

Macprudential Policies and Financial Inclusion: Good Intentions and Unintended Consequences

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INTRODUCTION

Financial inclusion is a pillar of the agenda to boost inclusive growth in emerging markets and developing economies. As a multidimensional concept, financial inclusion can be defined as ease of access to (or lack of barriers to), availability of, and use of formal financial services by all members of the economy (Sarma 2008; Camara and Tuesta 2014).¹

Financial inclusion has thus become a goal of public policy and typically aims to reduce financial exclusion and resort to informal financial services, such as moneylenders.² Worldwide, about 67 percent of bank regulators are tasked with promoting financial inclusion (Klapper and Singer 2015). In a similar vein, the Financial Action Task Force (FATF) supports formal financial inclusion to enhance transparency and traceability of transactions by reducing use of cash or informal financial services (FATF 2011).

Greater degrees of formal financial inclusion, that is, lower financial exclusion, however, may not necessarily reduce use of informal financial services. Many studies document that formal and informal services tend to coexist as complements, rather than substitutes, although the gradual increase in formal financial inclusion tends to decrease both exclusion and use of informal financial services

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¹ In this chapter, *formal financial services* are any financial institution or mobile-based form of financial access, including microfinance institutions, post offices, credit unions, and cooperatives.

² Informal financial services include resort to family and friends or any type of informal credit or savings club, as well as moneylenders.

(Aryeetey 1994, 2008; Soyibo 1996; De Koker and Jentzsch 2013; Pradhan 2013; World Bank 2017).

In this chapter, we investigate the determinants of informal and formal financial inclusion in emerging market and developing economies. We are particularly interested in examining whether monetary and financial policies interact with individuals' choice of financial services. The contributions of our chapter to the existing literature are twofold:

1. We use the World Bank Global Findex Database 2017 microdata worldwide sample to construct a new granular categorization of the various ways individuals combine access to formal and informal financial services. We find that individuals tend to use formal and informal financial services as complements. Mobile banking, in particular, combines with both formal and informal financial services, highlighting its role in bridging informal and formal finance. To our knowledge, ours is one of the first studies to analyze the determinants of formal and informal financial access in a large cross-section of countries, examining mobile banking access separately.
2. We study the relation between monetary and financial sector policies, including macroprudential measures, using the IMF 2016–17 Macroprudential Policies Survey and individuals' use of formal and informal financial services. Although there are intuitive reasons monetary policy or measures aimed at increasing financial stability would influence financial inclusion (and vice versa), this topic remains little explored in the literature. We are particularly interested in the potential relation between macroprudential policies (which affect formal financial services and their users) and the persistence of resort to informal financial services. Such persistence would be consistent with empirical findings that macroprudential policies “leak” by creating incentives for individuals or firms to move from formal toward informal or unregulated financial services (Aiyar, Calomiris, and Wieladek 2014; Ayyagari, Beck, and Martinez Peria 2018; Alam and others 2019).

Our findings suggest that central banks and bank regulators should pay more attention to the interactions between monetary and financial sector policies and financial inclusion. Macroprudential policies, in particular, are significantly related to individuals' use of informal financial services, relative to formal services and no financial access, after controlling for individual and country characteristics. In sub-Saharan Africa, the region with the highest prevalence of informality and the least financial development, we find that macroprudential policies have a particularly strong relationship with lack of financial access. Across all emerging market and developing economies, however, macroprudential policies show the strongest effects in countries with more developed financial systems.

The rest of the chapter briefly reviews the related literature; presents our definitions of formal and informal financial access and key stylized facts; presents the empirical approach, choice of variables, and empirical results; and offers conclusions and implications for policy.

RELATED LITERATURE

Our research links to the literature on formal and informal financial inclusion and their determinants.

Formal versus Informal Financial Inclusion and Mobile Banking

Theoretical and empirical studies mostly focusing on a single country highlight the importance of social capital (Guiso, Sapienza, and Zingales 2004), contract enforcement (Giné 2011; Karaivanov and Kessler 2018), and information asymmetries (Jain 1999; Armendáriz and Morduch 2005; Dabla-Norris and Koeda 2008; Madestam 2014; Mookherjee and Motta 2016) in explaining simultaneous resort to formal and informal financial services.

Empirical studies of the drivers of financial inclusion find that resort to informal financial services is highly persistent, with policy interventions aimed at increasing formal financial inclusion having limited success (Demirgüç-Kunt and Klapper 2012a; De Koker and Jentsch 2013; Allen, Qian, and Xie 2019; Allen and others 2016; Klapper and Singer 2015; Zins and Weill 2016).³ One explanation is that the reasons people resort to informal finance (accessing emergency funds and developing social networks) make it difficult for them to connect with the formal financial sector (Johnson, Malkamäki, and Niño-Zarazua 2010).

Mobile banking is often seen as a bridge between formal and informal finance; however, evidence suggests that the individual-level determinants of mobile banking are the same as for formal banking and different from those for informal finance, raising questions about mobile banking as a path out of informal finance (Zins and Weill 2016). It is therefore not surprising that government interventions aimed at increasing access to cheaper credit have not reduced use of informal finance (Giné 2011).

Monetary and Financial Sector Policies and Financial Inclusion

The literature on monetary policy and financial inclusion is sparse, although there are three intuitive reasons for why financial inclusion relates to monetary

³ The IMF's Financial Access Survey provides information on access to and use of financial services for 189 countries and spans more than 10 years containing 121 time series on financial access and use. Beck, Ross, and Levkov (2007); Honohan and Beck (2007); and Mookerjee and Kalipioni (2010) analyze financial inclusion using supply-side measures. On the demand side, the FinScope data sets stem from extensive, nationally representative demand-side surveys conducted in more than 30 countries and focusing on sub-Saharan Africa. Providing a battery of financial inclusion indicators, the World Bank's Global Findex Database is based on Gallup polls and covers 150 countries using representative samples of 1,000 individuals per country. A growing number of empirical studies rely on Findex data, for example, Allen and others (2016); Demirgüç-Kunt and Klapper (2013); Demirgüç-Kunt and Klapper (2012b); and Deléchat and others (2018).

policy. First, monetary policy focused on core inflation may be ineffective in countries with less financial inclusion, because these regions tend to be agricultural and thus food prices are particularly important. Second, interest rate policies are likely to become more effective regarding quantities (money supply) in countries with more informal—that is, cash based—financial transactions. Third, a central bank's interest rate rule may depend on the level of inclusion; the better the financial inclusion, the more effective the interest rate tools, and monetary policy can better focus on inflation stabilization versus output stabilization (Yetman 2017).

Qin, Zhong, and Zhang (2014) find that in China, informal credit lending rates are highly receptive to monetary policies and that informal lending is substitutive to bank savings in the short term but complementary to bank lending in the long term. This finding suggests that the bank lending channel also operates through the informal financial sector.

Another issue for central bankers and financial market supervisors is the relation between financial stability and financial inclusion. On the one hand, evidence has shown that better inclusion improves a bank's deposit bases and thereby deepens and diversifies the financial system (Hannig and Jansen 2010; Han and Melecky 2013). On the other hand, Sahay and others (2015) find that financial stability is at risk when access to credit is expanded without supervision.

The structure and health of the financial sector might also be associated with financial inclusion, but evidence is somewhat mixed. Owen and Pereira (2018) find that greater banking industry concentration is associated with more access to deposit accounts and loans, provided that the market power of banks is limited. Yet Mengistu and Perez-Saiz (2018) find the opposite true in a sample of sub-Saharan African countries. Sarma and Pais (2011) find that high numbers of nonperforming loans and high capital-to-asset ratios are associated with lower formal financial inclusion.

Macroprudential policies could also interact with financial access.⁴ By acting on formal financial intermediaries and households relying on formal credit, macroprudential policies could unintentionally push credit activity toward the informal sector. Ayyagari, Beck, and Martinez Peria (2018) show that borrower-targeted macroprudential policies are robustly and negatively associated with growth in long-term firm financing. Aiyar, Calomiris, and Wieladek (2014) find, when examining a relevant reference group of regulated banks, that regulated banks reduce lending in response to tighter capital requirements but that unregulated banks increase lending in response to tighter capital requirements. Alam and others (2019) find that the tighter the loan-to-value ratio, the smaller

⁴ Macroprudential policies aim to limit systemic risk by absorbing systemic shocks and can be directed at financial institutions, thus affecting the supply of credit (for example, countercyclical capital buffers, liquidity tools), or at borrowers, thus affecting the demand for credit (for example, loan-to-value ratios or debt-to-income ratios) (IMF 2013).

the per-unit effect on household credit, possibly because strong tightening could encourage people to seek credit from abroad or from nonbank lenders. Ben Hassine and Rebei (2019) show that informality weakens the effect of macroprudential policies in emerging markets.

