consistent with our theoretic model framework.

In summary, cross-country variation in per capita income depends on factors that influences the saving rates along with other growth determinants. Financial inclusion directly affects the level of per capita income through its influence on the savings rate. However, decomposing savings rate into wage and interest income saving rate, highlights the importance of capital market imperfections and financial sector development in increasing interest income saving rate for financial inclusion to have significant overall impact on country income level. Therefore, it explains the varying significance of financial inclusion across countries.

III. FINANCIAL INCLUSION CONCEPTS AND MEASUREMENT

Conceptually, the definitions of financial inclusion vary. Several studies define the concept within the broader context of social inclusion. For example, Leyshon and Thrift (1995) highlight the exclusion of some groups and individuals from access to formal financial systems, while Sinclair (2001) focuses on the inability to access necessary financial services in an appropriate form. Amidžić, Massara, and Mialou (2014) directly define financial inclusion as an economic state in which individuals and firms are not denied access to basic financial services. Sarma (2008) provides a multi-dimensional approach in defining financial inclusion as a process that ensures ease of access, availability, and usage of formal financial systems for all members of an economy. In contrast, Camara and Tuesta (2014) define an inclusive financial system as one that maximizes usage and access while minimizing involuntary exclusions. Hence, they focus more on usage, access, and barriers, which capture both the supply- and demand-side of financial access.

And just as no single conceptual definition of financial inclusion exists, no standard measure of the concept is universally accepted. Consequently, measures of financial inclusion often vary across studies. For instance, Honohan (2007 and 2008) constructed a financial access indicator that captures the fraction of the adult population in each economy with access to formal financial

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5 In fact, the World Bank (2014) defines involuntary exclusion arises from insufficient income, a high-risk profile due to discrimination, and financial market failures and imperfections.

6 Bahadir and Valev (2015) show that financial sector development, measured by credit to GDP ratio, show high degree of convergence, suggesting the existence of non-linear relationship between country income groups and financial sector development. Specifically, the authors found convergence to level off at medium level of development, and convergence slows down at high level of financial sector development.
intermediaries—which captures only one dimension of financial inclusion. This composite financial access indicator was constructed using household survey data for economies with available data on financial access. For those without a household survey on financial access, the indicator was derived using information on bank account numbers and gross domestic product (GDP) per capita. The dataset was constructed as a cross-section series using the most recent data as the reference year, which varies across economies.

Amidžić, Massara, and Mialou (2014) constructed a financial inclusion indicator as a composite of variables pertaining to multiple dimensions; outreach (geographic and demographic penetration), usage (deposit and lending), and quality (disclosure requirement, dispute resolution, and cost of usage). Each measure is normalized, statistically identified for each dimension, and then aggregated using statistical weights, the aggregation following a weighted geometric mean. One drawback of this approach is that it uses a set of variables down to a smaller number of factors and, therefore, not fully utilizing all available data for each country. Furthermore, it is very difficult to have a reliable and available cross-country data on quality measures.

Sarma (2008) followed a different approach to construct the indicator. She first computed a subindex for each dimension of financial inclusion (access, availability, and usage) and then aggregated each index as the normalized inverse of Euclidean distance, where the distance is computed from a reference ideal point and then normalized by the number of dimensions included in the aggregate index. An advantage of this approach is that it is easy to compute and does not impose varying weights for each dimension. In Sarma (2015), dimensional weights are set at arbitrary values due to the lack of available data to fully characterize availability and usage dimensions. For example, the weights for access, availability, and usage are 1, 0.5, and 0.5, respectively.

Camara and Tuesta (2014) use two-stage principal component analysis, wherein, in the first stage, they estimate three subindices—usage, access, and barriers—which define their financial inclusion measure. In the second stage, they estimate the dimension weights and the overall financial inclusion index by using the dimension subindices in the first stage as explanatory variables. In effect, their financial inclusion measure is a weighted average of three dimensions, where the weights are derived from principal component analysis. While their methodology suffers from weaknesses of its own, the weights are drawn from available data, rather than relying on the researcher’s discretion and potential biases.

This paper adopts a multidimension approach in defining financial inclusion as a process that ensures ease of access, availability, and usage of financial services for all members of society, similar to Sarma (2008). The advantage in this definition is that it builds the concept of financial inclusion based on several dimensions, which can be assessed separately. More importantly, it strictly delineates financial inclusion dimensions focusing on the financial access of a segment of the population included in the financial system, which is consistent with our theoretical framework discussed in Section II. However, we compute the weights for aggregating indices using principal component analysis (PCA) similar to Camara and Tuesta (2014).

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7 Although Amidžić, Massara, and Mialou (2014) defined proxies for a quality measure, they did not include it in their composite indicator due to a lack of reliable and available data.
8 Camara and Tuesta (2014) argued that barriers to financial access must be included as a dimension of financial inclusion as they reflect demand-side measures of financial services. However, demand-side indicators could also be included in a multidimensional approach. In other words, the lack of demand-side measures in existing financial inclusion measures does not fully justify the inclusion of barriers dimension in the aggregate financial inclusion measure.
IV. INDEX OF FINANCIAL INCLUSION

Before investigating what influences the change in financial inclusion and assessing the impact of financial inclusion in reducing poverty and lowering income inequality across different samples of countries, we first construct our own financial inclusion indicator. The motivation for constructing a new index for financial inclusion are as follows: (i) to develop a consistent and robust measure of financial inclusion using all available data for a large sample of economies, (ii) to help standardize the financial inclusion measure and allow consistent economic analysis for all countries in our sample, and (iii) to improve the quality of financial inclusion measure by combining multiple dimensions of financial inclusion into a composite index using principal component analysis.

In computing our index of financial inclusion, we follow a two-step approach. First, we combine various measures of access, availability, and usage into three dimensional indices that are related to financial inclusiveness, rather than financial exclusion. Second, we combine three dimension indices into a composite index of financial inclusion. The aggregate index is a weighted linear combination of dimensional indices, which itself is a weighted linear combination of varies indicators. The weights for aggregating indices are derived using principal component analysis (PCA). PCA is a commonly used method in combining a set of variables to extract maximum common information from individual indicators. In effect, PCA partitions the variance in a set of variables and uses it to determine weights that maximize the resulting principal component’s variation. The derived principal component is a variable which captures variations in data to the maximum extent possible.

Using PCA to derive the weights offers several advantages. First, in its application to financial inclusion index, the weights of each dimension will now be data-driven, hence parametric, as opposed to exogenously determining the weights, which is a non-parametric method. Second, unlike Common Factor Analysis, principal component analysis does not make any assumption regarding the number of common factors, enhancing its feature as a data-driven parametric approach to indexing. Given the main advantages of PCA, we use it to construct the weights in aggregating various indicators to dimension indices and then into a composite financial inclusion index.

In the first step, we standardize each indicator in each dimension as:

\[ X_{i,d} = \frac{x_i - m_i}{M_i - m_i} \]  

(Equation 8)

where \( x_i \) is the actual value of indicator \( i \), \( m_i \) is the minimum value of indicator \( i \), \( M_i \) is the maximum value of dimension \( i \). \( X_{i,d} \) is the standardized value of indicator \( i \) of dimension \( d \). In aggregating each indicator to a dimension index, we use principal component analysis. We denote \( \lambda_j (j = 1, ..., p) \) as the j-th eigenvalue, subscript \( j \) refers to the number of principal components that also coincides with the number of standardized indicators \( p \). We assume that \( \lambda_1 > \lambda_2 > ... > \lambda_p \) and denote \( P_k (k = 1, ..., p) \) as the k-th principal component. We derive each dimension index according to the weighted averages:

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9 We classify the percentage of the adult population with bank accounts as access and not as usage, in line with existing studies on financial access (Beck, Demirgüç-Kunt, and Honohan 2009; Honohan 2007 and 2008; Park and Mercado 2016 and 2018; and Sarma 2008 and 2015).

10 Some institutional measures using PCA include the KOF Index of Globalization (KOF Swiss Economic Institute), the Economic Freedom of the World Index (Economic Freedom Network), the Chicago Fed National Activity Index (Federal Reserve Bank of Chicago), Kansas City Financial Stress Index (Federal Reserve Bank of Kansas City) and the General Indicator of Science and Technology (National Institute of Science and Technology Policy, Japan).

11 We set the minimum value for each indicator to zero.
$D_d = \frac{\sum_{j,k=1}^{p} \lambda_j P_k}{\sum_{j=1}^{p} \lambda_j}$  \hspace{1cm} (Equation 9)

where $D_d$ is dimension $d$ index and $P_k = X\lambda_k$. $\lambda_j$ represents the variance of the $k$-th principal component (weights) and $X$ is the indicators matrix. The weights given to each component are decreasing, so that the larger proportion of the variation in each dimension is explained by the first principal component and so on. Following Camara and Tuesta (2014), we also account for 100 percent of the total variation in our dimension indices to avoid discarding information that could accurately estimate the overall country financial inclusion index.

Once we have the dimension indices, we run another principal component analysis to derive the dimension weights for the overall financial inclusion.

$IFI_i = \frac{\sum_{j,k=1}^{p} \lambda_j P_{ki}}{\sum_{j=1}^{p} \lambda_j}$  \hspace{1cm} (Equation 10)

where $IFI_i$ is the aggregate financial inclusion index for country $i$. $P_{ki} = X\lambda_k$. $\lambda_k$ represents the variance of the $k$-th principal component (weights of each dimension) and $X$ is the dimensions matrix. The weights given to each component are also decreasing; and we account for 100 percent of the total variation in our $IFI$. We can also represent equation 10 as:

$IFI_i = \omega_1 D_1 + \omega_2 D_2 + \omega_3 D_3$  \hspace{1cm} (Equation 11)

where $\omega$ are the weights derived from principal component analysis and $D_i$ are the dimensions. Equation 11 states that our index of financial inclusion for our sample of 151 advanced and emerging economies is a weighted average of individual dimensions.

For our indicators, we use better indicators for each dimension. For access, the indicators include the percentage of the adult population with financial accounts to total population. This indicator is a better measure of the segment of the adult population with bank accounts compared to the number of deposit accounts per adult population. We also include the proportion of the adult population with credit and debit cards as these measures complement those who have a bank account; that is, one must have a bank account before a debit and/or a credit card is issued. Our primary data source is the World Bank’s Global Findex database, which is based on individual and household survey data for 2011, 2014, and 2017 which are aggregated to a country level. For our 2014 and 2017 data on access, we also include the percentage share of the adult population with a mobile money account for those with available data.\textsuperscript{12}

For the availability dimension, we include the number of commercial bank branches and of ATMs per 100,000 adults, also taken from the Global Findex database. For the usage dimension, we include the share of the adult population who borrowed and saved from a financial institution, taken from the same database. We also include the domestic-credit-to-GDP ratio, sourced from the World Bank’s World Development Indicators.\textsuperscript{13}

\textsuperscript{12} Appendix 1 lists data definitions and sources.

