ADBI Working Paper Series

**Financial Stability and
Financial Inclusion**

Peter J. Morgan
Victor Pontines

No. 488
July 2014

Asian Development Bank Institute

Peter J. Morgan is Senior Consultant for Research at the Asian Development Bank Institute (ADBI). Victor Pontines is Research Fellow at ADBI.

Abstract

Developing economies are seeking to promote financial inclusion, i.e., greater access to financial services for low-income households and firms, as part of their overall strategies for economic and financial development. This raises the question of whether financial stability and financial inclusion are, broadly speaking, substitutes or complements. In other words, does the move toward greater financial inclusion tend to increase or decrease financial stability? A number of studies have suggested both positive and negative ways in which financial inclusion could affect financial stability, but very few empirical studies have been made of their relationship. This partly reflects the scarcity and relative newness of data on financial inclusion. This study contributes to the literature on this subject by estimating the effects of various measures of financial inclusion (together with some control variables) on some measures of financial stability, including bank non-performing loans and bank Z-scores. We find some evidence that an increased share of lending to small and medium-sized enterprises (SMEs) aids financial stability, mainly by reducing non-performing loans (NPLs) and the probability of default by financial institutions. This suggests that policy measures to increase financial inclusion, at least by SMEs, would have the side-benefit of contributing to financial stability as well.

JEL Codes: G21, G28, O16

Contents

1. INTRODUCTION

A key lesson of the 2007–2009 global financial crisis (GFC) was the importance of containing systemic financial risk and maintaining financial stability. At the same time, developing economies are seeking to promote financial inclusion, i.e., greater access to financial services for low-income households and small firms, as part of their overall strategies for economic and financial development. This raises the question of whether financial stability and financial inclusion are, broadly speaking, substitutes or complements. In other words, does the move toward greater financial inclusion tend to increase or decrease financial stability? A number of studies have suggested both positive and negative ways in which financial inclusion could affect financial stability, but very few empirical studies have been made of the relationship. This partly reflects the scarcity and relative newness of data on financial inclusion. This study contributes to the literature on this subject by estimating the effects of various measures of financial inclusion (together with some control variables) on some measures of financial stability. We find some evidence that an increased share of lending to small and medium-sized enterprises (SMEs) aids financial stability, mainly by reducing the number of non-performing loans (NPLs) and lowering the probability of default by financial institutions.

The paper is organized as follows. Section 2 examines the definitions of financial stability and financial inclusion, and describes possible channels for interactions between the two. Section 3 describes the available data on financial stability and financial inclusion, including limitations imposed by the relative scarcity of the latter. Section 4 presents stylized facts of the relationship between financial stability and financial inclusion. Section 5 surveys the previous literature in this area. Section 6 describes the model used in this paper and the econometric results. Section 7 concludes the paper.

2. FINANCIAL STABILITY AND FINANCIAL INCLUSION

This section provides some definitions of financial stability and financial inclusion, and discusses the channels by which increases in financial inclusion might affect financial stability.

2.1 Financial Stability

The GFC has heightened awareness of financial stability and the need for a macroprudential dimension to financial surveillance and regulation. Nonetheless, there is no generally agreed definition of financial stability, because financial systems are complex with multiple dimensions, institutions, products, and markets. Indeed, it is perhaps easier to describe financial instability than stability. The European Central Bank website defines financial stability as:

"… a condition in which the financial system—comprising of financial intermediaries, markets and market infrastructures—is capable of withstanding shocks, thereby reducing the likelihood of disruptions in the financial intermediation process which are severe enough to significantly impair the allocation of savings to profitable investment opportunities." (ECB 2012)

Further, the ECB defines three particular conditions associated with financial stability:

1. The financial system should be able to efficiently and smoothly transfer resources from savers to investors.

2. Financial risks should be assessed and priced reasonably accurately and should also be relatively well managed.

3. The financial system should be in such a condition that it can comfortably absorb financial and real economic surprises and shocks. (ECB 2012)

Perhaps the third condition is the most important, because the inability to absorb shocks can lead to a downward spiral whereby they are propagated through the system and become self-reinforcing, leading to a general financial crisis and broadly disrupting the financial intermediation mechanism.

Schinasi (2004:8) proposes, at a more theoretical level:

"A financial system is in a range of stability whenever it is capable of facilitating (rather than impeding) the performance of an economy, and of dissipating financial imbalances that arise endogenously or as a result of significant adverse and unanticipated events."

Again, the emphasis is on resilience to shocks and a continued ability to effectively perform the basic function of mediating savings and investment (and consumption) in the real economy.

In a similar vein, threats to financial stability are considered to pose systemic risks. The Committee on Global Financial Stability (CGFS 2010:2) defines systemic risk as "a risk of disruption to financial services that is caused by an impairment of all or parts of the financial system and has the potential to have serious negative consequences for the real economy."