Three main findings emerge from this brief literature survey. First, financial access takes multiple forms for the same individuals. The choice of formal or informal financial access is influenced by personal characteristics but also by country-level factors, including measures of institutional quality. Second, the literature suggests that because individuals mix formal and informal financial services, joint study of the determinants of formal and informal financial access would be useful. Third, given the still scarce literature, how monetary and financial sector policies, including macroprudential policy tools, are related to formal financial inclusion should be examined. Central banks in countries with large informal sectors (emerging market and developing economies in general, but sub-Saharan Africa in particular) would benefit, given their joint objectives of expanding financial inclusion and ensuring macroeconomic and financial stability.

KEY STYLIZED FACTS OF FORMAL AND INFORMAL FINANCIAL ACCESS

To classify respondents as having formal or informal access, we interpret their answers to questions about financial services as revealing their access to and use of financial services.

Definitions of Formal and Informal Financial Access

Our categorization of financial inclusion is based on the World Bank Global Findex Database 2017. The data are from a nationally representative survey of more than 150,000 adults in 150 economies, including 34 in sub-Saharan Africa (Demirgüç-Kunt and Klapper 2012a, 2012b; Demirgüç-Kunt and others 2018, 2020). The Global Findex database builds on similar 2011 and 2014 surveys by including questions on the use of financial technology (fintech), mobile phones, and the internet to conduct financial transactions.

The 2017 Findex questionnaire asked 48 questions, with additional follow-up questions depending on the answer given to certain questions. Questions such as the following examples were aimed at obtaining information about access to a particular type of financial services:

- *Do you currently have an account at a bank or another type of formal financial institution? Yes or no?* We classify a positive answer to this question as indicating that the respondent has formal financial access.

Questions could also indirectly reveal access, for example:

- *In the past 12 months, has an employer paid your salary or wages in any of the following ways? (1) You received payments directly into an account at a bank*

or another type of formal financial institution; (2) You received payments through a mobile phone. We consider a positive answer to (1) as revealing that the respondent has an account at a formal financial institution, and a positive answer to (2) as revealing that the respondent has access to mobile financial services.

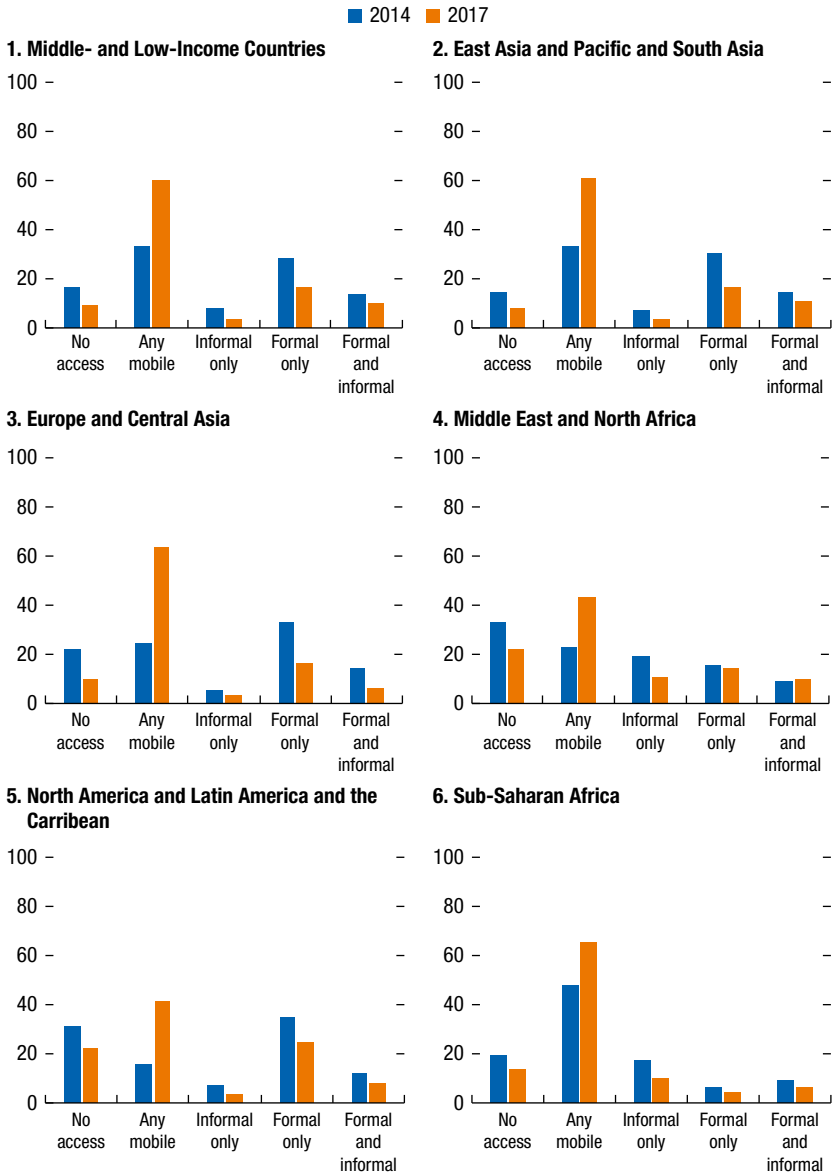
We examine each individual's responses to all questions and first classify them into one of five mutually exclusive categories. Our criteria for each category are as follows:

1. Complete exclusion: answers negatively to all questions regarding the use of formal, informal, and mobile services.
2. Informal access only: answers positively to any question regarding the use of informal services and answers negatively to all questions regarding the use of formal and mobile services.
3. Formal access only: answers positively to any question regarding the use of formal services and answers negatively to all questions regarding the use of informal and mobile services.
4. Formal and informal access: answers positively to any question regarding the use of formal or informal services and answers negatively to all questions regarding the use of mobile services.
5. Any mobile access: answers positively to any question regarding the use of mobile services, in combination with either no resort to formal and informal financial services, or to both formal and informal financial services, or to only formal or informal services.

Our categorization of individuals combines the extensive and intensive margins of financial service access. That is, we combine pure access or account ownership with intensity of use. There are benefits to taking this approach. First, combining the extensive and intensive margins also allows us to directly answer the question on access to financial services, particularly the role of monetary and macroprudential policies in access. Second, as with any survey data, individuals may make errors when responding to the Findex questions. For example, they may respond *no* to a direct question about having a formal account but may respond *yes* to having their wages paid to a bank account. By combining the extensive and intensive margins, we do not falsely exclude individuals from the extensive margin of access.

In the econometric analysis, we further collapse the index into three categories: (1) complete exclusion, (2) access to informal financial services only, and (3) access to formal or mobile banking. In this exercise, we treat access to mobile services as equivalent to access to formal financial services, because both are often considered as such in policy and research literature. In robustness checks, we show that personal characteristics associated with use of mobile and formal financial services are similar, so we believe this is a reasonable assumption.

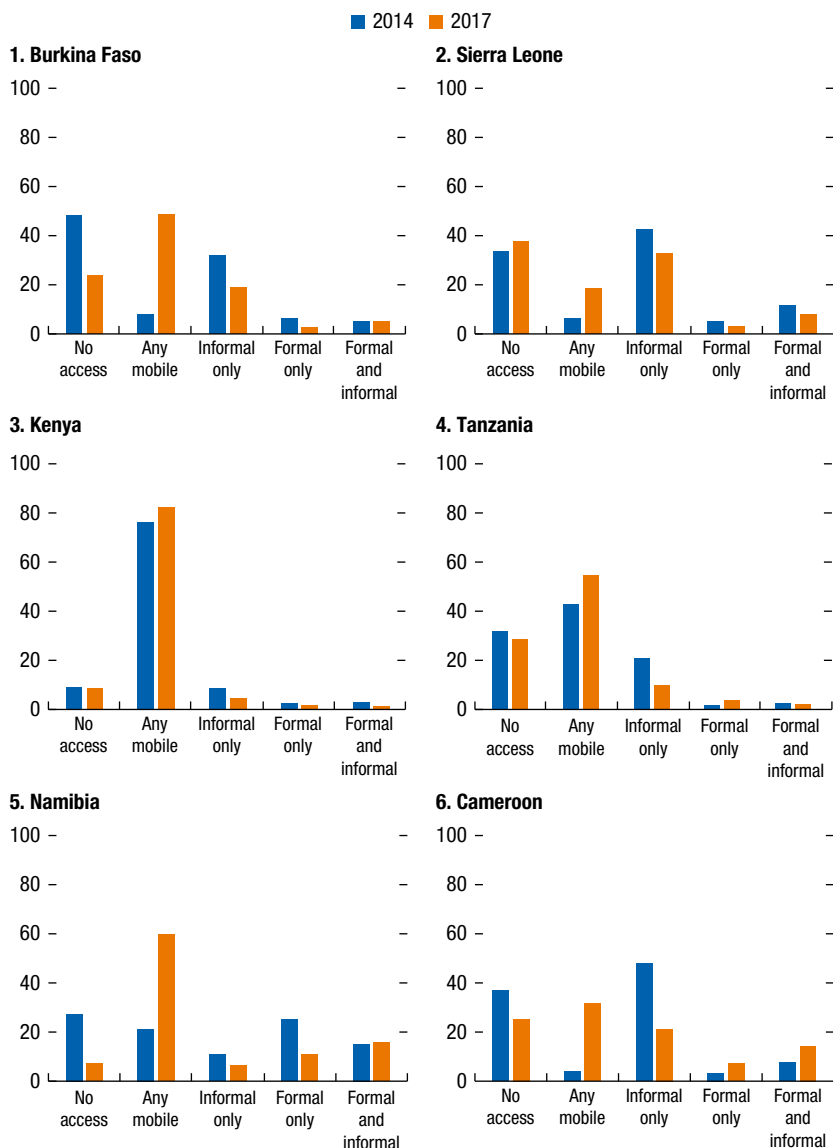
Figure 11.1. Financial Inclusion around the World
(All respondents, percentage of population age 15 years and older)



Sources: IMF, World Economic Outlook database; World Bank, Findex 2014, 2017; World Bank, World Development Indicators; and author estimates.