\textsuperscript{13} We explored the option of including point-of-sales data from the Global Findex database. Data is available for 78 economies and the survey period is not specified.
Table 1 presents the computed normalized weights for each indicator. Several observations are notable. First, changing the number of indicators in a dimension index significantly alters the resulting weights. For the access dimension, the inclusion of a mobile money account has altered the weights for 2014 and 2017 for countries with available mobile account data. For those without mobile account data, the weights are like 2011. Second, the weight of commercial bank branches is significantly larger than the weight of ATMs per adult population for the availability dimension. This holds true across country income groups. Third, the share of those who borrow from a financial institution is far greater than the share of those who saved and for the credit-to-GDP ratio for both high and middle low-income economies. In contrast, for credit-to-GDP ratio has a higher weight for middle high and low-income economy. Taken together, this implies weight variation across country income groups. Fourth, weights appear to be stable for all survey periods. This offers support for using principal component analysis to generate indicator and dimension weights in aggregating a financial inclusion index. Lastly, dimensional weights appear stable across the sample periods. Among the dimensions, availability appears to have greater importance than access and usage. This validates the findings of Demirgüç-Kunt and Klapper (2012), in which they find that distance or the lack of available bank branches in remote areas are primary reasons that survey respondents are involuntarily excluded from financial services.\(^\text{14}\)

Applying equations 8 to 11 on the list of indicators, Table 2 presents our cross-country IFI ordered from highest to lowest in 2017.\(^\text{15}\) In principle, the IFI index could reach 100, suggesting a very high level of financial inclusion. But our computed index reaches only up to 78.91 for Luxembourg in 2017. This could be attributed to the use of weighted averages for our indicators and dimensions, as weighted averages make it less likely for a country to score high points on each weight. Nonetheless, the ordering of economies based on IFI appears robust such that economies like Japan, Luxembourg, Spain, and the United States always score high on previous IFI rankings. Figure 1 illustrates IFI median values by country income groupings. As expected, high-income countries (as classified by the World Bank) score high on our IFI measure, while low-income countries score the lowest. It also shows that financial inclusion has moderately increased across income groups between sample periods, but the increase is most notable for low income economies.

V. EMPIRICAL METHODOLOGY AND RESULTS

To address the research questions of the paper, we ran two regression models. First, we test the covariation between the change or increase in IFI between 2014 and 2017 with average GDP growth in 2011 to 2013, average domestic credit provided by the financial sector to GDP in 2011 to 2013 as proxy for financial sector development, and membership to multilateral organization which promotes financial inclusion.\(^\text{16}\) This tests the drivers of increase in financial inclusion. Specifically, we run the regression equation:

\[
\DeltaIFI_{2014-11,j} = \alpha + \beta'X_{2011-13,j} + \phi D_i + \epsilon_i \quad \text{(Equation 12)}
\]

\(^{14}\) Table 1 also presents the weights of each indicator and dimension using country income-group samples. Note that similar patterns hold as in the full sample weights.

\(^{15}\) We tested for the significance of each indicator on each dimension as well as the significance of each dimension on overall financial inclusion index. The regression results show all indicators and dimensions indices are significant. The estimates imply that the all indicators are relevant for each of the dimensions and that dimensions are significant for the aggregate financial inclusion index.

\(^{16}\) The larger the domestic credit provided by the financial sector, the deeper the financial system, as it captures not only credit to households and nonfinancial corporations, but also credit to other financial corporations and government (Claessens 2006).
where $X_i$ is the row vector of regressors and $D_i$ is a dummy variable for membership in the Alliance for Financial Inclusion.\footnote{For the Alliance for Financial Inclusion, see \url{https://www.afi-global.org/members/}.} We estimate Equation 12 to determine whether growth rate, financial market development, and membership in the financial inclusion alliance significantly covary with the change of financial inclusion for the full sample and individual country income groups.

Figure 2a illustrates the relationship between the GDP growth rate in 2011–13 and the change in financial inclusion between 2011 and 2017. We observe an upward sloping scatter plot line, implying that economies with high average economic growth rates in 2011–13 tend to have increased their level of financial inclusiveness over the sample period. Figure 2b, in contrast, show that economies with more developed financial sector tends to have higher level of financial inclusion, which is consistent with the theoretical framework in Section II.

Second, we test the covariation between the average level of financial inclusion in 2011–14 and the level of poverty, income inequality, entrepreneurship, and female empowerment in 2014–17. We expect economies with higher financial inclusion would have lower poverty rates and income inequality and higher entrepreneurship (Dupas and Robinson 2009) and female empowerment (Ashraf, Karlan, and Yin 2010). As discussed in Section II, cross-country differences in the level of financial inclusiveness can be attributed to varying degrees of savings, financial development, and capital market imperfections. Figure 3a demonstrates this negative relationship between the average level of IFI in 2011–14 and average poverty rates in 2014–17, while Figure 3b exhibits a similar pattern for income inequality. But to formally test the covariation, we estimate the equation:

$$Y_{2014-16,i} = \alpha + \beta_1 IFI_{2011-14,i} + \beta X_{2011-2013,i} + \phi' D_i + \phi' D_i^* IFI_{2011-14,i} + \epsilon_i$$  \hspace{1cm} (Equation 13)

where $Y$ pertains to the average values of poverty, income inequality, entrepreneurship, and female empowerment for 2014–17. IFI is the average value for financial inclusion in 2011 and 2014. $X$ is a row vector of regressors which includes the average values of secondary education completion and GDP growth rates for 2011–13.\footnote{We considered including productivity as one of our explanatory variables. However, any changes in productivity are captured by the average GDP growth rate. Moreover, we include overall GDP growth rate, rather than the determinants of growth rates to avoid multicollinearity.} $D$ is a dummy variable for country income groupings. $D^* IFI$ is the interaction term between the country income group and financial inclusion.\footnote{Refer to Table 2 for the country income groups, and Appendix 1 for the full list of data notes and sources.} The interaction term in Equation 13 will indicate whether financial inclusion to a specific income group exerts greater or lesser impact on poverty and income inequality than in other income groups.

For both Equations 12 and 13, we limit the number of regressors to avoid multicollinearity among regressors.\footnote{We run similar estimation including rule of law, and Appendix 1 for the full list of data notes and sources.} We also use robust standard errors to address potential heteroskedasticity. In addition, regressing the dependent and independent variables in two different time periods reduces endogeneity, that is, the explanatory variables are lagged. This empirical approach is recommended to reduce endogeneity in a cross-section regression without the need to use an instrument variable. Finally, we estimated Equations 12 and 13 using ordinary least squares estimation. We do not use an instrument variable with two-stage least squares estimation because a valid instrument variable is lacking. Using a weak instrument variable would lead to inefficient estimation, as the standard errors

\footnote{For the Alliance for Financial Inclusion, see \url{https://www.afi-global.org/members/}.}
in the second-stage regression will be higher, yielding inconsistent results. For both specifications, we interpret the results as correlations as there could be omitted variable bias which leads to endogeneity, even if we’ve address reverse causality by using lagged values of our regressors.

Table 3 presents the estimates for Equation 12 on the covariation between the change in financial inclusion and growth, financial sector development, and membership to financial inclusion initiatives, using the most recent data. The results indicate that economies with strong economic growth have significantly higher increase in financial inclusion for the full sample estimates in column (1). But splitting the country income groups into high, middle-high, middle-low, and low-income countries as classified by the World Bank yields some interesting results. For high income economies and middle low-income economies, high economic growth significantly covaries with greater increase in financial inclusion, similar to the result for all sample countries. For low income economies, financial sector development and members of the Alliance for Financial Inclusion show significant positive relationships with the level of financial inclusiveness while the effect of economic growth is insignificant. These results provide supportive evidence on the role of financial sector development and policies promoting financial inclusion in improving financial inclusion, which is consistent with our theoretical motivation in Section II.

Tables 4 to 7 assess the impact of financial inclusion on poverty, income inequality, entrepreneurship, and female empowerment as shown in Equation 13. Apart from poverty and inequality, we added entrepreneurship and female empowerment, as financial inclusion is often discussed as a key driver for these two important economic variables in micro-level studies using individual and household survey data.

Table 4 presents evidence that economies with higher financial inclusion have significantly lower poverty, higher entrepreneurship and higher female empowerment. However, we do not find similar results for income inequality. These results hold while we control for educational attainment which significantly covaries with less income inequality and entrepreneurship and higher output growth which significantly covaries with higher income inequality and greater entrepreneurship.

Tables 5 and 6 present the results when we split the sample into high- and middle-high; and middle-low and low-income economies. For high- and middle-high-income economies, in Table 5, we find that higher financial inclusion significantly covaries with lower poverty rates, higher entrepreneurship and higher female empowerment. This result is valid with other control variables such as education completion and growth. Higher education completion is significantly associated with less poverty and income inequality, while higher growth rate with higher income inequality, entrepreneurship and female empowerment. For middle-low and low-income country groups in Table 6, higher financial inclusion significantly covaries with lower poverty rates and higher entrepreneurship. However, among other control variables, only higher education completion is significantly associated with less income inequality. Tables 5 and 6 show that while attaining a high level of financial inclusion is significantly correlated with having lower poverty rates and higher levels of entrepreneurship for all income groups, the impacts differ across country income groups, especially higher for lower income groups.

Given the significantly different results of Table 5 and 6, it would be worthwhile to explore interaction effects between financial inclusion and country incomes. This helps assess whether financial inclusion alone is a sufficient factor in lowering poverty and income inequality and how it interacts with other factors associated with the country income levels. This is because, as suggested by Beck, Demirgüç-Kunt, and Honohan (2009), financial access may lower poverty and income

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21 We combined high-and middle-high-income and middle-low and low-income economies in both regressions to have sufficient sample size to assume normality of both samples.
inequality, not through the direct provision of financial services to low-income groups, but through higher wages and higher participation in the formal sector of the economy. For middle-low and low-income economies, such indirect effects may dominate the direct effects due to inefficient financial systems and ineffective provision of financial services to the poor. More importantly, exploring the interaction effects between financial inclusion and country incomes will allow us to assess whether the impact of financial inclusion on poverty for specific income group is particularly greater or smaller than the other income groups. Such difference of financial inclusion impact on poverty by country income groups would help understand the pattern of nonlinear financial inclusion effects across country income groups.