Borio (2011) classifies financial system risk into two dimensions—time and cross-sectional. The first involves dealing with how aggregate risk in the financial system evolves over time. This is known as the tendency toward procyclicality of the financial system as a result of positive feedback between the economy and the financial system, the so-called macro-financial channel. These feedback loops can emerge from a number of different channels, including the following:

(i) **Bank capital/lending**. A decline in bank capital forces it to cut back on lending, but in the aggregate this can negatively affect the economy, leading to further losses of capital, etc.

(ii) **Asset value/bank lending**. A decline in values of assets such as real estate used for collateral means banks can lend less, but reduced bank lending may cause asset values to fall further, etc.

(iii) **Exchange rate/balance sheet interactions (currency mismatches)**. A decline in the exchange rate leads to a deterioration of net assets if firms have borrowed in foreign currencies, but such deterioration can weaken economic growth, leading to further currency depreciation, etc.

(iv) **Liquidity—interbank and other money markets (maturity mismatches)**. Loss of confidence in the banking sector can lead to "runs" on deposits or other short-term financing, further decreasing confidence, etc.

(v) **Leverage**. Weak economic growth may lead to capital losses that increase leverage, leading to reduced bank lending and further economic weakness, etc.

(vi) **Interest rate/credit risk**. Rising interest rates may reduce the ability of firms to repay debt, leading to higher risk premiums reflected in higher interest rates, etc.

The cross-sectional dimension involves dealing with how risk is allocated within the financial system at a point in time as a result of common exposures and interlinkages in the financial system. These linkages may include:

(i)   common exposures to similar asset classes, such as mortgage loans or securitized financial products;

(ii) indirect exposures through counterparty risks;

(iii) ownership structure;

(iv) exposure to systemically important financial institutions (SIFIs);

(v)   infrastructure-based risks that may arise in payment or settlement systems, such as centralized clearing parties; and

(vi) the level of financial development.

2.2 Financial Inclusion

Financial inclusion is more straightforward to define and recognize. Lower-income countries tend to see a large portion of their population and firms not having access to formal financial services for a number of reasons, including: limited branch networks of banks and other financial institutions; limited availability of automatic teller machines (ATMs); the relatively high costs of servicing small deposits and loans; limitations on satisfactory personal identification; and limitations on collaterizable assets and credit information. Two definitions are:

"Financial inclusion aims at drawing the "unbanked" population into the formal financial system so that they have the opportunity to access financial services ranging from savings, payments, and transfers to credit and insurance." (Hannig and Jansen 2010)

"… the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low income groups at an affordable cost. It primarily represents access to a bank account backed by deposit insurance, access to affordable credit and the payments system." (Khan 2011)

Financial inclusion is most commonly thought of in terms of access to credit from a formal financial institution, but the concept has more dimensions. Formal accounts include both loans and deposits, and can be considered from the point of view of their frequency of use, mode of access, and the purposes of the accounts. There may also be alternatives to formal accounts, such as mobile money via mobile telephones. The main other financial service besides banking is insurance, especially for health and agriculture (Demirguc-Kunt and Klapper 2012).

2.3 Interactions between Financial Inclusion and Financial Stability

In this paper we focus on the train of causality from financial inclusion to financial stability. In other words, does an increase in financial inclusion tend to enhance or worsen financial stability? This is because scholars have suggested both positive and negative ways that rising financial inclusion could affect financial stability. Alternatively, one could ask if an increase in financial stability leads to an increase in financial inclusion. However, this direction seems less interesting, as it seems unlikely that an increase in financial stability would lead to a decrease in financial inclusion.

Khan (2011) suggests three main ways in which greater financial inclusion can contribute positively to financial stability. First, greater diversification of bank assets as a result of increased lending to smaller firms could reduce the overall riskiness of a bank's loan portfolio. This would both reduce the relative size of any single borrower in the overall portfolio and reduce its volatility. According to the scheme described in the previous section, this would reduce the "inter-connectedness" risks of the financial system. Second, increasing the number of small savers would increase both the size and stability of the deposit base, reducing banks' dependence on "non-core" financing, which tends to be more volatile during a crisis. This corresponds to a reduction of procyclicality risk. Third, greater financial inclusion could also contribute to a better transmission of monetary policy, also contributing to greater financial stability.

Hannig and Jansen (2010) argue that low-income groups are relatively immune to economic cycles, so that including them in the financial sector will tend to raise the stability of the deposit and loan bases. They note anecdotal evidence that suggests that financial institutions catering to the lower end tend to weather macro-crises well and help sustain local economic activity. Prasad (2010) also observes that lack of adequate access to credit for small and medium-size enterprises and small-scale entrepreneurs has adverse effects on overall employment growth since these enterprises tend to be much more labor intensive in their operations.