Note: Data represent middle- and low-income countries only and are weighted by individual survey weights and country population.

Figure 11.2. Financial Inclusion in Sub-Saharan Africa
(All respondents, percentage of population age 15 years and older)



Sources: IMF, World Economic Outlook database; World Bank, Findex 2014, 2017; World Bank, World Development Indicators; and author estimates.

Note: Data are weighted by individual weights.

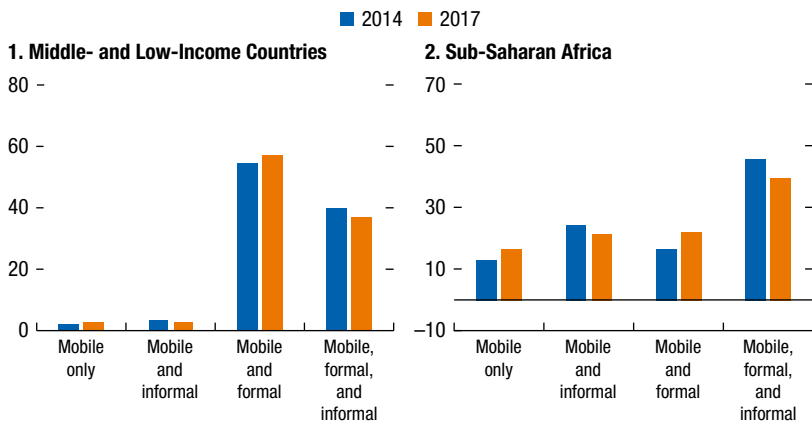
Facets of Financial Access

Financial access has improved between 2014 and 2017. The number of individuals completely excluded or with access only to informal services has fallen worldwide (Figure 11.1), practically disappearing in advanced economies. Whereas the number of individuals with access only to traditional banking (that is, those in the “formal” or “formal and informal” categories) has also fallen, this has been outweighed by the number of individuals with access to mobile technology.

The adoption of mobile banking to access formal financial services is particularly pronounced in sub-Saharan Africa, where access to informal financial services fell by more than 25 percent since 2014. Mobile, with or without other types of services, meanwhile accounted for 65 percent of total respondents in 2017 (Figure 11.1). A detailed analysis of six countries in sub-Saharan Africa shows wide cross-country variation (Figure 11.2). The simultaneous resort to formal and informal financial services by individuals is striking and suggests a complementary relationship. A more granular analysis of the use of mobile accounts together with other services also illustrates a complementary relationship (Figure 11.3).

Examining uses of, rather than access to, financial services shows that savings and borrowing through formal means has changed little since 2014. Sub-Saharan Africa has the most people both saving and borrowing informally rather than formally (Figure 11.4). The exclusive use of cash for both making

Figure 11.3. Decomposing Mobile Financial Access
(All respondents, percentage of population age 15 years and older)



Sources: IMF, World Economic Outlook database; World Bank, Findex 2014, 2017; World Bank, World Development Indicators; and author estimates.

Note: Data are weighted by individual weights and country population.

Figure 11.4 Savings and Borrowing: 2014 and 2017, by Region
(All respondents, percentage of population age 15 years and older)

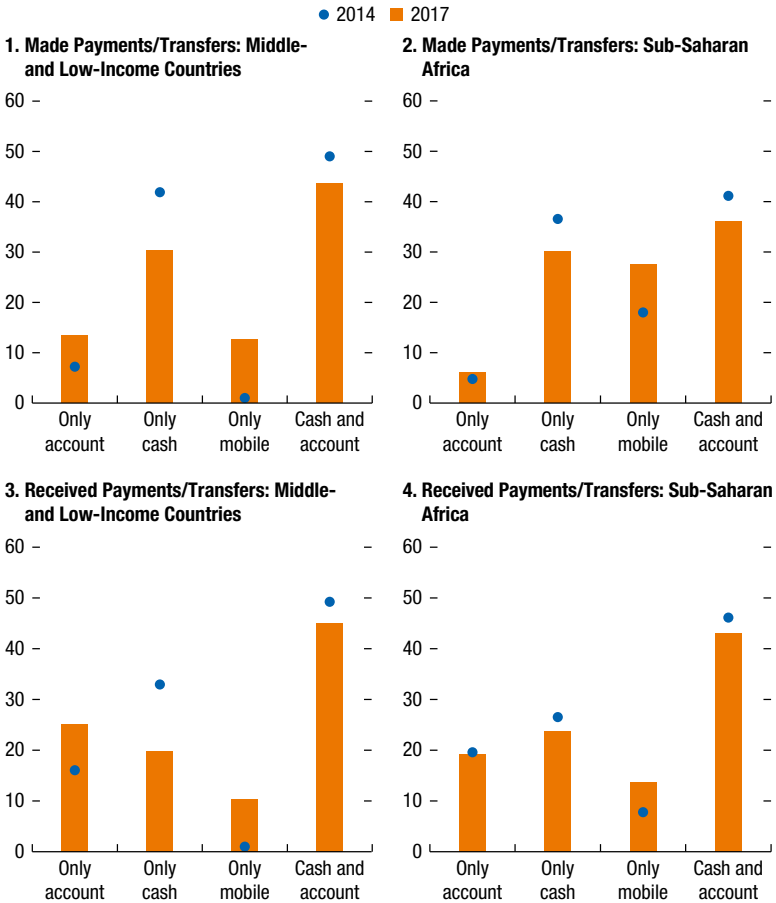


Sources: IMF, World Economic Outlook database; World Bank, Findex 2014, 2017; World Bank, World Development Indicators; and author estimates.
Note: Data represent middle- and low-income countries only and are weighted by individual survey weights and country population.

and receiving payments has become less common; users have moved toward accounts and mobile banking, indicating an increase in financial access (Figure 11.5). The stagnation in formal borrowing and saving is worrisome; their micro and macro benefits have been found to be the strongest relative to individuals having only a bank account. This stagnation also suggests that formal financial institutions may not adequately serve the needs of large parts of sub-Saharan Africa’s population.

DRIVERS OF FORMAL AND INFORMAL FINANCIAL ACCESS

The first step in our analysis refines our definitions of access to formal, informal, and mobile financial services. We collapse our index into three categories: (1) complete exclusion, (2) access to informal financial services only, and (3) access to formal or mobile financial services. This last category also includes any combination of access to formal, mobile, and informal financial services.

Figure 11.5. Payments and Transfers: 2014 and 2017*(All respondents, percentage of population age 15 years and older)*

Sources: IMF, World Economic Outlook database; World Bank, Findex 2014, 2017; World Bank, World Development Indicators; and author estimates.

Note: Data are weighted by individual weights and country population.

Empirical Strategy

To estimate the role of each explanatory variable as determinants of these three levels of access, we estimate a multinomial logistic regression:

$$\begin{aligned}
 \Pr(\text{excluded}) &= \frac{e^{X\beta^{(\text{excluded})}}}{e^{X\beta^{(\text{excluded})}} + e^{X\beta^{(\text{informal})}} + e^{X\beta^{(\text{formal-mobile})}}} \\
 \Pr(\text{informal}) &= \frac{e^{X\beta^{(\text{informal})}}}{e^{X\beta^{(\text{excluded})}} + e^{X\beta^{(\text{informal})}} + e^{X\beta^{(\text{formal-mobile})}}} \\
 \Pr(\text{formal} - \text{mobile}) &= \frac{e^{X\beta^{(\text{formal-mobile})}}}{e^{X\beta^{(\text{excluded})}} + e^{X\beta^{(\text{informal})}} + e^{X\beta^{(\text{formal-mobile})}}}
 \end{aligned} \tag{1}$$

where function $F(z) = \frac{e^z}{1+e^z}$ is the related cumulative logistic distribution; X is our set of explanatory variables for personal, macroeconomic, financial, and monetary and structural characteristics at the individual and country levels; and the dependent variable is a three-way index valued at 0 for complete exclusion, 1 for informal access, and 2 for formal or mobile access (or any combination).

We assume outcomes to be unordered, which means we do not assume exclusion to be “less” than informal, or informal to be “less” than mobile or formal access. Although these outcomes could be ordered, the inclusion of mobile financial services and the simultaneous use of multiple types of financial services makes the ordering more ambiguous than it would be otherwise. We cluster the standard errors at the country level to correct for correlation across individuals within the same country.