Tables 7a to 7d present the results when we control for different income groups and their interaction effects with financial inclusion to assess whether belonging to a specific income group has significantly different impact on our parameters of interest, as compared to other groups. Table 7a validates that higher financial inclusion significantly covaries with lower poverty rates and higher entrepreneurship for the high income group, while we do not see the same effect for income inequality and female empowerment. Interestingly, however, the estimates for interactive terms indicate that, for high income economies, a one-unit increase in financial inclusion is significantly correlated with higher poverty rates by around 0.03 percent, while, for all other income groups, the decline in poverty would be around 1.40 percent. The finding that for high income economies, financial inclusion is significantly associated with higher poverty rate might reflect the impact of recent financial crises and economic downturn in advance economies, which drove more households below the poverty line.\(^{22}\) Table 7a also shows that financial inclusion covaries significantly more with higher entrepreneurship for high income economies compared to other income groups. This implies that high income economies tend to offer more business friendly environment for entrepreneurial activities.

Tables 7b-7d show that higher financial inclusion significantly covaries with lower poverty rates, higher entrepreneurship, and higher female empowerment for all other income groups. However, the significance of interaction terms between financial inclusion and country income group varies across income groups. For middle-high income economies, the interaction term is significant i.e. a one-unit increase in financial inclusion is correlated with significantly lower poverty rates by around 0.22 percent, whereas the decline for other income groups is around 1.00 percent. This finding is intuitive given that middle high-income economies could have significantly lower poverty rates than other income groups, and so the decline in poverty would be smaller given an increase in financial inclusion. For middle low-income economies, in Table 7c, the interaction term is insignificant suggesting that the impact of financial inclusion on middle low-income economies is not statistically different from other income groups. For low income economies in Table 7d, the estimates indicate that a one-unit increase in financial inclusion is correlated with significantly lower poverty rates by around 3.33 percent for low income economies, whereas the decline for other income groups is around 0.83 percent. Again, this result is intuitive given that low income economies have significantly higher poverty rates than other income groups, and so the decline in poverty would be greater given an increase in financial inclusion. On the other hand, the estimates show that a one-unit increase in financial inclusion leads to a slightly lower female empowerment by around 0.19 percent for the middle-low income group. This is in contrast to the finding that a unit increase in financial inclusion is positively correlated with female empowerment for all but high income groups. This irregular income pattern suggests that the effect of financial inclusion on female empowerment may be subject to various sociopolitical and cultural backgrounds irrespective of the country income levels.

\(^{22}\) This result is in line with the actual poverty trends for most advanced economies in recent years, 2014-2017. In most cases, high income economies have maintained their current level of poverty. However, there is a significant number of high income economies whose poverty rates have been rising, including the likes of Austria, Germany, Spain, United Kingdom and even Sweden.
Taken together, these results suggest that although higher financial inclusion is positively correlated with lower poverty for all income groups, the magnitude to which poverty drops given a unit increase in the level of financial inclusion is higher for low income groups. In other words, although financial inclusion in general is positive for lowering poverty across all income groups, the marginal reduction in poverty is the largest for low income economies.

The estimates also show that educational attainment matters for lower poverty and income inequality, in line with previous studies. However, educational attainment has a negative relationship with entrepreneurship, which shows up consistently across Tables 4 to 7. A possible explanation for this is that those without higher educational completion have higher likelihood of starting their own business as they might have insufficient qualifications to be employed in the formal sector and, hence, they become more entrepreneurial. The estimates also indicate that financial inclusion does increase women’s empowerment, consistent with Buvinić and Furst-Nichols (2016), Calderon, Iacovone, and Juarez (2016), Ghosh and Vinod (2017) and Swamy (2014). As our measure of female empowerment is the proportion of adult female who borrowed from a financial institution within the sample year, the results imply that financial inclusion enables women to have greater access to financial services through credit.

In summary, we provide robust evidence that higher financial inclusion significantly covaries with lower poverty rates and higher entrepreneurship for all sample economies. But magnitude and significance of covariation differs across country income groups, reflecting different structural features associated with varying stages of economic development, including financial sector and market development and degree of capital market imperfections as discussed in Section II. These findings are new to the financial inclusion empirical literature, but in line with the model predictions of Bhattacharya and Patnaik (2015).

The baseline results hold when we run sensitivity tests. First, instead of using one indicator or dimension weight for all economies, we use varying weights across different income groups for alternative tests. The rationale for using varying income weights pertains more to the different levels of financial development across the sample. Tables 8a and 8b present the results using varying dimension weights and the estimates show that the baseline results remain robust. This is expected, as there is little difference between the financial inclusion index when country group weights are used.

Second, Tables 3 and 4 present the baseline estimates in a cross-sectional lagged form. We test whether the results hold if we run pooled OLS estimation and panel fixed effects regressions with country and time fixed effects separately. Tables 9a to 9c present the estimates on the determinants of financial inclusion. We regress our computed financial inclusion index for the years 2014 and 2017 and the corresponding lagged values of the regressors for 2011 and 2014, respectively such that the financial inclusion for 2014 is regressed on growth and financial development for 2011 whereas financial inclusion for 2017 is regressed on growth and financial development for 2014. The results are broadly consistent with the estimates in Tables 3, where financial sector development is significant for low income countries but not for AFI membership; and economic growth is significant for middle low-income countries. However, note that the dependent variable in Tables 9a to 9c is the level of financial inclusion and not the change in financial inclusion as in Table 3 as taking the change between periods would have resulted in a cross-section regression as in Table 3. Tables 10a to 10c present the results for pooled, panel with country fixed effects, and panel with time fixed effects on the significance of financial inclusion on poverty, income inequality, entrepreneurship and female empowerment. The estimates pertain to the 2014 and 2017 values of dependent variable

23See Table 1 for the indicator and dimension weights based on country income group samples.
regressed on the 2011 and 2014 values of the regressors such that poverty for 2017 is regressed on financial inclusion for 2014. The estimates using pooled OLS and panel with time fixed effects are consistent with the baseline estimates in Table 4 where we see financial inclusion significantly reduces poverty and increases entrepreneurship and female empowerment; while the results for panel with country fixed effects in Table 10b show no significant relationship. These suggest that the covariation between poverty, entrepreneurship, female empowerment and financial inclusion lies within cross-country differences and not with the time variation, perhaps due to shorter sample period. These results not only validate the baseline estimates but also support the empirical model tested in Equations 12 and 13 using cross-section set-up.

Third, we also run robustness checks considering institutional quality. Table 11 presents the estimates when we add the rule of law variable. The findings show that economies with higher financial inclusion have significantly lower poverty rates, but the magnitude of covariance is much smaller for the economies with high rule of law. The interaction term between high financial inclusion and high rule of law suggest the effect of financial inclusion on poverty reduction decreases over the degree of rule of law. Interestingly, we also find that, accounting for rule of law, financial inclusion significantly covaries with higher income inequality, but the covariation is significantly less for countries with high rule of law compared to other groups. The positive covariation between financial inclusion and income inequality may be likely at the early stage of economic development. What our estimates also demonstrate is that the magnitude of covariation significantly decreases as the rule of law improves. Given that countries with high rule of law are usually those with high per capita income, the findings imply that as countries develop, financial inclusion could help contain further widening of income inequality. Overall, these results demonstrate that the effects of financial inclusion on poverty and income inequality vary across countries with different institutional qualities such as presented by the rule of law.

VI. CONCLUSIONS

Financial inclusion has emerged as a major policy goal for governments across the world, but empirical evidence on its effects on poverty reduction and other social benefits has been elusive at the macro level. In this paper, we adopt a neoclassical growth model with capital market imperfections, which creates a wedge between wage and financial income savings to explain the heterogeneous effects of financial inclusion on poverty and other social goals across different country income levels.

In order to overcome data limitations for the financial inclusion measure at the macro level, we construct a new index of financial inclusion for 151 economies using weights derived from principal component analysis in aggregating indicators for access, availability, and usage to examine the cross-country variations in the relationship between financial inclusion and other economic variables. Using the World Bank Global Findex database, we combine multidimensional approach with the normalized weights from principal component analysis in deriving our index. The financial inclusion index shows that the weights using principal component analysis are relatively stable for three survey periods, suggesting its suitability in measuring financial inclusion.

Using the index, this paper first investigates what matters for financial inclusion. The results show that higher output growth significantly covaries with greater financial inclusion for high and middle low-income economies. It is important to note that financial sector development and membership of the Alliance for Financial Inclusion show significant positive relationships with the level of financial

24 We transformed our measure of rule of law, as discussed in Appendix 1, to avoid multicollinearity between financial inclusion and rule of law.
inclusiveness for low income economies, while economic growth seems insignificantly correlated with financial inclusion. These results suggest financial sector development and policies promoting financial inclusion play an important role in improving financial inclusion, especially for low income economies.

This paper also assesses the cross-country variation of financial inclusion impacts on poverty, income inequality, higher entrepreneurship, and higher female empowerment. Using a cross-sectional approach, our estimates provide robust evidence that economies with high financial inclusion have significantly lower poverty rates, higher entrepreneurship, and higher female empowerment. In addition, splitting the sample by country income groups, we find higher financial inclusion significantly covaries with lower poverty rates and higher entrepreneurship for all income groups. Higher financial inclusion significantly covaries with higher female empowerment for all but high income economies. However, we find that the impacts of financial inclusion on poverty and other social goals are heterogeneous across country income groups, with the unit increase in financial inclusion associated with the largest reduction in poverty for low income economies.
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Table 1: Principal Component Analysis of Indicators for Each Index of Financial Inclusion Dimension