Khan (2011) also cites a number of ways in which increased financial inclusion could contribute negatively to financial stability. The most obvious example is if an attempt to expand the pool of borrowers results in a reduction in lending standards. This was a major contributor to the severity of the "sub-prime" crisis in the United States. Second, banks could increase their reputational risk if they outsource various functions such as credit assessment in order to reach smaller borrowers. Finally, if microfinance institutions (MFIs) are not properly regulated, an increase in lending by that group could dilute the overall effectiveness of regulation in the economy and increase financial system risks.

3. DATA ON FINANCIAL INCLUSION AND FINANCIAL STABILITY

The single most important cross-country database in this area is the World Bank's Global Financial Development database (GFDD). [1] It includes a large number of variables related to financial inclusion, together with macroeconomic variables and some variables related to financial development and financial stability. The database covers 164 economies, and has data series for as long as 52 years (since 1960), although the time series for the variables of greatest interest are much shorter. Examples of variables related to financial inclusion include the number of bank branches per 100,000 people, the number of bank accounts per 1,000 people, the percentage of firms with a line of credit to total firms, the percentage of adults either saving at or borrowing from a financial institution in the past year, and the percentage of adults with at least one account at a formal financial institution. The GFDD includes extensive survey data on financial access from the World Bank's Global Financial Inclusion Database (Global Findex), which provides statistics on financial inclusion for

---

[1] The GFDD database is available at:
http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTGLOBALFINREPORT/0,,contentMDK:23 269602~pagePK:64168182~piPK:64168060~theSitePK:8816097,00.html. A description of the database can be found in Chapter 1 of World Bank (2013) and also in Cihák et al. (2012).

148 economies, including indicators on how people save, borrow, make payments, and manage risk.[2]

In the GFDD, data on the number of bank branches are typically available for about 8 years (2004–2011), but many economies have some missing data. Data from the Global Findex database, however, are available only for 2011, including the percent of adults with at least one account (or loan) at a formal financial institution, which is arguably the single best measure of inclusion, at least for households. This means that this variable can be used only in cross-section analysis, not panel data, which severely limits the number of potential observations that can be used. The situation is only marginally better for data on the percentage of firms having a line of credit, for either total firms or SMEs. In this case, economies for which data are available generally show one or two observations, but again, many economies have no values. Thus, data availability for financial inclusion variables is a major problem that confronts researchers in this area.

Examples of data on financial stability in the GFDD include bank Z-scores (an indicator of the probability of default of the country's banking system), the ratio of non-performing loans (NPLs), the ratio of bank credit to bank deposits, the ratio of bank regulatory capital to risk-weighted assets, and the ratio of bank liquid assets to deposits and short-term funding. Data on these items typically are available for at least 10 years, and in some cases considerably longer, although, again, there are many gaps in country coverage. Therefore scarcity of data related to financial stability is less of an issue than for data related to financial inclusion.

The International Monetary Fund's (IMF) Financial Access Survey (FAS) provides additional useful data, including inclusion data for non-bank financial institutions such as credit unions, insurance companies, and MFIs, as well as the availability of ATMs and the amount of commercial bank loans and deposits to SMEs.[3] Since it also includes total commercial loans and deposits, the data can be used to calculate the share of SMEs in total commercial bank loans and deposits, an important measure of inclusion. The database covers 193 economies and has time series for up to 9 years (2004–2012), although again there are many missing values, so the effective size of the database is much smaller.

Additional measures of financial stability include the identification of periods of financial crises. Reinhart and Rogoff (2009, 2010) compiled an exhaustive global list of periods of financial crises of various types dating back to 1800. Another database by Laeven and Valencia (2008) identifies 124 systemic banking crises over the period 1970–2007. However, Laeven and Valencia (2008) only identify the year associated with the onset of a banking crisis, while Reinhart and Rogoff (2009) identify the entire period of a crisis, so the latter database is more useful for quantifying the severity of a crisis.

4. STYLIZED FACTS OF FINANCIAL STABILITY AND FINANCIAL INCLUSION

This section provides some simple comparisons of the relationship between measures of financial inclusion and financial stability obtained from the databases described in

---

[2] The Global Findex database is available at:
http://databank.worldbank.org/data/views/variableselection/selectvariables.aspx?source=global-findex-(global-financial-inclusion-database). Demirguc-Kunt and Klapper (2012) provides a detailed discussion of how the data were obtained.