In the multinomial logit model, we choose “informal access only” as the referent group and estimate a model for no access relative to informal access and a model for formal access relative to informal access. The multinomial logit essentially runs two logit models: one on formal access versus informal access and the other on no access versus informal access. The coefficient should be interpreted as follows: for a unit change in the explanatory variable, the logit of formal access (or no access) relative to informal access is expected to change by the parameter estimate while holding all other variables in the model constant.

We also estimate two models analogous to equation (1), with the left-side variable being the probability of saving informally, on the one hand, and the probability of borrowing informally, on the other, considering the determinants of access to formal savings and borrowing may be different and may be confounded in our baseline regression. These estimates aim to discover the specific channels through which financial inclusion and financial or macroprudential variables are related.

Our next step is to investigate the specific determinants of access to mobile financial services. We define an individual as having access to mobile financial services if he or she is identified as having access to any mobile financial service (see Annex Table 11.1.1 for questions that fall into these categories). With this definition, we estimate the following simple logistic regression:

$$\Pr(\text{mobile} = 1) = \frac{e^{\beta_0 + \beta_1 X}}{1 + e^{\beta_0 + \beta_1 X}}, \quad (2)$$

where function $F(z) = \frac{e^z}{1+e^z}$ is the related cumulative logistic distribution and X is our set of explanatory variables.

Our analysis is conducted using the 2017 Findex microdata and other independent variables for 2017 (or 2016, depending on data availability). The analysis is limited to a simple but large cross-section, because the three successive Findex surveys (2011, 2014, 2017) have not been conducted with the same individuals. Data aggregation would be possible only at the country level, which would collapse the rich individual data and further complicate identification of the model.

Choice of Explanatory Variables

The choice of explanatory variables follows the literature reviewed here. Variable definitions and sources, as well as summary statistics, can be found in Annex Tables 11.1.3 and 11.1.4, respectively.

Individual Characteristics

From the Global Findex Database 2017, we use the following as individual characteristics: *gender*, *age*, *education level*, *income quintile*, and a *proxy for being in the workforce* (that is, an indicator variable based on the Findex question concerning whether the person has received wages in the past 12 months).⁵ We expect being female, younger, less educated, poorer, and unemployed to be negatively associated with formal financial inclusion and mobile inclusion.

Country-Level Controls

For parsimony and to avoid multicollinearity, we use a reduced number of country-level controls, namely the log of real GDP per capita as a proxy for development; the size of the informal economy, measured as the share of the informal sector in GDP from Medina and Schneider (2018); and an indicator variable taking the value of 1 if average inflation is 12 percent and above in the year of the Findex survey (countries with 12 percent inflation and above are in the 90th decile of inflation in our sample), as a measure of macroeconomic stability. An index of regulatory quality from the World Bank Worldwide Governance Indicators, as presented by Kaufmann, Kraay, and Mastruzzi (2003), controls for the quality of institutions. Last, we include controls for financial sector development, including the ratio of domestic credit to GDP as a proxy for financial depth, the mobile regulatory support index from GSMA Mobile Money Metrics,⁶ an indicator variable taking the value of 1 if the country has an inflation-targeting regime, and an indicator variable taking the value of 1 if the country has a credit bureau or registry. We expect financial sector development to be positively associated with formal financial inclusion.

Monetary Policy

We control in all regressions for whether a country has an inflation-targeting regime, which is typically associated with more financial development. We also examine additional variables related to monetary policy. We expect higher real interest rates to be negatively associated with formal financial inclusion. We also include an indicator variable taking the value of 1 if interest rate controls are in place in the country. Although the literature finds that interest rate controls tend

⁵ The individual characteristics variable is generally considered a proxy for formal employment, because most self-employed individuals are in the informal sector. Workers employed by informal firms could also receive wages, however. Nonetheless, given that one reason for involuntary exclusion is lack of income, individuals receiving wages are more likely to be financially included.

⁶ Bahia and Muthiora (2019) show that supportive mobile banking regulation is highly correlated with mobile money adoption.

to increase the cost of credit and reduce financial access that are opposite to the intention, several countries in the world still have interest controls in place (Munzele Maimbo and Henriquez Gallegos 2014; Alper and others 2019).

Financial Sector Health and Structure

To assay financial sector health and structure, we use a measure of banking sector concentration, with greater concentration expected to be associated with less formal financial inclusion (Mengistu and Perez-Saiz 2018). We then use the log of the bank-capital-to-total-assets ratio, a measure of financial sector health, which we expect to be positively associated with formal financial inclusion (World Bank 2017).

Macprudential Policies

We use data based on the worldwide 2016–17 IMF Annual Macprudential Policies Survey. The data set catalogs the use of macroprudential tools by individual countries in 2016–17, with 141 countries reporting 1,313 measures for an average of 9.3 measures by country (9.9 for advanced economies and 9.1 for emerging market and developing economies). For sub-Saharan Africa, about 11 out of 44 countries resort to macroprudential policy instruments, for an average of 6 measures per country (IMF 2018).⁷

We use an indicator variable for each of the 15 macroprudential measures in the survey, which takes the value of 1 if the measure is reported to be active. Then we test whether the presence of each of the following policies is correlated with the choice of financial access: (1) limit on leverage ratio, (2) forward-looking loan provision, (3) cap on credit growth, (4) other broad-based measures, (5) household sector capital requirement, (6) cap on credit growth to the household sector, (7) loan restrictions or borrower eligibility criteria, (8) cap on loan-to-value ratio, (9) cap on loan-to-income ratio, (10) cap on debt-service-to-income ratio, (11) limit on amortization periods, (12) restrictions on unsecured loans, (13) other, (14) loan-to-deposit ratio, and (15) loan-to-deposit ratio differentiated by currency.

Because for many individual tools the variation is limited, we group macroprudential measures following the classification in Alam and others (2019), including all, demand (that is, targeted at borrowers), and supply measures (that is, targeted at financial institutions). The supply measures are further subdivided into three categories: (1) general-, (2) capital-, and (3) loan-supply tools.⁸ For

⁷ Information on the IMF Annual Macprudential Policies Survey is available at <https://www.elibrary-areaar.imf.org/Macprudential/Pages/Home.aspx/>.

⁸ The “loan-targeted” group consists of the “demand” and the “supply-loans” instruments. “Demand” instruments are the limits to the loan-to-value ratio and the limits to the debt-service-to-income ratio. “Supply-loans” measures are limits to credit growth, loan-loss provisions, loan restrictions, limits to the loan-to-deposit ratio, and limits to foreign currency loans. “Supply-general” instruments are reserve requirements, liquidity requirements, and limits to foreign exchange positions. “Supply-capital” instruments are leverage limits, countercyclical buffers, conservation buffers, and capital requirements.

each country, we count the number of macroprudential measures in each group as a rough estimate of “intensity” of use of macroprudential tools, then estimate the correlation between intensity and each individual’s choice of financial services. We are interested in testing whether measures targeted at formal financial institutions (supply measures) are associated with less formal versus informal financial inclusion.

Regional Controls

We control for regional heterogeneity by adding regional indicator variables (East Asia and Pacific, Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa, South Asia, and sub-Saharan Africa).

Results

Baseline Estimates

Individuals’ financial access is strongly associated with personal, macro, and structural characteristics. Table 11.1 reports the multinomial logit regression results specified in equation (2), showing both the emerging market and developing economies sample and the the sub-Saharan Africa sample. The column labeled “No Access” shows determinants of exclusion from financial services relative to informal financial services only, and the column labeled “Formal Access” shows formal and mobile banking access relative to informal access.

- *Individual characteristics.* Being female is negatively associated with having no access and with formal access, suggesting women tend to use informal financial services more often than men. Having only primary education and low income have significant negative association with formal access. Having wage income improves both informal and formal financial access.
- *Country-level controls.* Access to formal financial services is positively and significantly associated with GDP per capita, a measure of development, but has little correlation with other country-level variables. In sub-Saharan Africa, regulatory support for mobile money also has positive association with formal financial access.
- *Monetary policy.* The monetary policy regime, captured by an indicator variable for whether a country targets inflation, is positively associated with formal access and negatively associated with no access. Such associations are consistent with inflation targeting being common in more developed financial markets, although the estimates are not statistically significant.⁹ In sub-Saharan African countries, tighter monetary policy, measured by the real interest rate, is associated with less formal financial access.

⁹ Results for the inflation-targeting variable are robust to the use of an alternative monetary policy regime control of whether countries have an exchange rate peg. These results are available upon request.

TABLE 11.1.