|                                | Full Sample |             |             |             | HIC   |             |             | MHI   |             |             |             |             |
|--------------------------------|-------------|-------------|-------------|-------------|-------|-------------|-------------|-------|-------------|-------------|-------------|-------------|
|                                | 2011 | 2014 | 2017 | 2011 | 2014 | 2017 | 2011 | 2014 | 2017 | 2011 | 2014 | 2017 |
| Account (% age 15+)            | 0.314 | 0.321 | 0.263 | 0.321 | 0.273 | 0.312 | 0.289 | 0.290 | 0.310 | 0.294 | 0.284 | 0.292 | 0.336 | 0.295 | 0.274 |
| Credit Card (% age 15+)        | 0.367 | 0.363 | 0.250 | 0.365 | 0.239 | 0.488 | 0.432 | 0.181 | 0.436 | 0.146 | 0.412 | 0.408 | 0.065 | 0.403 | 0.180 |
| Debit Card (% age 15+)         | 0.318 | 0.316 | 0.273 | 0.314 | 0.254 | 0.200 | 0.279 | 0.297 | 0.255 | 0.284 | 0.304 | 0.300 | 0.324 | 0.302 | 0.255 |
| Mobile Money (% age 15+)       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                | 0.215 | 0.234 | 0.231 | 0.234 | 0.234 | 0.231 | 0.276 | 0.276 | 0.276 | 0.276 | 0.276 | 0.276 | 0.291 |       |       |
| Branches per 100,000 pop.     | 0.626 | 0.649 | 0.640 | 0.767 | 0.794 | 0.746 | 0.647 | 0.710 | 0.749 | 0.647 | 0.710 | 0.749 |       |       |       |
| ATMs per 100,000 pop.          | 0.374 | 0.351 | 0.360 | 0.233 | 0.206 | 0.254 | 0.353 | 0.290 | 0.251 | 0.353 | 0.290 | 0.251 |       |       |       |
| Borrower (% age 15+)           | 0.437 | 0.447 | 0.441 | 0.305 | 0.174 | 0.148 | 0.444 | 0.443 | 0.508 | 0.444 | 0.443 | 0.508 |       |       |       |
| Saver (% age 15+)              | 0.247 | 0.268 | 0.276 | 0.209 | 0.294 | 0.314 | 0.323 | 0.291 | 0.277 | 0.323 | 0.291 | 0.277 |       |       |       |
| Credit (% GDP)                 | 0.315 | 0.285 | 0.283 | 0.487 | 0.532 | 0.538 | 0.233 | 0.266 | 0.216 | 0.233 | 0.266 | 0.216 |       |       |       |
| Dimension 1 (Access)           | 0.300 | 0.291 | 0.284 | 0.302 | 0.250 | 0.260 | 0.237 | 0.231 | 0.173 | 0.237 | 0.231 | 0.173 |       |       |       |
| Dimension 2 (Availability)     | 0.402 | 0.395 | 0.399 | 0.434 | 0.426 | 0.436 | 0.229 | 0.481 | 0.475 | 0.229 | 0.481 | 0.475 |       |       |       |
| Dimension 3 (Usage)            | 0.298 | 0.314 | 0.317 | 0.264 | 0.324 | 0.304 | 0.534 | 0.288 | 0.353 | 0.534 | 0.288 | 0.353 |       |       |       |

|                                | MLI   |             |             |             | LJC   |             |             |             |
|--------------------------------|-------|-------------|-------------|-------------|-------|-------------|-------------|-------------|
|                                | 2011 | 2014 | 2017 | 2011 | 2014 | 2017 | 2011 | 2014 | 2017 |
| Account (% age 15+)            | 0.276 | 0.281 | 0.217 | 0.294 | 0.268 | 0.415 | 0.343 | 0.281 | 0.295 | 0.227 |
| Credit Card (% age 15+)        | 0.444 | 0.428 | 0.359 | 0.432 | 0.156 | 0.290 | 0.354 | 0.225 | 0.407 | 0.264 |
| Debit Card (% age 15+)         | 0.280 | 0.291 | 0.224 | 0.274 | 0.174 | 0.295 | 0.302 | 0.262 | 0.298 | 0.237 |
| Mobile Money (% age 15+)       |       |       |       |       |       |       |       |       |       |       |       |       |
|                                | 0.200 |       |       | 0.241 |       |       |       |       |       |       |       |       |
| Branches per 100,000 pop.     | 0.758 | 0.687 | 0.621 | 0.639 | 0.609 | 0.561 |       |       |       |       |       |       |
| ATMs per 100,000 pop.          | 0.242 | 0.313 | 0.379 | 0.361 | 0.391 | 0.439 |       |       |       |       |       |       |
| Borrower (% age 15+)           | 0.135 | 0.246 | 0.355 | 0.280 | 0.257 | 0.281 |       |       |       |       |       |       |
| Saver (% age 15+)              | 0.278 | 0.553 | 0.482 | 0.287 | 0.313 | 0.284 |       |       |       |       |       |       |
| Credit (% GDP)                 | 0.587 | 0.201 | 0.163 | 0.433 | 0.430 | 0.436 |       |       |       |       |       |       |
| Dimension 1 (Access)           | 0.269 | 0.179 | 0.231 | 0.285 | 0.299 | 0.443 |       |       |       |       |       |       |
| Dimension 2 (Availability)     | 0.261 | 0.461 | 0.543 | 0.430 | 0.489 | 0.246 |       |       |       |       |       |       |
| Dimension 3 (Usage)            | 0.470 | 0.360 | 0.226 | 0.285 | 0.212 | 0.311 |       |       |       |       |       |       |

Notes: GDP = gross domestic product, HIC = high-income countries, MHI = middle-high income countries, MLI = middle-low income countries, and LIC = low-income countries. Weights are normalized. Dimension 1 (Access) weights for 2014 and 2017 include weights for mobile money whenever data is available. Refer to Appendix 1 for data definition and sources. Source: Authors’ calculations.
| Rank | Economy             | Code | Income Group | Geographic Group | IFI 2011 | IFI 2014 | IFI 2017 |
|------|---------------------|------|--------------|------------------|----------|----------|----------|
| 1    | Luxembourg          | LUX  | HIC          | EUR              | 71.81    | 73.21    | 78.91    |
| 2    | United States       | USA  | HIC          | NAM              | 63.24    | 66.33    | 72.48    |
| 3    | Canada              | CAN  | HIC          | NAM              | 62.33    | 66.30    | 68.87    |
| 4    | Spain               | ESP  | HIC          | EUR              | 68.15    | 68.65    | 66.92    |
| 5    | Australia           | AUS  | HIC          | EAP              | 61.20    | 62.21    | 63.34    |
| 6    | New Zealand         | NZL  | HIC          | EAP              | 62.39    | 63.15    | 63.11    |
| 7    | Switzerland         | CHE  | HIC          | EUR              | 59.40    | 59.00    | 62.07    |
| 8    | Korea Rep           | KOR  | HIC          | EAP              | 59.16    | 59.03    | 62.06    |
| 9    | United Kingdom      | GBR  | HIC          | EUR              | 54.06    | 59.06    | 59.73    |
| 10   | Norway              | NOR  | HIC          | EUR              | 58.95    | 56.08    | 59.34    |
| 11   | Japan               | JPN  | HIC          | EAP              | 49.83    | 59.20    | 59.24    |
| 12   | Australia           | AUS  | HIC          | EAP              | 48.31    | 56.99    | 59.16    |
| 13   | Italy               | ITA  | HIC          | EUR              | 43.30    | 51.57    | 57.58    |
| 14   | Israel              | ISR  | HIC          | MENA             | 45.99    | 56.80    | 56.37    |
| 15   | Denmark             | DNK  | HIC          | EUR              | 59.14    | 55.47    | 55.95    |
| 16   | France              | FRA  | HIC          | EUR              | 54.96    | 54.42    | 55.67    |
| 17   | Portugal            | PRT  | HIC          | EUR              | 58.70    | 54.82    | 54.75    |
| 18   | Sweden              | SWE  | HIC          | EUR              | 55.38    | 55.77    | 53.30    |
| 19   | Germany             | DEU  | HIC          | EUR              | 47.54    | 50.36    | 51.59    |
| 20   | Hong Kong, China    | HKG  | HIC          | EUR              | 48.33    | 50.53    | 51.35    |
| 21   | Malta               | MLT  | HIC          | EUR              | 51.08    | 48.33    | 49.87    |
| 22   | Slovenia            | SVN  | HIC          | CEE              | 51.25    | 47.45    | 49.61    |
| 23   | Ireland             | IRL  | HIC          | EUR              | 51.69    | 49.71    | 48.59    |
| 24   | Austria             | AUT  | HIC          | EUR              | 45.38    | 47.04    | 48.33    |
| 25   | Croatia             | HRV  | MIH          | CEE              | 46.48    | 49.99    | 47.70    |
| 26   | Finland             | FIN  | HIC          | EUR              | 52.02    | 49.60    | 46.80    |
| 27   | Poland              | POL  | HIC          | CEE              | 32.59    | 38.58    | 46.39    |
| 28   | Belgium             | BEL  | HIC          | EUR              | 43.45    | 44.58    | 45.75    |
| 29   | Bulgaria            | BGR  | MIH          | CEE              | 39.19    | 45.11    | 45.69    |
| 30   | Cyprus              | CYP  | HIC          | EUR              | 62.16    | 46.05    | 45.64    |
| 31   | Slovakia            | SVK  | HIC          | CEE              | 37.26    | 40.69    | 45.47    |
| 32   | Iran                | IRN  | MIH          | MENA             | 43.08    | 41.38    | 45.46    |
| 33   | Netherlands         | NLD  | HIC          | EUR              | 48.80    | 45.37    | 45.30    |
| 34   | Singapore           | SGP  | HIC          | EAP              | 37.17    | 39.06    | 44.07    |
| 35   | Russia              | RUS  | MIH          | FSU              | 32.07    | 41.53    | 42.55    |
| 36   | Estonia             | EST  | HIC          | CEE              | 40.85    | 40.70    | 41.71    |
| 37   | Czech Republic      | CZE  | HIC          | CEE              | 35.38    | 37.75    | 40.50    |
| 38   | United Arab Emirates| ARE  | HIC          | MENA             | 30.38    | 35.69    | 40.23    |
| 39   | Montenegro          | MNE  | MIH          | EUR              | 35.54    | 38.39    | 39.52    |
| 40   | Kuwait              | KWT  | HIC          | MENA             | 46.50    | 34.48    | 38.71    |
| 41   | Thailand            | THA  | MIH          | EAP              | 36.84    | 35.45    | 38.45    |
| 42   | Latvia              | LVA  | HIC          | CEE              | 38.86    | 39.38    | 36.99    |
| 43   | China               | CHN  | MIH          | EAP              | 25.75    | 32.08    | 36.59    |
| 44   | Georgia             | GEO  | MIL          | FSU              | 21.58    | 29.39    | 36.27    |
| 45   | Turkey              | TUR  | MIH          | MENA             | 29.71    | 31.28    | 35.75    |
| 46   | Colombia            | COL  | MIH          | LAC              | 20.02    | 34.64    | 35.56    |
| 47   | Malaysia            | MYS  | MIH          | EAP              | 28.45    | 32.36    | 35.07    |
| 48   | Chile               | CHL  | HIC          | LAC              | 26.50    | 31.50    | 34.65    |
| 49   | Serbia              | SRB  | MIH          | CEE              | 34.50    | 32.88    | 34.56    |
| 50   | Mauritius           | MUS  | MIH          | SSA              | 35.32    | 35.72    | 34.52    |
| Rank | Economy          | Code | Income Group | Geographic Group | IFI 2011 | IFI 2014 | IFI 2017 |
|------|------------------|------|--------------|-----------------|----------|----------|----------|
| 51   | Trinidad and Tobago | TTO  | HIC          | LAC             | 29.84    | 30.38    | 34.47    |
| 52   | Macedonia        | MKD  | MIH          | CEE             | 29.33    | 33.11    | 34.46    |
| 53   | Namibia          | NAM  | MIH          | SSA             | 25.02    | 24.22    | 34.43    |
| 54   | Costa Rica       | CRI  | MIH          | LAC             | 27.97    | 33.04    | 33.74    |
| 55   | Greece           | GRC  | HIC          | EUR             | 38.07    | 35.95    | 33.46    |
| 56   | Qatar            | QAT  | HIC          | MENA            | 31.14    | 31.25    | 32.57    |
| 57   | Armenia          | ARM  | MIL          | FSU             | 19.96    | 21.70    | 32.45    |
| 58   | Brazil           | BRA  | MIH          | LAC             | 30.73    | 33.38    | 32.42    |
| 59   | Lithuania        | LTU  | HIC          | CEE             | 29.09    | 30.56    | 32.38    |
| 60   | Oman             | OMN  | HIC          | MENA            | 31.06    | 29.61    | 31.23    |
| 61   | Romania          | ROU  | MIH          | CEE             | 27.88    | 29.24    | 30.73    |
| 62   | Lebanon          | LBN  | MIH          | MENA            | 27.16    | 28.32    | 30.60    |
| 63   | Uruguay          | URY  | HIC          | LAC             | 21.25    | 26.50    | 30.30    |
| 64   | Saudi Arabia     | SAU  | HIC          | MENA            | 20.15    | 27.61    | 29.71    |
| 65   | Hungary          | HUN  | HIC          | CEE             | 30.63    | 28.43    | 29.65    |
| 66   | Kenya            | KEN  | MIL          | SSA             | 17.15    | 27.09    | 29.43    |
| 67   | South Africa     | ZAF  | MIH          | SSA             | 27.78    | 32.49    | 29.17    |
| 68   | Bosnia and Herzegovina | BIH  | MIH         | CEE             | 29.63    | 30.24    | 29.14    |
| 69   | Belize           | BLZ  | MIH          | LAC             | 27.50    | 26.87    | 28.68    |
| 70   | Belarus          | BLR  | MIH          | FSU             | 23.20    | 22.73    | 28.60    |
| 71   | Venezuela        | VEN  | MIH          | LAC             | 18.69    | 22.36    | 27.95    |
| 72   | Kazakhstan       | KAZ  | MIH          | FSU             | 20.14    | 22.01    | 27.09    |
| 73   | Dominican Republic | DOM  | MIH         | LAC             | 20.29    | 22.72    | 26.97    |
| 74   | Sri Lanka        | LKA  | MIL          | SAS             | 25.22    | 26.24    | 26.76    |
| 75   | Panama           | PAN  | MIH          | LAC             | 22.30    | 26.49    | 26.66    |
| 76   | Indonesia        | IDN  | MIL          | EAP             | 14.24    | 21.96    | 25.99    |
| 77   | Ukraine          | UKR  | MIL          | FSU             | 21.47    | 23.73    | 25.94    |
| 78   | Bolivia          | BOL  | MIL          | LAC             | 18.67    | 23.66    | 25.49    |
| 79   | Guatemala        | GTM  | MIL          | LAC             | 23.12    | 25.12    | 24.86    |
| 80   | Kosovo           | UVK  | MIL          | CEE             | 21.04    | 23.05    | 24.75    |
| 81   | Jordan           | JOR  | MIL          | MENA            | 15.89    | 17.55    | 23.04    |
| 82   | Peru             | PER  | MIH          | LAC             | 15.60    | 16.74    | 22.96    |
| 83   | Jamaica          | JAM  | MIH          | LAC             | 22.00    | 22.20    | 22.91    |
| 84   | Honduras         | HND  | MIL          | LAC             | 16.03    | 19.40    | 22.29    |
| 85   | Vietnam          | VNM  | MIL          | EAP             | 17.20    | 18.65    | 22.29    |
| 86   | Tunisia          | TUN  | MIL          | MENA            | 17.97    | 17.81    | 22.26    |
| 87   | India            | IND  | MIL          | SAS             | 14.18    | 17.12    | 21.59    |
| 88   | Paraguay         | PRY  | MIH          | LAC             | 16.00    | 17.71    | 20.91    |
| 89   | Argentina        | ARG  | MIH          | LAC             | 18.99    | 20.91    | 20.85    |
| 90   | Uzbekistan       | UZB  | MIL          | FSU             | 17.10    | 20.19    | 20.84    |
| 91   | Ecuador          | ECU  | MIH          | LAC             | 19.51    | 20.98    | 20.78    |
| 92   | Albania          | ALB  | MIH          | CEE             | 20.45    | 20.83    | 20.76    |
| 93   | Cambodia         | KHM  | MIL          | EAP             | 11.64    | 18.08    | 19.50    |
| 94   | Moldova          | MDA  | MIL          | CEE             | 12.76    | 14.03    | 19.30    |
| 95   | Uganda           | UGA  | LIC          | SSA             | 9.92     | 17.63    | 19.24    |
| 96   | Ghana            | GHA  | MIL          | SSA             | 10.48    | 13.23    | 19.16    |
| 97   | Botswana         | BWA  | MIH          | SSA             | 14.63    | 22.63    | 18.47    |
| 98   | Nepal            | NPL  | LIC          | SAS             | 12.85    | 14.42    | 18.38    |
| 99   | Mexico           | MEX  | MIH          | LAC             | 17.72    | 20.62    | 18.19    |
| 100  | Gabon            | GAB  | MIH          | SSA             | 7.19     | 12.82    | 18.01    |
### Table 2: Index of Financial Inclusion Ranking, 2017 (Continued)