[3] The IMF FAS database can be accessed at http://fas.imf.org/.

the previous section. The first point is that financial inclusion increases along with per capita GDP (Figure 1). The chart indicates that financial access tends to be less than 20% when per capita income is below $1,000, and exceeds 80% when per capita income exceeds $30,000.

Figure 1: Share of Adults with an Account at One or More Formal Financial Institution versus per Capita GDP
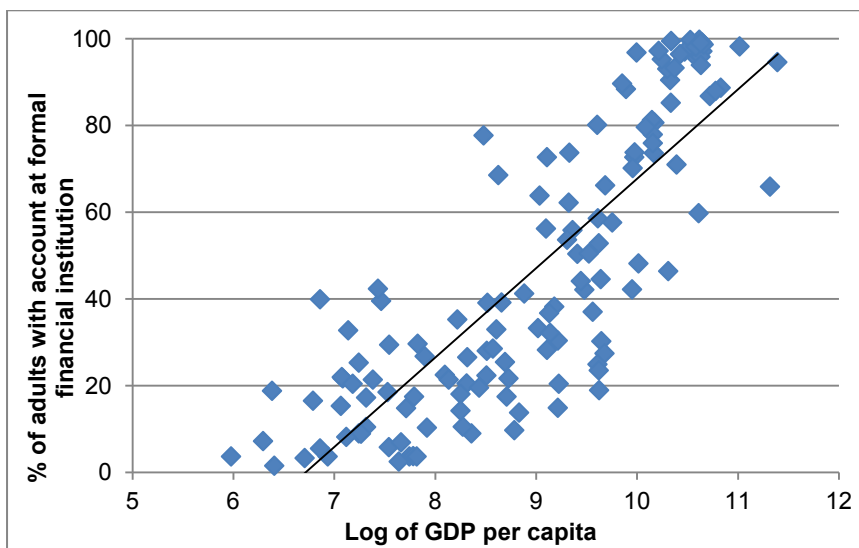
GDP = gross domestic product.

Source: World Bank Global Financial Inclusion Database (2012), 2011 data.

However, there is little correlation between adult access to formal financial accounts and financial stability measures. For example, Figure 2 shows that the plot of NPLs versus the share of adults with an account at at least one formal financial institution is virtually flat. The chart for banks' Z-scores versus adult account access looks very similar.

Figure 2: Share of Adults with an Account at One or More Formal Financial Institution versus Bank NPLs
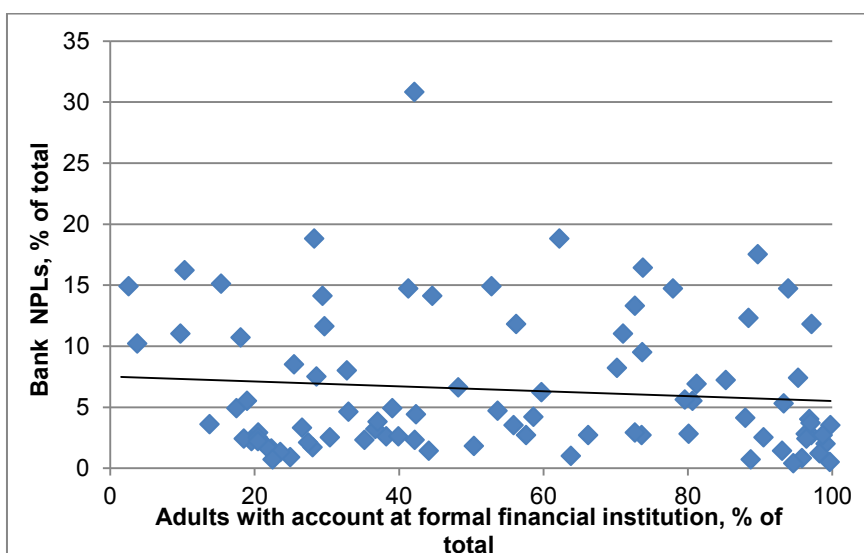
GDP = gross domestic product, NPL = non-performing loan.

Source: World Bank Global Financial Inclusion Database (2012), 2011 data.

Results are somewhat more promising when looking at firms' access to financing. Figure 3 shows that there is some correlation between the share of SMEs obtaining finance and bank NPLs. The downward sloping line implies that increasing access of SMEs to finance tends to reduce the share of bank NPLs, which is in line with the positive factor identified in Section 3. However, the number of data points is small and the degree of dispersion is fairly wide, so these results have to be taken with caution.