Variable	Emerging Markets and Developing Economies		Sub-Saharan Africa
	No Access (vs. Informal Access)	Formal (vs. Informal Access)	No Access (vs. Informal Access)
Female	-0.085** (0.041)	-0.236*** (0.064)	-0.121** (0.053)
Primary education	0.055 (0.051)	-0.823*** (0.060)	0.110** (0.056)
Low income	0.101** (0.040)	-0.441*** (0.040)	0.195*** (0.044)
Age	-0.023*** (0.005)	0.041*** (0.006)	-0.020*** (0.005)
Age ²	0.000*** (0.000)	-0.000*** (0.000)	0.000*** (0.000)
Receive wage	-0.486*** (0.049)	0.305*** (0.065)	-0.574*** (0.073)
High inflation (12 pc)	0.218 (0.163)	0.251 (0.199)	0.132 (0.184)
Regulatory quality (estimate)	0.283 (0.194)	0.365 (0.232)	-0.005 (0.290)
Mobile money regulatory support	0.003 (0.007)	0.012 (0.009)	-0.008 (0.011)
Domestic private credit/GDP	-0.001 (0.003)	0.007 (0.006)	-0.003 (0.004)
Inflation targeter	-0.175 (0.156)	0.236 (0.291)	-0.157 (0.252)
Log(GDP per capita)	0.106 (0.081)	0.342*** (0.103)	0.056 (0.103)
Size of informal sector	-0.001 (0.007)	-0.009 (0.011)	-0.006 (0.013)
Credit registry or bureau	-0.206 (0.158)	-0.075 (0.239)	-0.050 (0.194)
Constant	0.688 (0.884)	-2.163** (1.091)	1.767 (1.169)
Regional dummies	Yes	Yes	No
No. of observations		67,354	
Pseudo R ²		0.102	

Source: Author estimates.

Note: The reference group is informal access only. The multinomial logit estimates two models, that is, one logit model for no access relative to informal access and one logit model for formal access relative to informal access.

** $p < 0.05$; *** $p < 0.01$.

Addition of Monetary and Financial Variables

After establishing the baseline control variables, we explore the relationship between monetary policy and financial market structure on financial inclusion. We add these monetary and financial variables one by one to the baseline specification, considering the high correlation between them. The results, as presented in Table 11.2, suggest that macroprudential policies are significantly associated with individuals' choice of financial services.

- *Financial market structure.* Financial inclusion is significantly associated with banking sector competition. In particular, more concentration in the

banking sector is associated with more individuals having no access to financial services in sub-Saharan Africa. This could be because less-developed financial markets also tend to be more concentrated, or because higher lending costs are related to lower competition in the banking sector. For sub-Saharan Africa, Mengistu and Perez-Saiz (2018) find that more competition is related to better formal financial access.

TABLE 11.2.

Multinomial Logit Adding Financial and Monetary Variables				
Variable	Emerging Markets and Developing Economies		Sub-Saharan Africa	
	No Access (vs. Informal Access)	Formal (vs. Informal Access)	No Access (vs. Informal Access)	Formal (vs. Informal Access)
All control variables	Yes	Yes	Yes	Yes
Interest rate controls	0.444* (0.234)	0.280 (0.366)		
Real interest rate	–0.000 (0.004)	–0.005 (0.009)	0.003 (0.004)	–0.021*** (0.005)
Log(bank concentration) (%)	–0.047 (0.258)	–0.430 (0.434)	0.461*** (0.175)	–0.172 (0.393)
Log(bank capital/total assets) (%)	0.176 (0.679)	–0.344 (0.830)	–0.566 (0.824)	–0.160 (0.812)
Macprudential Measures				
Limit on leverage ratio	–0.568*** (0.170)	–0.681*** (0.247)	–0.895*** (0.129)	–0.544** (0.222)
Cap on credit growth	–0.274 (0.196)	–0.602* (0.329)	–1.352*** (0.322)	–1.049*** (0.317)
Broad-based measures	–0.362*** (0.113)	–0.374* (0.203)	–0.668*** (0.112)	–0.295 (0.266)
Loan restrictions or borrower eligibility criteria	–0.405*** (0.119)	0.016 (0.164)	–0.377** (0.165)	–0.213 (0.215)
Loan-to-deposit ratio	–0.426*** (0.144)	–1.245*** (0.255)	–0.690*** (0.221)	–0.789*** (0.163)
Macprudential Count, by Group				
All macprudential measures	–0.081*** (0.024)	–0.064* (0.034)	–0.118*** (0.026)	–0.064 (0.044)
Macprudential: demand side	–0.021 (0.093)	0.113 (0.168)	0.260** (0.127)	0.453 (0.298)
Macprudential: supply side	–0.109*** (0.024)	–0.099*** (0.034)	–0.145*** (0.025)	–0.097*** (0.033)
Macprudential: supply loans	–0.151*** (0.044)	–0.145** (0.063)	–0.190*** (0.048)	–0.118 (0.080)
Macprudential: supply general	–0.228*** (0.076)	–0.162** (0.081)	–0.394*** (0.065)	–0.260*** (0.100)
Macprudential: supply capital	–0.278** (0.126)	–0.289 (0.204)	–0.506*** (0.170)	–0.438** (0.220)
Regional dummies	Yes	Yes	No	No

Source: Author estimates.

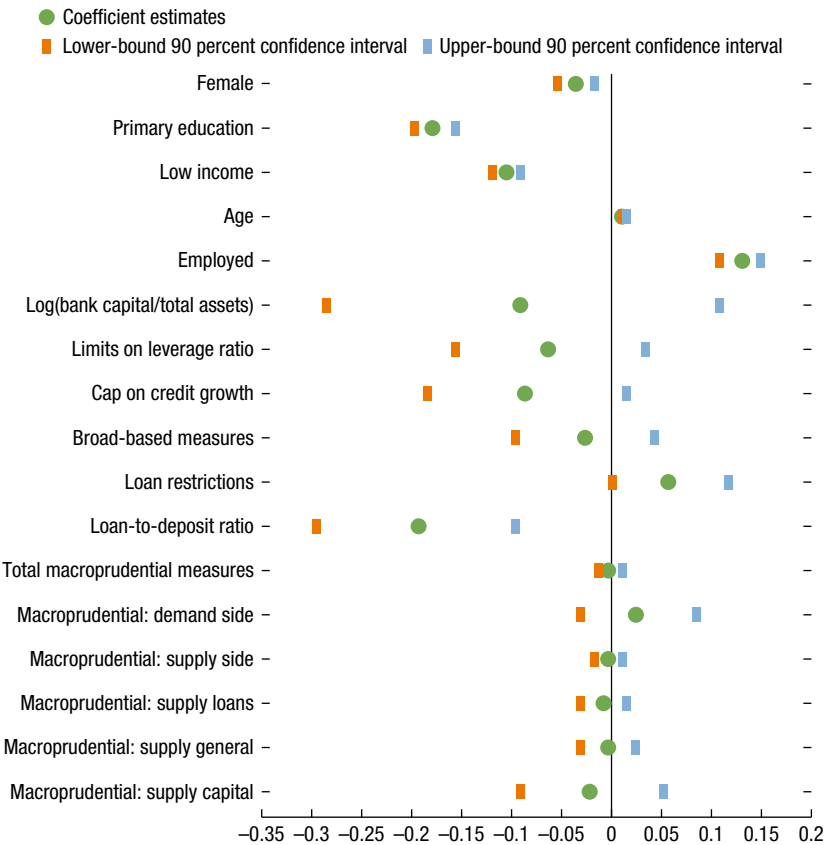
Note: These financial sector structure, monetary policy, and macprudential variables are added to the full list of control variables one by one. These variables are highly correlated and thus should not be included together.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

- *Macroprudential policies.* Supply-side macroprudential policies, including limits on leverage ratio, cap on credit growth, and loan-to-deposit ratio, as well as aggregate indicators of supply-side measures (loans, general, and capital-based) are negatively and significantly associated with having access to formal financial services. Demand-side policies, however, are not significantly associated with choice of financial services. These results can be interpreted as supporting the hypothesis that macroprudential measures targeted at formal financial institutions are easier for people to evade than macroprudential measures targeted at individuals. In other words, macroprudential measures targeted at formal financial institutions may motivate individuals to resort to informal financial services in emerging market and developing economies.

We also present the marginal effects of the baseline personal control variables and the macroprudential variables on the probability of having formal financial access in Figure 11.6 to indicate the relative size of the effect of each dependent variable on the type of financial access. This figure indicates the effect of macroprudential variables is only slightly smaller than that of personal characteristics.

Figure 11.6. Margin Plots of Baseline Multinomial Logit Regressions



Source: Author estimates.

Mobile banking, identified as the main driver of improved financial access in sub-Saharan Africa from 2014 to 2017, is also affected by personal, monetary, and financial factors. Using a simple logit regression to determine the probability of any mobile use, in Table 11.3 we estimate the coefficients for the same macroprudential variables as shown in Table 11.2. The coefficients are similar to those in the multinomial logit on formal and mobile access, with a few exceptions. Mobile money regulatory support is associated with a significant increase in mobile banking access in both samples. The results in Table 11.3 show that certain supply-side macroprudential measures have a strong and negative association with mobile banking in sub-Saharan Africa (caps on credit growth and loan-to-deposit ratios). This may be because mobile banking is complementary to formal banking. (In much of sub-Saharan Africa, mobile financial services have to be backed by a formal bank account.)

TABLE 11.3.