| Rank | Economy   | Code | Income Group | Geographic Group | IFI 2011 | IFI 2014 | IFI 2017 |
|------|------------|------|--------------|------------------|----------|----------|----------|
| 101  | Morocco    | MAR  | MIL          | MENA             | 19.49    | 19.72    | 17.74    |
| 102  | Azerbaijan | AZE  | MIH          | FSU              | 15.51    | 18.83    | 17.54    |
| 103  | Bhutan     | BTN  | MIL          | SAS              | 15.94    | 16.27    | 17.48    |
| 104  | Swaziland  | SWZ  | MIL          | SSA              | 16.95    | 16.49    | 17.19    |
| 105  | Tajikistan | TJK  | MIL          | FSU              | 5.24     | 6.13     | 17.02    |
| 106  | Philippines| PHL  | MIL          | EAP              | 14.38    | 15.79    | 16.13    |
| 107  | Bangladesh | BGD  | MIL          | SAS              | 18.85    | 11.80    | 16.03    |
| 108  | El Salvador| SLV  | MIL          | LAC              | 12.34    | 20.25    | 16.02    |
| 109  | Nicaragua  | NIC  | MIL          | LAC              | 9.91     | 13.12    | 15.78    |
| 110  | Zambia     | ZMB  | MIL          | SSA              | 9.80     | 11.80    | 15.62    |
| 111  | Rwanda     | RWA  | LIC          | SSA              | 11.56    | 14.10    | 15.47    |
| 112  | Zimbabwe   | ZWE  | LIC          | SSA              | 13.55    | 13.08    | 15.39    |
| 113  | Burkina Faso| BFA | LIC          | SSA              | 4.97     | 6.68     | 14.86    |
| 114  | Togo       | TGO  | LIC          | SSA              | 5.66     | 6.77     | 14.70    |
| 115  | Kyrgyzstan | KGZ  | MIL          | FSU              | 8.64     | 12.42    | 14.42    |
| 116  | Senegal    | SEN  | LIC          | SSA              | 5.27     | 7.25     | 13.80    |
| 117  | Nigeria    | NGA  | MIL          | SSA              | 10.74    | 14.61    | 13.24    |
| 118  | Lesotho    | LSO  | MIL          | SSA              | 7.42     | 9.26     | 13.24    |
| 119  | Angola     |AGO   | MIL          | SSA              | 17.45    | 12.92    | 13.19    |
| 120  | Myanmar    | MMR  | MIL          | EAP              | 10.87    | 10.38    | 13.10    |
| 121  | Benin      | BEN  | LIC          | SSA              | 5.50     | 7.54     | 13.07    |
| 122  | Lao PDR    | LAO  | MIL          | EAP              | 15.54    | 15.37    | 13.05    |
| 123  | Haiti      | HTI  | LIC          | LAC              | 9.16     | 6.74     | 12.73    |
| 124  | Mali       | MLI  | LIC          | SSA              | 5.04     | 7.21     | 12.64    |
| 125  | Tanzania   | TZA  | LIC          | SSA              | 8.55     | 12.28    | 12.63    |
| 126  | West Bank and Gaza | PSE | MIL | MENA | 10.51 | 11.03 | 12.27 |
| 127  | Ethiopia   | ETH  | LIC          | SSA              | 7.63     | 7.18     | 11.69    |
| 128  | Algeria    | DZA  | MIH          | MENA             | 7.97     | 12.49    | 11.68    |
| 129  | Egypt      | EGY  | MIL          | MENA             | 6.19     | 7.72     | 11.55    |
| 130  | Cote d'Ivoire | CIV | MIL | SSA | 7.85 | 10.02 | 11.48 |
| 131  | Malawi     | MWI  | LIC          | SSA              | 8.38     | 7.38     | 11.46    |
| 132  | Liberia    | LBR  | LIC          | SSA              | 8.30     | 8.86     | 11.46    |
| 133  | Syria      | SYR  | MIL          | MENA             | 11.43    | 10.63    | 11.38    |
| 134  | Mauritania | MRT  | MIL          | SSA              | 8.72     | 10.86    | 11.03    |
| 135  | Cameroon   | CMR  | MIL          | SSA              | 5.85     | 4.55     | 10.42    |
| 136  | Pakistan   | PAK  | MIL          | SAS              | 5.61     | 6.77     | 9.18     |
| 137  | Comoros    | COM  | LIC          | SSA              | 8.57     | 8.44     | 9.10     |
| 138  | Congo Rep  | COG  | MIL          | SSA              | 5.02     | 7.03     | 8.65     |
| 139  | Djibouti   | DJI  | MIL          | MENA             | 7.42     | 7.49     | 8.14     |
| 140  | Guinea     | GIN  | LIC          | SSA              | 2.79     | 3.41     | 7.64     |
| 141  | Sudan      | SDN  | MIL          | SSA              | 3.59     | 6.23     | 6.60     |
| 142  | Congo Dem Rep | COD | LIC | SSA | 1.89 | 4.68 | 6.47 |
| 143  | Sierra Leone | SLE | LIC | SSA | 7.19 | 5.76 | 6.20 |
| 144  | Madagascar | MDG  | LIC          | SSA              | 2.65     | 3.46     | 6.05     |
| 145  | Iraq       | IRQ  | MIH          | MENA             | 7.19     | 5.52     | 5.90     |
| 146  | Chad       | TCD  | LIC          | SSA              | 5.78     | 3.86     | 5.75     |
| 147  | Central African Republic | CAF | LIC | SSA | 1.81 | 2.76 | 4.92 |
| 148  | Niger      | NER  | LIC          | SSA              | 1.78     | 2.79     | 4.91     |
| 149  | Afghanistan | AFG | LIC | SAS | 5.69 | 3.62 | 4.19 |
| 150  | Burundi    | BDH  | LIC          | SSA              | 3.40     | 3.39     | 3.58     |
| 151  | Yemen      | YEM  | MIL          | MENA             | 2.00     | 2.12     | 2.16     |

HIC = high-income countries, MHI = middle-high income countries, MLI = middle-low income countries, and LIC = low-income countries. Refer to Section II for the discussion of the construction of the IFI. Source: Authors’ calculations.
Figure 1: Index of Financial Inclusion by Income Group (Median)

Financial Inclusion Index, by Income Group (Median)

LIC = low income economies. MIL = middle income low economies. MIH = middle income high economies. HIC = high income economies. Median values based on the Index of Financial Inclusion presented in Table 2. Source: Authors’ calculations.