Figure 3: Bank NPLs and the Share of SMEs in Total Commercial Bank Loans
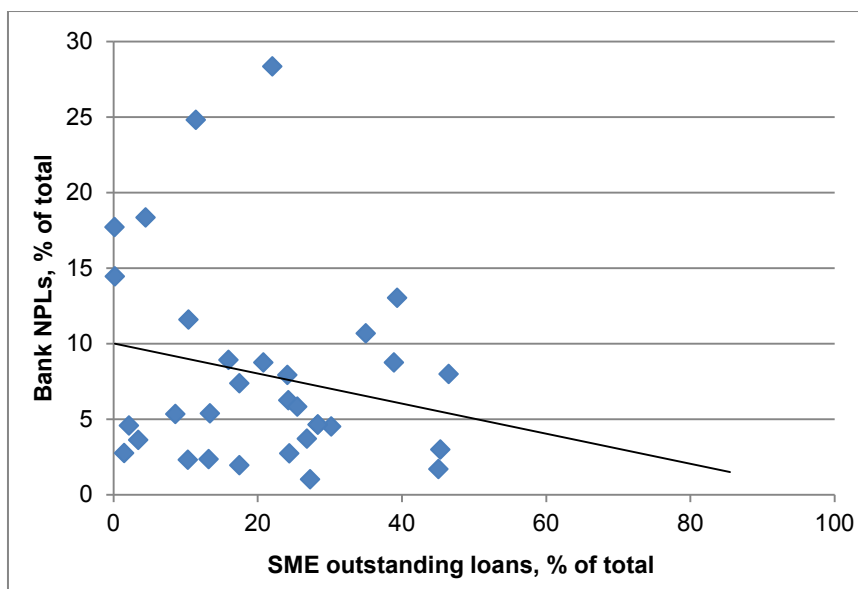
NPL = non-performing loan, SME = small and medium-sized enterprise.

Source: IMF Global Financial Access Survey (2013), 2001–2011 average.

In summary, the link between per capita income and financial inclusion is fairly clear, but the link between financial inclusion and financial stability is less clear. Section 6 presents our analytical model and econometric results for some measures of this relationship.

5. SURVEY OF EARLIER STUDIES

As mentioned above, empirical work in this area is scarce. In a study of Chilean banks, Adasme, Majnoni, and Uribe (2006) found that the NPLs of small firms have quasi-normal loss distributions, while those of large firms have fat-tailed distributions. They note that the quasi-normality of small loans' loss curves means that the occurrence of large and infrequent losses is a major concern, and therefore lending processes to this class can be greatly simplified. This implies that the systemic risk of the former group is less than that of the latter, so increased loans to SMEs should reduce the overall riskiness of banks' lending portfolios, i.e., it should be positive for financial stability, in line with our preliminary finding in the previous section.

Han and Melecky (2013) analyzed the World Bank data described above. They hypothesized that a greater share of people with bank deposits would increase banks' shares of stable funding (deposits), and tend to reduce volatility of total bank deposits during economic downturns, thereby contributing to financial stability by reducing the procyclical effect of economic downturns on bank liquidity. Their dependent variable was the maximum drop in bank deposit growth between 2006 and 2010. For independent variables, they used two different measures of financial inclusion—an

index of Honohan (2008) measuring access to bank deposits before the 2008 crisis period and the Demirguc-Kunt and Klapper (2012) measure of the share of people that were using banking deposits in 2011, cited previously, plus a number of control variables. They found that a 10% increase in the share of people that have access to bank deposits can reduce the deposit growth drops (or deposit withdrawal rates) by 3–8 percentage points, which supports the case that financial inclusion is positive for financial stability.

6. MODEL, DATA, AND RESULTS

To formally verify the link between financial stability and financial inclusion, we estimate the following dynamic-panel equation:

$$finstab_{i,t} = \alpha(fininclusion_{i,t}) + \beta X_{i,t} + \varepsilon_{i,t}, \tag{1}$$

where $finstab_{i,t}$ is the measure of financial stability; $fininclusion_{i,t}$ is the measure of financial inclusion; X is a vector of controls (logarithm of GDP per capita [$lgdp_{i,t}$], private credit by deposit money banks and other financial institutions to GDP [$cgdp_{i,t}$], liquid assets to deposits and short-term funding [$liq_{i,t}$], non-FDI capital flow to GDP [$nfdi_{i,t}$] and financial openness [$opns_{i,t}$]); β are a set of nuisance parameters; $\varepsilon_{i,t}$ is an error term; $i = 1, \ldots, N$ represents the country; and $t = 1, \ldots, T$ represents time. Finally, α is the coefficient of interest to us, which measures the effect of financial inclusion on financial stability.