Logit Regressions with Baseline Controls: Mobile		
Variable	Emerging Markets and Developing Economies	
		Sub-Saharan Africa
Female	−0.191*** (0.040)	−0.151*** (0.043)
Primary education	−0.756*** (0.092)	−0.952*** (0.082)
Low income	−0.525*** (0.039)	−0.540*** (0.058)
Age	0.032*** (0.006)	0.033*** (0.007)
Age ²	−0.000*** (0.000)	−0.000*** (0.000)
Receive wage	0.552*** (0.054)	0.586*** (0.082)
High inflation (>12 percent)	−0.334 (0.253)	−0.350 (0.328)
Regulatory quality (estimate)	−0.081 (0.270)	0.562 (0.446)
Mobile money regulatory support	0.026*** (0.009)	0.044** (0.020)
Domestic private credit/GDP	−0.004 (0.003)	−0.005 (0.005)
Inflation targeter	0.162 (0.232)	0.565 (0.360)
Log(GDP per capita)	0.233* (0.124)	0.198 (0.185)
Size of informal sector	−0.012 (0.012)	0.001 (0.023)
Credit registry or bureau	0.477 (0.297)	0.164 (0.338)
Constant	−4.730*** (1.344)	−4.850* (2.569)
Regional dummies	Yes	No
No. of observations	67,354	27,829
Pseudo R ²	0.162	0.112

Source: Author estimates.

Note: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

In addition to the type of financial access, the Findex survey inquires about how people borrow and save, which enables separate analyses. Applying the same multinomial logit regression on our borrowing index, defined as complete exclusion (only informal borrowing, and formal borrowing or formal plus informal borrowing, and with the three categories defined analogously for our saving index), we estimate the model using the same control variables and monetary and financial variables. Our analyses on borrowing and saving also allow us to test the economic relevance of the previous results using our grouping of the Findex variables. Tables 11.4 and 11.5 present the results.

TABLE 11.4.

Multinomial Logit Regressions with Baseline Controls				
Variable	Borrowing		Saving	
	No Access (vs. Informal Access)	Formal (vs. Informal Access)	No Access (vs. Informal Access)	Formal (vs. Informal Access)
Female	0.034 (0.025)	−0.008 (0.047)	−0.369*** (0.066)	−0.443*** (0.078)
Primary education	0.083* (0.046)	−0.313*** (0.092)	0.213*** (0.064)	−0.683*** (0.085)
Low income	0.020 (0.038)	−0.246*** (0.059)	0.310*** (0.039)	−0.474*** (0.057)
Age	−0.028*** (0.005)	0.090*** (0.009)	−0.050*** (0.007)	−0.005 (0.010)
Age ²	0.000*** (0.000)	−0.001*** (0.000)	0.001*** (0.000)	0.000 (0.000)
Receive wage	−0.495*** (0.039)	0.298*** (0.067)	−0.600*** (0.058)	0.196** (0.082)
High inflation (>12 percent)	0.218* (0.126)	0.228 (0.217)	0.101 (0.200)	0.316* (0.178)
Regulatory quality (estimate)	0.057 (0.170)	0.419*** (0.151)	−0.296 (0.243)	−0.101 (0.257)
Mobile money regulatory support	0.000 (0.005)	−0.008 (0.007)	0.015* (0.009)	0.016* (0.009)
Domestic private credit/GDP	−0.000 (0.002)	0.003 (0.003)	−0.001 (0.003)	0.005 (0.004)
Inflation targeter	−0.258* (0.141)	−0.205 (0.220)	0.203 (0.225)	0.066 (0.239)
Log(GDP per capita)	0.136 (0.089)	−0.175* (0.091)	0.235* (0.131)	0.416*** (0.149)
Level of informality (Medina and Schneider 2018)	−0.001 (0.006)	−0.001 (0.008)	−0.003 (0.009)	−0.001 (0.011)
Credit registry or bureau	−0.146 (0.130)	−0.090 (0.217)	0.163 (0.240)	0.509** (0.216)
Constant	0.703 (0.808)	−0.222 (0.939)	1.074 (1.341)	−3.604 (1.501)
Regional dummies	Yes	Yes	Yes	No
No. of observations		67,354		67,354
Pseudo R ²		0.055		0.0992

Source: Author estimates.

Note: The reference group is informal access only. The multinomial logit estimates two models, that is, one logit model for no access relative to informal access and one logit model for formal access relative to informal access.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

TABLE 11.5.

Multinomial Logit Regressions with Baseline Controls				
Variable	Borrowing		Saving	
	No Access (vs. Informal Access)	Formal (vs. Informal Access)	No Access (vs. Informal Access)	Formal (vs. Informal Access)
All control variables	Yes	Yes	Yes	Yes
Interest rate controls	0.177 (0.222)	-0.191 (0.230)	0.703** (0.331)	0.740* (0.421)
Real interest rate	0.003 (0.004)	0.007 (0.008)	0.022 (0.015)	0.020** (0.009)
Log(bank concentration) (%)	0.016 (0.161)	0.476 (0.302)	-0.184 (0.338)	-0.539 (0.392)
Log(bank capital/total assets) (%)	0.509* (0.291)	0.262 (0.500)	-1.161 (1.061)	-1.781 (1.157)
Macprudential Measures				
Limit on leverage ratio	-0.329** (0.165)	-0.265 (0.214)	-0.676*** (0.172)	-0.688*** (0.248)
Cap on credit growth	-0.095 (0.162)	-0.139 (0.280)	0.018 (0.281)	-0.256 (0.330)
Broad-based measures	-0.299*** (0.096)	-0.025 (0.197)	-0.339** (0.155)	-0.033 (0.183)
Loan restrictions or borrower eligibility criteria	-0.273** (0.109)	0.034 (0.142)	-0.134 (0.201)	0.400** (0.162)
Loan-to-deposit ratio	-0.171 (0.131)	-0.484* (0.248)	-0.544*** (0.185)	-0.968*** (0.319)
Macprudential Count, by Group				
All macprudential measures	-0.057*** (0.021)	-0.055* (0.029)	-0.051 (0.034)	0.003 (0.040)
Macprudential: demand side	-0.100 (0.080)	-0.009 (0.115)	0.175 (0.159)	0.250 (0.169)
Macprudential: supply side	-0.070*** (0.025)	-0.078** (0.035)	-0.082** (0.035)	-0.013 (0.042)
Macprudential: supply loans	-0.077* (0.041)	-0.103** (0.052)	-0.107* (0.055)	-0.063 (0.063)
Macprudential: supply general	-0.161** (0.063)	-0.111 (0.085)	-0.161 (0.098)	0.052 (0.093)
Macprudential: supply capital	-0.198 (0.127)	-0.244* (0.143)	-0.233 (0.179)	-0.024 (0.251)
Regional dummies	Yes	Yes	No	No

Source: Author estimates.

Note: These financial sector structure, monetary policy, and macprudential variables are added to the full list of control variables one by one. These variables are highly correlated and thus should not be included together.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

By comparing Table 11.4 with Table 11.1 and Table 11.5 with Table 11.2, we can trace whether a specific factor influences financial access through the borrowing channel, the savings channel, or both.

- *Individual characteristics.* Most individual characteristics affect borrowing and saving choices in the same way they affect overall financial access. One noteworthy difference is in gender: women are more likely to save through informal channels but not to borrow informally.
- *Country-level controls.* Separating borrowing from saving shows more nuanced effects of country controls. For instance, better regulatory quality is now asso-

ciated with a higher probability of formal borrowing. Mobile money regulatory support is positively related to formal financial access, but for mobile regulation, this is only through the savings channel. Higher GDP per capita is similarly associated with formal borrowing mostly through the savings channel.

- *Macroprudential policies.* Supply- and demand-side macroprudential measures both tend to increase informal borrowing by suppressing the populations with no access. Yet only supply-side policies in aggregate are associated with less formal borrowing. Because most macroprudential policies target borrowing rather than saving, they have little influence on the savings channel. Some supply-side policies, however, are still associated with less formal saving (limit on leverage and loan-to-deposit ratios).

“Leaks” in Macroprudential Policies

Despite its exploratory nature, the empirical analysis so far has highlighted fairly consistent and statistically significant associations between the use of macroprudential measures and formal financial access, including how individuals save and borrow. This significance holds after we control for individual- and country-level characteristics. However, policymakers in emerging market and developing economies must better understand how macroprudential policies “leak,” because leaks could imply the policies are ineffective. Furthermore, macroprudential policies could also help drive the persistence of resort to informal financial services; this runs counter to the goal of fostering access to formal financial services.

We find that the effect of macroprudential policies changes according to the level of financial development in a country. Table 11.6 reports estimates for our baseline regression on the full sample of countries, splitting the sample into higher- and lower-than-average financial development.¹⁰ By splitting the sample, we are able to estimate the differential effect of country-level controls and macroprudential policies on financial access according to level of financial development, rather than estimate the average effect when we simply control for financial development.

The negative association of macroprudential policies with access to formal financial services is primarily in countries with more financial development especially for specific supply-side macroprudential variables, namely limit on leverage ratio, broad-based measures, and loan-to-deposit ratio. This negative association is consistent with the finding in Cizel and others (2019) that the leaks are stronger for more advanced economies and where quantity of credit is restricted. In countries with little financial development, macroprudential measures are instead associated with greater odds of informal access relative to no access, while individuals’ banking choices show little to no movement from formal to informal.