Figure 2a: Change in Financial Inclusion on GDP Growth

Notes: Change refers to the difference of IFI log values in 2014 and 2017. Growth refers to the average GDP growth rate for 2011 to 2013. Source: Authors’ calculations.
Figure 2b: Index of Financial Inclusion on Financial Development

Notes: Level_IFI1114 pertains to the average IFI for 2011 and 2014. Financial development is the average values of the domestic credit to the private sector by the financial sector (% of GDP) for 2011–13. Source: Authors’ calculations.

Figure 3a: Poverty on Index of Financial Inclusion

Notes: Level_IFI1114 pertains to the average IFI for 2011 and 2014. Poverty refers to the average value of poverty headcount ratio for 2014 to 2017. Source: Authors’ calculations.
Figure 3b: Income Inequality on Index of Financial Inclusion

Notes: Level_IFI1114 pertains to the average IFI for 2011 and 2014. Income Inequality refers to the average value of GINI coefficient for 2014 to 2017. Source: Authors’ calculations.

Figure 4: Rule of Law on Index of Financial Inclusion

Notes: Level_IFI1114 pertains to the average IFI for 2011 and 2014. Rule of Law is the average values of the percentile ranking for 2011–13. Data on Rule of Law are taken from the World Governance Indicators. Source: Authors’ calculations.
Table 3: Estimates on the Change in Index of Financial Inclusion, by Income Group

| VARIABLES                              | (1)          | (2)          | (3)          | (4)          | (5)          |
|----------------------------------------|--------------|--------------|--------------|--------------|--------------|
| Change in IFI2014-17                   |              |              |              |              |              |
| Growth2011-13                          | 0.131*       | 0.240*       | 0.177        | 0.286*       | -0.051       |
| [1.826]                                | [1.685]      | [0.889]      | [1.790]      | [-0.339]     |              |
| Financial Sector Development2011-13    | -0.004       | -0.005       | -0.005       | -0.000       | 0.110***     |
| [-1.154]                               | [-0.843]     | [-0.480]     | [-0.008]     |              | [3.358]      |
| AFI Member                             | 0.423        | 1.278*       | 1.000        | -0.707       | 3.896***     |
| [0.791]                                | [1.840]      | [0.937]      | [-0.849]     |              | [2.958]      |
| Constant                               | 1.778***     | 1.797*       | 0.764        | 1.695        | -2.557       |
| [3.147]                                | [1.749]      | [0.749]      | [1.338]      |              | [-1.410]     |

Observations                            145  43  38  42  22
R-squared                               0.066 0.160 0.078 0.072 0.300
Countries                                All Countries High Income Middle High Income Middle Low Income Low Income

AFI = Alliance for Financial Inclusion, IFI = Index of Financial Inclusion. Dependent variable is the change in IFI from 2011 to 2017. Refer to Appendix 1 for definition and data sources. Refer to Table 2 for the list of countries included in each income group. t-stats are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used.

Table 4: Estimates on Poverty, Income Inequality, Entrepreneurship, and Female Empowerment, Full Sample

| VARIABLES                              | Poverty14-17 | Income Inequality14-17 | Entrepre14-17 | Female Empower14-17 |
|----------------------------------------|--------------|------------------------|---------------|---------------------|
| Financial Inclusion2011-14             | -0.891***    | 0.022                  | 0.230***      | 0.457***            |
| [ -5.422]                              | [ 0.413]     | [ 8.538]               | [4.488]       |                     |
| Education Completion2011-13            | -0.120       | -0.145***              | -0.034**      | -0.078              |
| [ -1.197]                              | [-3.902]     | [-2.057]               | [-1.353]      |                     |
| Growth2011-13                          | 0.586        | 0.512**                | 0.190*        | 0.625               |
| [ 0.881]                               | [ 2.150]     | [ 1.674]               | [1.345]       |                     |
| Constant                               | 55.075***    | 44.787***              | 4.933***      | 37.239***           |
| [ 7.915]                               | [18.439]     | [ 4.540]               | [7.843]       |                     |

Observations                            121 90 127 127
R-squared                               0.501 0.300 0.426 0.200

Notes: Dependent variables are average values of poverty, Income inequality, entrepreneurship and female empowerment for 2014 to 2017. The regressors are average values of financial inclusion for 2011 and 2014; and education completion and GDP growth rates for 2011 to 2013. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used for t-stats reported in brackets.
## Table 5: Estimates on Poverty, Income Inequality, Entrepreneurship, and Female Empowerment, High- and Middle-High-Income Economies

| VARIABLES                  | Poverty<sub>14-17</sub> | Income Inequality<sub>14-17</sub> | Entrepreneurship<sub>14-17</sub> | Female Empower<sub>14-17</sub> |
|----------------------------|--------------------------|------------------------------------|----------------------------------|-------------------------------|
| Financial Inclusion<sub>2011-14</sub> | -0.253***                | -0.001                             | 0.295***                         | 0.706***                      |
|                            | [-2.800]                 | [-0.022]                           | [10.806]                         | [7.115]                        |
| Education Completion<sub>2011-13</sub> | -0.121**                 | -0.240***                          | 0.014                            | 0.097                          |
|                            | [-2.594]                 | [-5.394]                           | [0.562]                          | [1.262]                        |
| Growth<sub>2011-13</sub>   | 0.163                    | 0.787***                           | 0.295*                           | 1.788***                      |
|                            | [0.428]                  | [2.895]                            | [1.939]                          | [3.190]                        |
| Constant                   | 25.944***                | 53.317***                          | -2.008                           | 10.177                         |
|                            | [4.662]                  | [14.810]                           | [-0.967]                         | [1.575]                        |
| Observations               | 71                       | 60                                 | 75                               | 75                             |
| R-squared                  | 0.257                    | 0.474                              | 0.567                            | 0.484                          |

Notes: Dependent variables are average values of poverty, income inequality, entrepreneurship and female empowerment for 2014 to 2017. The regressors are average values of financial inclusion for 2011 and 2014; and education completion and GDP growth rates for 2011 to 2013. Refer to Table 2 for high (HiC) and middle high (MIH) income country list. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used for t-stats reported in brackets.

## Table 6: Estimates on Poverty, Income Inequality, Entrepreneurship, and Female Empowerment, Middle-Low and Low-Income Economies

| VARIABLES                  | Poverty<sub>14-17</sub> | Income Inequality<sub>14-17</sub> | Entrepreneurship<sub>14-17</sub> | Female Empower<sub>14-17</sub> |
|----------------------------|--------------------------|------------------------------------|----------------------------------|-------------------------------|
| Financial Inclusion<sub>2011-14</sub> | -1.403***                | 0.168                              | 0.112*                           | -0.110                        |
|                            | [-2.927]                 | [0.914]                            | [1.953]                          | [-0.433]                      |
| Education Completion<sub>2011-13</sub> | 0.100                    | -0.116*                            | -0.027                           | -0.058                        |
|                            | [0.691]                  | [-1.846]                           | [-1.126]                         | [-0.713]                      |
| Growth<sub>2011-13</sub>   | 0.631                    | -0.339                             | 0.198                            | 0.253                         |
|                            | [0.478]                  | [-0.758]                           | [1.580]                          | [0.426]                       |
| Constant                   | 59.116***                | 44.530***                          | 6.930***                         | 47.575***                     |
|                            | [6.305]                  | [14.177]                           | [6.728]                          | [9.648]                       |
| Observations               | 50                       | 30                                 | 52                               | 52                             |
| R-squared                  | 0.169                    | 0.167                              | 0.103                            | 0.030                          |

Notes: Dependent variables are average values of poverty, income inequality, entrepreneurship and female empowerment for 2014 to 2017. The regressors are average values of financial inclusion for 2011 and 2014; and education completion and GDP growth rates for 2011 to 2013. Refer to Table 2 for middle-low (MiL) and low-income (LiC) country list. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used for t-stats reported in brackets.
Table 7a: Estimates on Poverty, Income Inequality, Entrepreneurship, and Female Empowerment, with High-Income Interaction Effects

| VARIABLES                  | Poverty_14-17 | Income Inequality_14-17 | Entrepreneur_14-17 | Female Empower_14-17 |
|----------------------------|---------------|-------------------------|--------------------|----------------------|
| Financial Inclusion_2011-14| -1.397***     | 0.158                   | 0.073*             | 0.022                |
|                           | [-5.044]      | [1.403]                 | [1.968]            | [0.146]              |
| Education Completion_2011-13| -0.015        | -0.155***               | -0.017             | -0.021               |
|                           | [-0.146]      | [-3.844]                | [-0.967]           | [-0.357]             |
| Growth_2011-13             | 0.658         | 0.408                   | 0.224**            | 0.674                |
|                           | [0.906]       | [1.388]                 | [2.305]            | [1.605]              |
| HIC                       | -59.342***    | 2.889                   | -7.506***          | -28.228***           |
|                           | [-8.329]      | [0.591]                 | [-3.691]           | [-4.116]             |
| HIC*Financial Inclusion_2011-14| 1.429**       | -0.168                  | 0.263***           | 0.851***             |
|                           | [5.872]       | [-1.320]                | [4.979]            | [4.394]              |
| Constant                  | 59.647***     | 43.546***               | 6.465***           | 41.581***            |
|                           | [7.535]       | [15.707]                | [7.180]            | [10.104]             |
| Observations              | 121           | 90                      | 127                | 127                  |
| R-squared                 | 0.590         | 0.335                   | 0.521              | 0.313                |

Notes: Dependent variables are average values of poverty, income inequality, entrepreneurship and female empowerment for 2014 to 2017. The regressors are average values of financial inclusion for 2011 and 2014; and education completion and GDP growth rates for 2011 to 2013. Refer to Table 2 for the list of countries in each country income group. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used for t-stats reported in brackets.