To estimate equation (1), this study employs panel data for the period 2005–2011, the period for which data on the two measures of financial inclusion employed in this section are made available from the World Bank's GFDD and the IMF's FAS. The two measures of financial inclusion used in the analysis are SME outstanding loans as a proportion of total outstanding loans of commercial banks ($smel_{i,t}$), and the number of SME borrowers as a proportion of the total number of borrowers from commercial banks ($semb_{i,t}$). We also used two measures of financial stability in the regressions, namely, bank Z-score ($bzs_{i,t}$) (defined as the sum of capital to assets and return on assets divided by the standard deviation of return on assets) and bank NPLs as a proportion of gross loans by banks ($npl_{i,t}$). Both measures of financial stability were also obtained from the GFDD. The data on GDP per capita and the capital flow data used to generate the ratio of non-FDI capital flow to GDP were obtained from the World Bank's World Development Indicators database. The data used to generate the financial openness variable were obtained from the Lane and Milesi-Ferretti (2007) foreign assets and foreign liabilities database. Finally, the ratio of private credit by deposit money banks and other financial institutions to GDP and the ratio of liquid assets to deposits and short-term funding were obtained from the GFDD.

Tables 1 and 2 report the descriptive statistics and the correlations, respectively, of the variables used in the empirical analysis that follows. One important caveat from Table 1 is that, while most of the variables have at least 1,000 available observations, the number of available observations for the two measures of financial inclusion is quite problematic, with $smel_{i,t}$ and $semb_{i,t}$ having only 266 and 161 available observations, respectively. The correlations in Table 2 are quite low, particularly those among the right-hand side variables, which suggests that multicollinearity is not likely to be an issue in our empirical analysis.

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std Dev	Min	Max
bzs	1888	15.08	9.98	-6.17	70.51
npl	1034	6.67	7.20	0.10	74.10
smel	266	0.27	0.20	0.00	0.85
semb	161	0.17	0.27	0.00	0.96
lgdp	1975	8.72	1.30	5.47	11.39
cgdp	1820	49.88	50.07	0.55	434.09
liq	1809	38.75	20.71	0.32	146.23
nfdi	1141	6.37	27.28	-137.92	314.08
opns	1975	381.60	1612.61	27.20	24143.10

Source: Authors' calculations.

Table 2: Correlations of the Variables

Variable	*bzs*	*npl*	*smel*	*semb*	*lgdp*	*cgdp*	*liq*	*nfdi*	*opns*
bzs	1								
npl	0.2846	1							
smel	0.042	0.6784	1						
semb	-0.0807	0.1081	-0.1113	1					
lgdp	0.0923	-0.1351	-0.0708	0.0193	1				
cgdp	-0.375	0.2112	0.3305	0.1689	0.3389	1			
liq	0.4688	-0.0626	0.1827	-0.1593	0.1707	-0.207	1		
nfdi	-0.1117	-0.1634	-0.3901	-0.1541	-0.1867	0.2191	-0.2629	1	
opns	-0.1793	-0.2067	-0.0934	-0.1408	0.7219	0.4878	0.1164	0.0994	1

Source: Authors' calculations.

We estimate equation (1) above using the system-GMM dynamic panel estimator of Blundell and Bond (1998). System-GMM is based on a system composed of first-differences instrumented on lagged levels, and of levels instrumented on lagged first-differences. In addition to providing a rigorous remedy for endogeneity bias, dynamic panel GMM estimation holds two further attractions. First, it is more robust to measurement error than cross-sectional regressions. Second, dynamic panel GMM remains consistent even if the explanatory variables are endogenous in the sense that $E[X_t \varepsilon_s] \neq 0$ for $s \leq t$, if the instrumental variables are sufficiently lagged.

We employ the two-step estimator, and correct the standard errors of the two-step estimator for small-sample bias by applying the correction suggested by Windmeijier (2005). The maximum number of lags of the instrument sets is constrained in some specifications to avoid over-fitting. We report Hansen tests to test for over-identifying restrictions (Blundell and Bond 1998). Table 3 presents our estimation results.

Table 3: Dynamic Panel Estimation Results, 2005–2011

	(1) Bank Z-score ($bzs_{i,t}$)	(2) Bank Z-score ($bzs_{i,t}$)	(3) Bank NPLs ($npl_{i,t}$)	(4) Bank NPLs ($npl_{i,t}$)
$bzs_{i,t-1}$	-0.96 (0.04)***	0.61 (0.20)***		
$npl_{i,t-1}$			0.17 (0.04)***	0.92 (0.11)***
$smel_{i,t}$	24.59 (6.06)***		-5.70 (3.19)*	
$smeb_{i,t}$		92.07 (44.58)**		-41.35 (19.38)**
$lgdp_{i,t}$	2.07 (0.93)**	13.79 (5.81)**	-11.57 (1.64)***	-0.58 (5.06)
$cgdp_{i,t}$	-0.09 (0.4)**	-0.18 (0.05)***	0.21 (0.05)***	0.01 (0.07)
$liq_{i,t}$	0.13 (0.05)**	0.28 (0.10)**	0.20 (0.05)***	-0.12 (0.12)
$nfdi_{i,t}$	-0.01 (0.06)	-0.02 (0.06)	-0.27 (0.05)***	-0.01 (0.14)
$opns_{i,t}$	0.004 (0.002)*	0.002 (0.08)	-0.002 (0.002)	-0.003 (0.005)
No. of observations	168	89	122	65
No. instruments	32	49	39	18
AB test AR2	[0.82]	[0.86]	[0.14]	[0.13]
Hansen J test	[0.50]	[1.00]	[0.62]	[0.61]