Tight and Loose Macroprudential Policies

In Deléchat and others (2020), we also dig deeper into the role of macroprudential policies by using the integrated Macroprudential Policy database constructed

¹⁰ The index of financial development constructed by Sviryzdenka (2016) provides a relative ranking of 176 countries on the depth, access, and efficiency of their financial institutions and financial markets.

TABLE 11.6.

Multinomial Logit Regressions with Baseline Controls, by Level of Financial Development				
Variable	Emerging Markets and Developing Economies			
	No Access (vs. Informal Access)	Formal (vs. Informal Access)	No Access (vs. Informal Access)	Formal (vs. Informal Access)
	High Financial Development		Low Financial Development	
	Yes	Yes	Yes	Yes
All control variables				
Interest rate controls	-2.220 (1.561)	-1.056 (0.757)	0.523 (0.368)	0.222 (0.558)
Real interest rate	-0.002 (0.011)	0.028 (0.020)	0.006 (0.004)	-0.011** (0.005)
Log(bank concentration) (%)	-0.110 (1.459)	4.190** (1.784)	0.568*** (0.186)	-0.042 (0.429)
Log(bank capital/total assets) (%)	7.086*** (0.204)	-1.371*** (0.519)	-1.907*** (0.538)	1.131 (0.908)
Macprudential Measures				
Limit on leverage ratio	-2.183*** (0.337)	-2.632*** (0.853)	-0.450** (0.225)	-0.152 (0.254)
Cap on credit growth	1.148 (1.098)	-1.236 (1.166)	-0.236 (0.334)	-0.158 (0.487)
Broad-based measures	-1.095 (1.361)	-3.414* (1.766)	-0.486*** (0.140)	-0.135 (0.260)
Loan restrictions or borrower eligibility criteria	-0.721*** (0.074)	-0.002 (0.159)	-0.426*** (0.158)	-0.074 (0.206)
Loan-to-deposit ratio	2.551 (3.127)	-4.486* (2.710)	-0.602*** (0.180)	-1.056*** (0.237)
Macprudential Count, by Group				
All macroprudential measures	-0.210*** (0.035)	-0.084 (0.053)	-0.109*** (0.029)	-0.056 (0.049)
Macroprudential: demand side	-0.544*** (0.094)	0.077 (0.167)	0.265** (0.131)	0.350 (0.234)
Macroprudential: supply side	-0.304*** (0.061)	-0.281** (0.132)	-0.143*** (0.026)	-0.084** (0.042)
Macroprudential: supply loans	-0.379*** (0.077)	-0.236* (0.126)	-0.182*** (0.050)	-0.093 (0.081)
Macroprudential: supply general	-0.913** (0.373)	-2.171*** (0.266)	-0.399*** (0.066)	-0.176* (0.095)
Macroprudential: supply capital	-1.481*** (0.444)	0.078 (0.350)	-0.264* (0.136)	-0.358* (0.205)
Regional dummies	Yes	Yes	Yes	Yes

Source: Author estimates.

Note: These financial sector structure, monetary policy, and macroprudential variables are added to the full list of control variables one by one. These variables are highly correlated and thus should not be included together. Results for the baseline coefficients in these high and low levels of informality sample regressions are available upon request.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

by Alam and others (2019). We show that the strictness of macroprudential measures also appears relevant for financial inclusion. On the demand side, a higher average level of the loan-to-value ratio is associated with greater financial inclusion, consistent with the idea that higher caps on the loan-to-value ratio allow more individuals to access loans. On the supply side, tighter countercyclical capital buffers, tighter limits on credit growth, foreign currency loans, and

loan-to-deposit ratios are all associated with lower formal access and higher incidence of no access. These findings are consistent with our baseline results, where we find that most of the effect of macroprudential policies on formal financial access comes from supply-side measures.

CONCLUSIONS

Financial inclusion continues to be a goal of public policy in low-income countries. The micro- and macroeconomic benefits of greater financial inclusion are by now well established—allowing individuals to smooth their consumption, efficiently allocating productive resources across the economy, empowering women, reducing poverty and inequality, and supporting growth, among other things. Given these benefits, many countries and international organizations, such as the Financial Action Task Force, have rightly set greater financial inclusion as an important objective.

Across emerging market and developing economies, financial inclusion has been improving thanks largely to the adoption of mobile financial services. For example, although sub-Saharan Africa continues to have the highest rates of informal finance, since 2014, its share of total access to financial services has declined by 7.8 percent. In place of informal banking, mobile money and mobile banking have grown in use. Mobile accounts now make up 17.4 percent of all financial services access on the entire continent. The growth of the mobile financial services industry has given millions of the world's poorest people access to formalized accounts, greatly facilitating payment transactions.

The goal of financial inclusion, including access to mobile financial services, still has not been met. Although access greatly increased between 2014 and 2017, a large share of individuals in sub-Saharan Africa are still excluded from the formal financial sector. The rates are lower, albeit still elevated, for financial exclusion in other emerging market and developing economies globally. Access to bank accounts has increased worldwide, yet too few individuals use the accounts for borrowing and saving. Furthermore, in many countries mobile financial services may only include mobile money, which does not necessarily provide the same benefits of formal financial services that full-fledged mobile banking would. To further increase the use of formal savings and borrowing instruments worldwide, developing mobile-based savings and borrowing instruments along with an appropriately supportive regulatory framework could be most effective. Developing mobile-based savings and borrowing instruments along with an appropriately supportive regulatory framework could be the most effective way to continue to boost financial inclusion worldwide.

Macroprudential policies and the health of the financial sector seem to play a role in financial inclusion. Our results are some of the first to show a robust association between financial inclusion and monetary, macroprudential, and financial sector policies and conditions. In particular, supply-side (institution-based) macroprudential policies seem to be associated with more use of informal finance and with less use of formal and mobile services. The association between limits on

credit growth and greater use of informal financial services relative to formal ones is particularly strong. These results do not establish causality, yet they suggest a significant relationship between certain policies and individual-level use of certain types of financial services. Although the precise channel for resort to informality remains to be investigated, including the likely complex interactions between the size of the informal sector and financial development, the unintended consequences of macroprudential policies appear to be more persistent for countries at higher levels of financial development.

The key policy implication emerging from these initial findings is that central bankers and bank regulators ought to at least consider the interactions between monetary and financial sector policies and financial inclusion. Given possible negative spillover effects from many macroprudential and financial sector policies, policymakers may need to consider the potential effects of these policies on financial inclusion before implementing them. At the same time, policies to support financial inclusion, including by increasing financial and digital literacy and regulatory support to mobile banking, should be even more actively pursued.

ANNEX 11.1.

ANNEX TABLE 11.1.1.

Findex Questionnaire Mapping to Index				
2017 Question ID	Question Definition	Index Classification		
		Informal	Mobile	Formal
account	Has an account		Yes	Yes
account_fin	Has an account at a financial institution			Yes
account_mob	Has a mobile money account		Yes	
fin2	Has a debit card			Yes
fin5	Used mobile phone or internet to access financial institution account		Yes	
fin7	Has a credit card			Yes
fin17a	Saved in past 12 months: using an account at a financial institution			Yes
fin17b	Saved in past 12 months: using an informal savings club	Yes		
fin19	Has loan from a financial institution for home, apartment, or land			Yes
fin22a	Borrowed in past 12 months: from a financial institution			Yes
fin22b	Borrowed in past 12 months: from family or friends	Yes		
fin22c	Borrowed in past 12 months: from an informal savings club	Yes		
fin27a	If sent domestic remittances: through a financial institution			Yes
fin27b	If sent domestic remittances: through a mobile phone		Yes	
fin29a	If received domestic remittances: through a financial institution			Yes

(continued)

ANNEX TABLE 11.1.1. (continued)

Findex Questionnaire Mapping to Index				
2017 Question ID	Question Definition	Index Classification		
		Informal	Mobile	Formal
fin29b	If received domestic remittances: through a mobile phone		Yes	
fin31a	If paid utility bills: using an account			Yes
fin31b	If paid utility bills: through a mobile phone		Yes	
fin34a	If received wage payments: into an account			Yes
fin34b	If received wage payments: through a mobile phone		Yes	
fin39a	If received government transfers: into an account			Yes
fin39b	If received government transfers: through a mobile phone		Yes	
fin40	If received cashless government transfers: first account			Yes
fin41	If received cashless government transfers: opened to receive payments			Yes
fin43a	If received agricultural payments: into an account			Yes
fin43b	If received agricultural payments: through a mobile phone		Yes	
fin27c1	If sent domestic remittances: in cash	Yes		
fin27c2	If sent domestic remittances: through a money transfer service		Yes	
fin29c1	If received domestic remittances: in cash	Yes		
fin29c2	If received domestic remittances: through an MTO		Yes	
fin34c2	If received wage payments: to a card			Yes
fin35	If received cashless wage payments: first account			Yes
fin36	If received cashless wage payments: opened to receive payments			Yes
fin47a	If received self-employment payments: into an account			Yes
fin47b	If received self-employment payments: through a mobile phone		Yes	

Source: Authors.