Table 7b: Estimates on Poverty, Income Inequality, Entrepreneurship, and Female Empowerment, with Middle High-Income Interaction Effects

| VARIABLES                  | Poverty_14-17 | Income Inequality_14-17 | Entrepreneur_14-17 | Female Empower_14-17 |
|----------------------------|---------------|-------------------------|--------------------|----------------------|
| Financial Inclusion_2011-14| -0.996***     | 0.037                   | 0.221***           | 0.431***             |
|                           | [-6.399]      | [0.668]                 | [8.318]            | [4.126]              |
| Education Completion_2011-13| -0.070        | -0.149***               | -0.027             | -0.062               |
|                           | [-0.730]      | [-3.925]                | [-1.590]           | [-1.030]             |
| Growth_2011-13             | 0.536         | 0.476**                 | 0.137              | 0.546                |
|                           | [0.832]       | [2.097]                 | [1.136]            | [1.172]              |
| MHI                       | -34.489***    | 6.832*                  | -0.490             | -4.294               |
|                           | [-4.197]      | [1.811]                 | [-0.322]           | [-0.510]             |
| MHI*Financial Inclusion_2011-14| 0.773***     | -0.092                  | -0.085             | -0.036               |
|                           | [3.303]       | [-0.867]                | [-1.407]           | [-0.123]             |
| Constant                  | 58.194***     | 43.531***               | 5.669***           | 38.653***            |
|                           | [8.530]       | [18.763]                | [5.004]            | [8.110]              |
| Observations              | 121           | 90                      | 127                | 127                  |
| R-squared                 | 0.553         | 0.359                   | 0.490              | 0.228                |

Notes: Dependent variables are average values of poverty, income inequality, entrepreneurship and female empowerment for 2014 to 2017. The regressors are average values of financial inclusion for 2011 and 2014; and education completion and GDP growth rates for 2011 to 2013. Refer to Table 2 for the list of countries in each country income group. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used for t-stats reported in brackets.
### Table 7c: Estimates on Poverty, Income Inequality, Entrepreneurship, and Female Empowerment, with Middle Low-Income Interaction Effects

| VARIABLES                          | Poverty 14-17 | Income Inequality 14-17 | Entrepreneurship 14-17 | Female Empowerment 14-17 |
|-----------------------------------|---------------|-------------------------|------------------------|--------------------------|
| Financial Inclusion 2011-14       | -0.753***     | 0.034                   | 0.251***               | 0.536***                 |
|                                   | [-4.312]      | [0.586]                 | [8.503]                | [5.049]                  |
| Education Completion 2011-13      | -0.148        | -0.145***               | -0.036**               | -0.080                   |
|                                   | [-1.519]      | [-3.988]                | [-2.153]               | [-1.381]                 |
| Growth 2011-13                    | 0.492         | 0.605**                 | 0.272**                | 1.140**                  |
|                                   | [0.740]       | [2.276]                 | [2.385]                | [2.582]                  |
| MLI                               | 12.921        | 1.190                   | 2.470*                 | 10.182*                  |
|                                   | [1.206]       | [0.305]                 | [1.880]                | [1.870]                  |
| MLI*Financial Inclusion 2011-14   | -0.087        | -0.089                  | -0.131**               | -0.727***                |
|                                   | [-0.193]      | [-0.531]                | [-2.089]               | [-2.786]                 |
| Constant                          | 50.342***     | 44.165***               | 4.058***               | 33.601***                |
|                                   | [6.255]       | [14.176]                | [3.276]                | [7.165]                  |

Notes: Dependent variables are average values of poverty, Income inequality, entrepreneurship and female empowerment for 2014 to 2017. The regressors are average values of financial inclusion for 2011 and 2014; and education completion and GDP growth rates for 2011 to 2013. Refer to Table 2 for the list of countries in each country income group. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used for t-stats reported in brackets.

### Table 7d: Estimates on Poverty, Income Inequality, Entrepreneurship, and Female Empowerment, with Low-Income Interaction Effects

| VARIABLES                          | Poverty 14-17 | Income Inequality 14-17 | Entrepreneurship 14-17 | Female Empowerment 14-17 |
|-----------------------------------|---------------|-------------------------|------------------------|--------------------------|
| Financial Inclusion 2011-14       | -0.826***     | 0.012                   | 0.237***               | 0.482***                 |
|                                   | [-4.964]      | [0.210]                 | [9.086]                | [4.692]                  |
| Education Completion 2011-13      | -0.022        | -0.193***               | -0.013                 | -0.006                   |
|                                   | [-0.209]      | [-5.213]                | [-0.719]               | [-0.091]                 |
| Growth 2011-13                    | 0.570         | 0.560**                 | 0.135                  | 0.425                    |
|                                   | [0.803]       | [2.291]                 | [1.157]                | [0.877]                  |
| LIC                               | 33.912**      | -15.936***              | 2.578                  | 8.381                    |
|                                   | [2.566]       | [-4.870]                | [1.444]                | [1.203]                  |
| LIC*Financial Inclusion 2011-14   | -2.500**      | 1.149***                | 0.129                  | 0.558                    |
|                                   | [-2.042]      | [5.317]                 | [0.524]                | [0.854]                  |
| Constant                          | 44.701***     | 48.966***               | 3.115**                | 30.871***                |
|                                   | [5.471]       | [18.538]                | [2.459]                | [5.385]                  |

Notes: Dependent variables are average values of poverty, Income inequality, entrepreneurship and female empowerment for 2014 to 2017. The regressors are average values of financial inclusion for 2011 and 2014; and education completion and GDP growth rates for 2011 to 2013. Refer to Table 2 for the list of countries in each country income group. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used for t-stats reported in brackets.
Table 8a: Estimates on the Change in Index of Financial Inclusion, by Income Group using Varying Dimension Weights

| VARIABLES                          | (1)       | (2)       | (3)       | (4)       | (5)       |
|-----------------------------------|-----------|-----------|-----------|-----------|-----------|
| Growth2011-13                     | 0.121*    | 0.334***  | 0.132     | 0.247**   | 0.022     |
|                                   | [1.754]   | [3.428]   | [0.672]   | [2.172]   | [0.115]   |
| Financial Sector Development2011-13| -0.008**  | -0.004    | -0.012    | -0.006    | 0.119**   |
|                                   | [-1.980]  | [-1.019]  | [-0.971]  | [-0.407]  | [2.855]   |
| AFI Member                        | 0.521     | 0.306     | 0.605     | -0.240    | 4.747**   |
|                                   | [0.910]   | [0.683]   | [0.563]   | [-0.253]  | [2.863]   |
| Constant                          | 1.932***  | 1.531**   | 0.773     | 1.156     | -1.780    |
|                                   | [3.374]   | [2.211]   | [0.792]   | [0.988]   | [-0.785]  |
| Observations                      | 145       | 43        | 38        | 42        | 22        |
| R-squared                         | 0.005     | 0.265     | 0.072     | 0.060     | 0.216     |
| Countries                         | All Countries | High Income | Middle High Income | Middle Low Income | Low Income |

AFI = Alliance for Financial Inclusion, IFI = Index of Financial Inclusion. Dependent variable is the change in IFI from 2011 to 2017. Refer to Appendix 1 for definition and data sources. Refer to Table 2 for the list of countries included in each income group. t-stats are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used.

Table 8b: Estimates on Poverty, Income Inequality, Entrepreneurship, and Female Empowerment using Varying Dimension Weights

| VARIABLES                          | Poverty14-17 | Income Inequality14-17 | Entrepre14-17 | Female Empower14-17 |
|-----------------------------------|--------------|------------------------|---------------|---------------------|
| Financial Inclusion2011-14        | -0.881***    | 0.036                  | 0.212***      | 0.424***            |
|                                   | [-5.427]     | [0.693]                | [8.043]       | [4.253]             |
| Education Completion2011-13       | -0.142       | -0.149***              | -0.023        | -0.057              |
|                                   | [-1.486]     | [-4.269]               | [-1.389]      | [-1.004]            |
| Growth2011-13                     | 0.485        | 0.543**                | 0.184         | 0.617               |
|                                   | [0.729]      | [2.191]                | [1.632]       | [1.329]             |
| Constant                          | 55.953***    | 44.562***              | 4.891***      | 37.132***           |
|                                   | [7.991]      | [18.018]               | [4.435]       | [7.780]             |
| Observations                      | 121          | 90                     | 127           | 127                 |
| R-squared                         | 0.500        | 0.303                  | 0.383         | 0.178               |

Notes: Dependent variables are average values of poverty, Income inequality, entrepreneurship and female empowerment for 2014 to 2017. The regressors are average values of financial inclusion for 2011 and 2014; and education completion and GDP growth rates for 2011 to 2013. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used for t-stats reported in brackets.
### Table 9a: Pooled OLS Estimates on the Index of Financial Inclusion

| VARIABLES                        | (1)       | (2)       | (3)       | (4)       | (5)       |
|----------------------------------|-----------|-----------|-----------|-----------|-----------|
| Growth, \( t-1 \)                | 0.329     | 0.144     | -0.480*   | 0.894**   | 0.856***  |
|                                  | [1.387]   | [0.359]   | [-1.667]  | [2.250]   | [3.612]   |
| Financial Sector Development, \( t-1 \) | 0.174***  | 0.108***  | 0.105***  | 0.121***  | 0.167***  |
|                                  | [12.795]  | [6.045]   | [4.614]   | [4.205]   | [4.432]   |
| AFI Member                       | -10.515***| -8.394*** | -1.616    | -2.069    | -0.950    |
|                                  | [-8.091]  | [-3.696]  | [-0.808]  | [-0.932]  | [-0.662]  |
| Constant                         | 19.355*** | 32.995*** | 24.307*** | 9.497***  | 1.788     |
|                                  | [10.969]  | [11.371]  | [10.986]  | [2.894]   | [1.008]   |

Notes: Dependent variable is the IFI for 2014 and 2017. Regressors are lagged and refers to values for 2011 and 2014, respectively. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used.

### Table 9b: Panel Estimates with Country Fixed Effects

| VARIABLES                        | (1)       | (2)       | (3)       | (4)       | (5)       |
|----------------------------------|-----------|-----------|-----------|-----------|-----------|
| Growth, \( t-1 \)                | -0.053    | -0.109    | -0.152    | 0.014     | 0.213     |
|                                  | [-0.987]  | [-1.102]  | [-1.021]  | [0.195]   | [1.166]   |
| Financial Sector Development, \( t-1 \) | 0.082***  | 0.032*    | 0.122**   | 0.206***  | 0.387***  |
|                                  | [3.924]   | [1.750]   | [2.645]   | [3.020]   | [2.408]   |
| AFI Member                       | -7.832*** | -30.139***| 5.121     | 11.663*   | 12.434    |
|                                  | [-2.767]  | [-10.470] | [1.270]   | [1.783]   | [1.194]   |
| Constant                         | 11.602*** | 57.954*** | 12.708*** | -2.963    | -11.193   |
|                                  | [3.938]   | [19.152]  | [3.801]   | [-0.372]  | [-1.009]  |

Notes: Dependent variable is the IFI for 2014 and 2017. Regressors are lagged and refers to values for 2011 and 2014, respectively. Country dummies are included. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used.