Notes: All estimations include unreported intercept and time dummies. Estimated system-GMM are based on two-step standard errors based on Windmeijer (2005) finite sample correction. Standard errors are reported in parentheses. The values reported in brackets are p-values. "AB test AR2": p-value of the Arellano–Bond tests that average autocovariance in residuals of order 2 is 0. The Hansen *J* test *p*-values are for the test of over-identifying restrictions, which are asymptotically distributed as χ^2 under the null of instrument validity.

*, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Source: Authors' calculations.

Referring to column (1), our first measure of financial inclusion ($smel_{i,t}$) enters positively and significantly, that is, greater lending to SMEs leads to a lower probability of default by financial institutions ($bzs_{i,t}$). In column (3), we obtain a consistent finding, in which $smel_{i,t}$ enters negatively, that is, greater lending to SMEs leads to lower bank NPLs ($npl_{i,t}$), though this result is only weakly significant at the 10% significance level. The results on the effect of financial inclusion on financial stability using our second measure of financial inclusion ($semb_{i,t}$) are reported in columns (2) and (4) of Table 3. In column (2), we find $semb_{i,t}$ to be positive and significant, that is, a greater number of SME borrowers leads to a lower probability of default by financial institutions. In column (4), we find $semb_{i,t}$ to be negative and significant, that is, a greater number of SME borrowers leads to lower bank NPLs.

In terms of our conditioning variables, we obtain the following results. In three (columns [1]–[3]) of our four regressions, income as measured by $lgdp_{i,t}$ significantly affects financial stability, that is, high-income countries are less prone to financial instability. In line with the previous literature (e.g., Drehmann et al [2011]; Gourinchas and Obstfeld [2012]; Drehmann and Juselius [2013]), we also find in three (columns [1]–[3]) of our four regressions that higher private sector credit relative to GDP ($cgdp_{i,t}$) leads to a higher likelihood of financial instability. Following on from Han and Melecky (2013), in two (columns [1] and [2]) of our four regressions, we find that greater liquidity by banks ($liq_{i,t}$) leads to greater financial stability via a lower probability of default by financial institutions. At the same time, though, we also obtain evidence that greater liquidity by banks ($liq_{i,t}$) leads to higher bank NPLs (column 3). In line with the previous result obtained by Calderon and Serven (2011), in three of the four GMM regressions, we find that the ratio of non-FDI capital flows to GDP ($nfdi_{i,t}$) does not have a significant effect on financial stability, whereas, in one of the regressions we find a counter-intuitive result that short-term capital flows lead to lower bank NPLs. Finally, in line with the result obtained by Frankel and Saravelos (2012), we find in only one (though it was weakly significant) of the four regressions that financial openness ($opns_{i,t}$) can lead to greater financial stability.

The standard diagnostic tests of the four regressions presented in Table 3 suggest no misspecification problems, with the AR2 test failing to reject the null hypothesis of no second-order residual autocorrelation, while the Hansen test for over-identifying restrictions also fails to reject the null hypothesis that the instruments are valid.[4]

7. CONCLUSIONS

This paper has examined the relationship between financial stability and financial inclusion to examine whether they are mutually reinforcing, or whether there are substantial trade-offs between them. The literature suggests that greater financial inclusion could be either positive or negative for financial stability. Positive effects include: diversification of bank assets, thereby reducing their riskiness; increased stability of their deposit base, reducing liquidity risks; and improved transmission of monetary policy. Negative effects include the erosion of credit standards (e.g., sub-prime), bank reputational risk, and inadequate regulation of MFIs.

Financial inclusion data are problematic because of their short time span and limited availability. Some variables only have 1 year of observation, and others only 2. However, working with panel data, in spite of the relatively small size, we are able to control for the more serious issue of endogeneity through the use of the system-GMM dynamic panel estimator.