ANNEX TABLE 11.1.2.

Financial Access Index Definition		
Index Value	Label	Question Response Criteria
0	No access	Answers no to every formal, mobile, and informal question
1	Informal only	Answers yes to any informal question and answers no to every formal and mobile question
2	Mobile only	Answers yes to any mobile question and answers no to every formal and informal question
3	Informal and mobile	Answers yes to any mobile or informal question and answers no to every formal question
4	Formal only	Answers yes to any formal question and answers no to every informal and mobile question
5	Formal and informal	Answers yes to any formal or informal question and answered no to every mobile question
6	Formal and mobile	Answers yes to any formal or mobile question and answers no to every informal question
7	Formal and informal and mobile	Answers yes to any formal or mobile or informal question

Source: Authors.

ANNEX TABLE 11.1.3.

Definitions and Data Sources of Variables		
Name	Definition	Source
Female	Dummy variable equal to 1 if respondent is female	World Bank, Findex 2014, 2017
Primary education	Respondent education level is "completed primary or less"	World Bank, Findex 2014, 2017
Low income	Within-economy household income quintile is "poorest 20%"	World Bank, Findex 2014, 2017
Age	Respondent is age 15 years or older	World Bank, Findex 2014, 2017
Receive wage	Respondent receives wage payments	World Bank, Findex 2014, 2017
High inflation (>12 percent)	Dummy variable equal to 1 inflation in respondent's country is 12 percent or higher	World Bank, World Development Indicators
Regulatory quality (estimate)	Aggregate score for getting credit and protecting minority investors as well as the regulatory quality indices from the indicator sets for dealing with construction permits, getting electricity, registering property, enforcing contracts, and resolving insolvency	World Bank, Doing Business Survey
Mobile money regulatory support	Index based on six aggregated metrics: authorization, consumer protection, transaction limits, know your customer, agent network, investment and infrastructure environment	Mobile Money Regulatory Index, Groupe Spéciale Mobile Association
Domestic private credit/GDP	Domestic credit to private sector (percent of GDP)	World Bank, World Development Indicators
Inflation targeter	0 (no) or 1 (yes)	Annual Report on Exchange Arrangements and Exchange Restrictions
Log(GDP per capita)	GDP per capita	World Bank, World Development Indicators
Size of informal sector	Measured as share of GDP	Medina and Schneider 2018
Credit registry or bureau	Dummy variable equal to 1 if country had a credit registry (public) or bureau (private)	Monetary and Capital Markets Department, IMF
Interest rate controls	0 (no) or 1 (yes)	Annual Report on Exchange Arrangements and Exchange Restrictions
Real interest rate	Value of real interest rate	Annual Report on Exchange Arrangements and Exchange Restrictions
Log(bank concentration) (%)	Measure of concentration in the banking system (percent)	World Bank, Global Financial Development Database
Log(bank capital/total assets) (%)	Percent of bank capital to total assets	World Bank, Global Financial Development Database
Limit on leverage ratio	0 (no) or 1 (yes)	Macprudential Policy Survey
Cap on credit growth	0 (no) or 1 (yes)	Macprudential Policy Survey
Broad-based measures (macroprudential)	0 (no) or 1 (yes)	Macprudential Policy Survey

(continued)

ANNEX TABLE 11.1.3. (continued)

Definitions and Data Sources of Variables		
Name	Definition	Source
Loan restrictions or borrower eligibility criteria	0 (no) or 1 (yes)	Macroprudential Policy Survey
Loan-to-deposit ratio	0 (no) or 1 (yes)	Macroprudential Policy Survey
All macroprudential measures	Count of all macroprudential measures (demand side and supply side), by country	Macroprudential Policy Survey
Macroprudential: demand side	Count of measures classified as a cap on loan-to-value ratios, cap on loan-to-income ratio, and cap on debt-service-to-income ratios, by country	Macroprudential Policy Survey
Macroprudential: supply side	Count of measures classified by supply-loans, supply-general, and supply-capital, by country	Macroprudential Policy Survey
Macroprudential: supply loans	Count of measures classified as forward-looking loan loss provision requirement, cap on credit growth, cap on credit growth to the household sector, loan restrictions or borrower eligibility criteria, restrictions on unsecured loans, loan-to-deposit ratio, and loan-to-deposit ratio differentiated by currency, by country	Macroprudential Policy Survey
Macroprudential: supply general	Count of measures classified as limit on amortization periods, other broad-based measures to increase resilience, and other measures, by country	Macroprudential Policy Survey
Macroprudential: supply capital	Count of measures classified as household sector capital requirements and limits on leverage, by country	Macroprudential Policy Survey

Source: Authors.

ANNEX TABLE 11.1.4.

Means and Standard Deviations of Variables			
Variable	Mean	Standard Deviation	No. of Observations
Female	1.54	0.50	150,923
Primary education	0.35	0.48	150,938
Low income	0.35	0.48	150,938
Age	41.91	17.92	150,483
Receive wage	3.06	1.33	150,923
High inflation (>12 percent)	0.13	0.33	150,938
Regulatory quality (estimate)	0.05	0.97	150,923
Mobile money regulatory support	75.12	10.49	74,553
Domestic private credit/GDP	63.04	46.63	140,920
Inflation targeter	0.27	0.44	150,923
Log(GDP per capita)	8.35	1.48	150,923
Size of informal sector	27.75	12.00	140,926
Credit registry or bureau	0.82	0.39	148,878
Interest rate controls	0.11	0.32	150,923
Real interest rate	7.13	12.07	95,167
Log(credit to government and state-owned enterprises/GDP) (percent)	1.92	1.16	137,323
Log(bank concentration) (percent)	4.15	0.34	120,707
Log(bank capital/total assets) (percent)	2.15	0.37	91,618
Limit on leverage ratio	0.21	0.41	150,938
Cap on credit growth	0.10	0.30	150,938
Broad-based measures (macroprudential)	0.45	0.50	150,938
Loan restrictions or borrower eligibility criteria	0.56	0.50	150,938
Loan-to-deposit ratio	0.10	0.30	150,938
All macroprudential measures	2.87	2.59	150,938
Macroprudential: demand side	0.64	0.84	150,938
Macroprudential: supply side	2.23	2.01	150,938
Macroprudential: supply loans	1.14	1.20	150,938
Macroprudential: supply general	0.62	0.78	150,938
Macroprudential: supply capital	0.48	0.61	150,938

Source: Authors.

ANNEX TABLE 11.1.5.

Names of Countries in the Database			
Countries in Sample (Macroprudential Policy Survey)		Countries in Sample (Integrated Macroprudential Policy Database)	
Sub-Saharan Africa (19)	Emerging Markets (49)	Sub-Saharan Africa (14)	Emerging Markets (40)
Benin	Argentina	Benin	Argentina
Botswana	Armenia	Botswana	Armenia
Burkina Faso	Bangladesh	Burkina Faso	Bangladesh
Central African Republic	Benin	Côte d'Ivoire	Benin
Chad	Bolivia	Ghana	Botswana
Côte d'Ivoire	Botswana	Kenya	Brazil
Ghana	Brazil	Mali	Burkina Faso
Kenya	Burkina Faso	Mozambique	Cambodia
Madagascar	Cambodia	Niger	Colombia
Mali	Central African Republic	Nigeria	Côte d'Ivoire
Mozambique	Chad	Senegal	Dominican Republic
Namibia	Colombia	South Africa	El Salvador
Niger	Côte d'Ivoire	Uganda	Georgia

(continued)

ANNEX TABLE 11.1.5. (continued)

Names of Countries in the Database			
Countries in Sample (Macroprudential Policy Survey)		Countries in Sample (Integrated Macroprudential Policy Database)	
Sub-Saharan Africa (19)	Emerging Markets (49)	Sub-Saharan Africa (14)	Emerging Markets (40)
Nigeria	Dominican Republic	Zambia	Ghana
Rwanda	El Salvador		Haiti
Senegal	Georgia		Honduras
South Africa	Ghana		India
Uganda	Guatemala		Jordan
Zambia	Haiti		Kenya
	Honduras		Kyrgyz Republic
	India		Malaysia
	Jordan		Mali
	Kenya		Mongolia
	Kyrgyz Republic		Morocco
	Madagascar		Mozambique
	Malaysia		Nepal
	Mali		Niger
	Mongolia		Nigeria
	Morocco		Pakistan
	Mozambique		Paraguay
	Myanmar		Philippines
	Namibia		Romania
	Nepal		Russian Federation
	Nicaragua		Senegal
	Niger		South Africa
	Nigeria		Thailand
	Pakistan		Tunisia
	Paraguay		Uganda
	Philippines		Vietnam
	Romania		Zambia
	Russian Federation		
	Rwanda		
	Senegal		
	South Africa		
	Thailand		
	Tunisia		
	Uganda		
	Vietnam		
	Zambia		

Source: Authors.

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