### Table 9c: Panel Estimates with Time Fixed Effects

| VARIABLES                        | (1)       | (2)       | (3)       | (4)       | (5)       |
|----------------------------------|-----------|-----------|-----------|-----------|-----------|
| Growth, \( t-1 \)                | 0.361     | 0.175     | -0.467    | 0.911**   | 0.820***  |
|                                  | [1.531]   | [0.464]   | [-1.556]  | [2.244]   | [3.071]   |
| Financial Sector Development, \( t-1 \) | 0.174***  | 0.109***  | 0.105***  | 0.117***  | 0.151***  |
|                                  | [12.786]  | [6.037]   | [4.556]   | [4.261]   | [4.296]   |
| AFI Member                       | -10.561***| -8.322*** | -1.636    | -2.098    | -1.299    |
|                                  | [-8.151]  | [-3.759]  | [-0.811]  | [-0.958]  | [-0.978]  |
| Constant                         | 18.287*** | 31.738*** | 24.155*** | 8.421**   | 1.352     |
|                                  | [9.828]   | [9.910]   | [9.925]   | [2.531]   | [0.795]   |

Notes: Dependent variable is the IFI for 2014 and 2017. Regressors are lagged and refers to values for 2011 and 2014, respectively. Time dummies are included. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used.
Table 10a: Pooled OLS Estimates on the Index of Financial Inclusion

| VARIABLES                  | Poverty, t | Income Inequality, t-1 | Entrepreneurs, t-1 | Female Empowerment, t-1 |
|----------------------------|------------|------------------------|---------------------|------------------------|
| Financial Inclusion 2011-14| -0.811***  | 0.026                  | 0.214***            | 0.423***               |
|                           | [-7.441]   | [0.746]                | [4.198]             | [6.030]                |
| Education Completion 2011-13| -0.140*    | -0.158***              | -0.030              | -0.080*                |
|                           | [-1.913]   | [-6.309]               | [-1.348]            | [-1.900]               |
| Growth 2011-13             | 0.250      | 0.357***               | 0.111               | 0.325                  |
|                           | [0.473]    | [3.007]                | [0.894]             | [1.014]                |
| Constant                  | 53.413***  | 45.523***              | 5.428***            | 39.452***              |
|                           | [10.379]   | [26.570]               | [4.263]             | [12.582]               |
| Observations               | 201        | 161                    | 254                 | 244                    |
| R-squared                  | 0.482      | 0.310                  | 0.124               | 0.180                  |

Notes: Dependent variables are for 2014 and 2017. Regressors are lagged values for 2011 and 2014, respectively. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used.

Table 10d: Panel Estimates with Country Fixed Effects

| VARIABLES                  | Poverty, t | Income Inequality, t-1 | Entrepreneurs, t-1 | Female Empowerment, t-1 |
|----------------------------|------------|------------------------|---------------------|------------------------|
| Financial Inclusion 2011-14| -0.105     | -0.098                 | -0.061              | -0.134                 |
|                           | [-1.339]   | [-1.531]               | [-0.194]            | [-0.585]               |
| Education Completion 2011-13| -0.108     | -0.039                 | 2.757***            | -0.860                 |
|                           | [-1.201]   | [-0.230]               | [2.685]             | [-1.005]               |
| Growth 2011-13             | -0.081     | 0.016                  | -0.123              | 0.115                  |
|                           | [-0.549]   | [0.222]                | [-0.512]            | [0.443]                |
| Constant                  | 38.704***  | 34.329**               | -59.158**           | 51.198**               |
|                           | [13.082]   | [2.460]                | [-2.332]            | [2.338]                |
| Observations               | 201        | 161                    | 254                 | 244                    |
| R-squared                  | 0.998      | 0.994                  | 0.333               | 0.888                  |

Dependent variables are for 2014 and 2017. Regressors are lagged values for 2011 and 2014, respectively. Country dummies are included. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used.

Table 10c: Panel Estimates with Time Fixed Effects

| VARIABLES                  | Poverty, t | Income Inequality, t-1 | Entrepreneurs, t-1 | Female Empowerment, t-1 |
|----------------------------|------------|------------------------|---------------------|------------------------|
| Financial Inclusion 2011-14| -0.802***  | 0.028                  | 0.205***            | 0.429***               |
|                           | [-7.388]   | [0.818]                | [4.782]             | [6.137]                |
| Education Completion 2011-13| -0.142*    | -0.162***              | -0.024              | -0.083*                |
|                           | [-1.940]   | [-6.547]               | [-1.106]            | [-1.969]               |
| Growth 2011-13             | 0.208      | 0.380***               | 0.224*              | 0.262                  |
|                           | [0.397]    | [3.131]                | [1.802]             | [0.839]                |
| Constant                  | 55.288***  | 45.142***              | 1.458               | 41.882***              |
|                           | [10.215]   | [25.863]               | [0.847]             | [12.444]               |
| Observations               | 201        | 161                    | 254                 | 244                    |
| R-squared                  | 0.487      | 0.317                  | 0.257               | 0.201                  |

Dependent variables are for 2014 and 2017. Regressors are lagged values for 2011 and 2014, respectively. Time dummies are included. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used.
| VARIABLES | Poverty 14-17 | Income Inequality 14-17 | Entrepreneurship 14-17 | Female Empowerment 14-17 |
|-----------|--------------|-------------------------|------------------------|-------------------------|
| Financial Inclusion 2011-14 | -2.063*** | 0.316* | -0.038 | -0.411 |
| [4.706] | [1.959] | [-0.411] | [-1.172] |
| Education Completion 2011-13 | -0.056 | -0.170*** | -0.021 | -0.032 |
| [-0.570] | [-4.380] | [-1.190] | [-0.529] |
| Growth 2011-13 | 0.712 | 0.449* | 0.203** | 0.631 |
| [1.051] | [1.761] | [1.993] | [1.590] |
| Rule of Law | -17.509*** | 3.554** | -2.107*** | -9.015*** |
| [-4.539] | [2.008] | [-3.601] | [-3.840] |
| Law*Financial Inclusion 2011-14 | 0.460*** | -0.103** | 0.084*** | 0.294*** |
| [4.406] | [-2.457] | [3.638] | [3.401] |
| Constant | 87.680*** | 38.359*** | 9.659*** | 55.929*** |
| [8.276] | [10.857] | [7.861] | [10.009] |

Notes: Dependent variables are average values of poverty, income inequality, entrepreneurship and female empowerment for 2014 to 2017. The regressors are average values of financial inclusion for 2011 and 2014; and education completion and GDP growth rates for 2011 to 2013. Rule of law is an index with values 1 to 4 corresponding to the quartile ranking of economies in the World Governance Indicators. Refer to Table 2 for the list of countries in each country income group. *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors are used for t-stats reported in brackets.
## Appendix: Data Definition and Sources

| Variable                        | Definition                                                                 | Sources                                      |
|---------------------------------|---------------------------------------------------------------------------|----------------------------------------------|
| Account (% aged 15+)            | Population 15 years old and above to total population with an account in a financial institution. | World Bank, Global Financial Inclusion database. |
| Credit card (% aged 15+)        | Population 15 years old and above to total population with a credit card. | World Bank, Global Financial Inclusion database. |
| Debit card (% aged 15+)         | Population 15 years old and above to total population with a debit card.  | World Bank, Global Financial Inclusion database. |
| Mobile money account (% aged 15+) | Population 15 years old and above to total population with mobile money account. | World Bank, Global Financial Inclusion database. |
| Branches                        | Number of commercial bank branches per 100,000 adult population           | World Bank, World Development Indicators     |
| ATMs                            | Number of ATMs per 100,000 adult population                               | World Bank, World Development Indicators     |
| Borrower (% aged 15+)           | Borrowed from a financial institution, percentage of population 15 years old and above. | World Bank, Global Financial Inclusion database. |
| Saver (% aged 15+)              | Saved in a financial institution, percentage of population 15 years old and above. | World Bank, Global Financial Inclusion database. |
| Credit (% GDP)                  | Domestic credit to the private sector as % of nominal GDP                 | World Bank, World Development Indicators     |
| Change in IFI\textsubscript{2014–17} | Log difference of IFI for 2014 and 2017                                   | Authors’ calculations                        |
| Growth\textsubscript{2011–13}   | Average GDP growth rate for 2011 to 2013 (%)                              | World Bank, World Development Indicators     |
| Financial Sector Development\textsubscript{2011–13} | Average of domestic credit provided by the financial sector for 2011 to 2013 (% of GDP), converted to log value | World Bank, World Development Indicators     |
| AFI Member                      | Dummy variable with a value of 1 if a country has an institution that is a member of the Alliance for Financial Inclusion; 0 otherwise. | Alliance for Financial Inclusion             |
| Variable          | Definition                                                                 | Sources                                                                 |
|-------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Poverty<sub>2014–17</sub> | Average of poverty headcount ratio at national poverty lines for 2014 to 2017 (% of population). | Asian Development Bank, World Bank (World Development Indicators) and World Poverty Clock at [www.worldpoverty.io](https://www.worldpoverty.io) |
| Income Inequality<sub>2014–17</sub> | Average of GINI Index for 2014–17.                                           | Asian Development Bank, Chart Book Economic Inequality, OECD Statistics, UNU-WIDER, and World Bank (World Development Indicators and PovcalNet) |
| Entrepre<sub>2014–17</sub> | Average values for 2014 and 2017 of population age 15 and above who borrowed to start, operate or expand a farm or business (%) | World Bank, Global Financial Inclusion database. |
| Female Empower<sub>2014–17</sub> | Average values for 2014 and 2017 of the percentage of female population age 15 and above who borrowed in a financial institution for any purpose (%) | World Bank, Global Financial Inclusion database. |
| Financial Inclusion<sub>2011-14</sub> | Average financial inclusion index for 2011 and 2014                          | Financial Inclusion<sub>2011-14</sub>                                   |
| Education Completion<sub>2011–13</sub> | Average value of the percentage of population ages 25 and over who attained or completed lower secondary education. Values can be for an earlier period if 2011 to 2013 data are unavailable. | Barro and Lee Database, UNESCO Institute of Statistics, World Bank (World Development Indicators). |
| Rule of Law       | Values refer to the average of the percentile ranking of countries. Data for Table 8 take the value of 1 if a country falls in the lowest quartile, 2 for the second lowest quartile, 3 for the second highest quartile, and 4 for the higher quartile. The values are transformed to avoid multicollinearity in Table 8. | World Bank, World Governance Indicators. |

Source: Authors’ enumeration.