Previous studies tended to find positive effects of greater financial inclusion on financial stability, i.e., that the two are complementary rather than there being a trade-off between them. Our estimation work also supports this. Specifically, we find evidence that an increased share of lending to SMEs in total bank lending aids financial stability, mainly by a reduction of NPLs and a lower probability of default by financial institutions. This suggests that policy measures to increase financial inclusion, at least by SMEs, would have the side benefit of contributing to financial stability as well. We also find that higher per capita GDP tends to increase financial stability, while a higher ratio of

---

[4] Though the p-value of 1.0 of the Hansen test in column (2) suggests over-fitting, this is probably due to the relatively small sample size in our regressions.

private bank credit to GDP reduces financial stability. These results are consistent for both measures of financial stability used in the study.

Future work could consider the effects of measures of household inclusion, such as the percentage of adults with deposits or loans at a formal financial institution, on financial stability measures. We could also examine other measures of financial stability, such as the volatility of GDP growth, bank loans, bank deposits, or the presence of financial crises.

REFERENCES

Adasme, O., G. Majnoni, and M. Uribe. 2006. Access and Risk: Friends or Foes? Lessons from Chile. World Bank Policy Research Working Paper 4003. Washington, DC: World Bank.

Blundell, R., and S. Bond. 1998. Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics* 87(1): 115–143.

Borio, C. 2011. Implementing a Macroprudential Framework: Blending Boldness and Realism. *Capitalism and Society* 6(1): Article 1.

Calderon, C. and Serven, L. 2011. Macro-Prudential over the Cycle in Latin America. Mimeo. Available at http://ww.webmeets.com/files/papers/LACEA-LAMES/2012/456/CC-LS%20LAC%20Macroprudential%202012.pdf

Cihák, M., A. Demirgüç-Kunt, E. Feyen, and R. Levine. 2012. Benchmarking Financial Systems around the World. Policy Research Working Paper 6175. Washington, DC: World Bank.

Committee on the Global Financial System. 2010. Macroprudential Instruments and Frameworks: A Stocktaking of Issues and Experiences. CGFS Papers No. 38. Basel: Bank for International Settlements.

Demirguc-Kunt, A., and L. Klapper. 2012. Measuring Financial Inclusion: The Global Findex Database. Development Research Group Policy Research Working Paper No. 6025. Washington, DC : World Bank.

Drehmann, M., C. Borio, and K. Tsatsaronis. 2011. Anchoring Countercyclical Capital buffers: The Role of Credit Aggregates. *International Journal of Central Banking* December: 189–240.

Drehmann, M., and M. Juselius. 2013. Evaluating Early Warning Indicators of Banking Crises: Satisfying Policy Requirements. BIS Working Papers No. 421. Basel: Bank for International Settlements.

European Central Bank. 2012. Financial Stability Review. What is Financial Stability? Frankfurt: European Central Bank. www.ecb.int/pub/fsr/html/index.en.html (accessed 22 March 2012).

Frankel, J., and G. Saravelos. 2012. Can Leading Indicators Assess Country Vulnerability? Evidence from the 2008–09 Global Financial Crisis. *Journal of International Economics* 87(2): 216–231.

Gourinchas, P. O., and M. Obstfeld. 2012. Stories of the Twentieth Century for the Twenty-First. *American Economic Journal: Macroeconomics* 4(1): 226–265.

Han, R., and M. Melecky. 2013. Financial Inclusion for Financial Stability: Access to Bank Deposits and the Growth of Deposits in the Global Financial Crisis. World Bank Policy Research Working Paper No. 6577. Washington, DC: World Bank.

Hannig, A., and S. Jansen. 2010. Financial Inclusion and Financial Stability: Current Policy Issues. ADBI Working Paper 259. Tokyo: Asian Development Bank Institute. Available: http://www.adbi.org/working-paper/2010/12/21/4272.financial.inclusion.stability.policy.issues/

Honohan, P. 2008. Cross-Country Variation in Household Access to Financial Services. *Journal of Banking and Finance* 32(11): 2493–2500.

Khan, H. R. 2011. Financial Inclusion and Financial Stability: Are They Two Sides of the Same Coin? Address by Shri H. R. Khan, Deputy Governor of the Reserve Bank of India, at BANCON 2011, organized by the Indian Bankers Association and Indian Overseas Bank, Chennai, India, 4 November.

Laeven, L., and F. Valencia. 2008. Systemic Banking Crises: A New Database. IMF Working Papers No. WP/08/224. Washington, DC: International Monetary Fund.

Lane, P., and G. Milesi-Ferretti. 2007. The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004. *Journal of International Economics* 73(2): 223–250.

Prasad, E. 2010. Financial Sector Regulation and Reforms in Emerging Markets: An Overview. NBER Working Paper 16428. Cambridge, MA: National Bureau of Economic Research.

Reinhart, C., and K. Rogoff. 2009. *This Time is Different: Eight Centuries of Financial Folly*. Princeton, New Jersey, and Oxford, UK: Princeton University Press.

———. 2010. From Financial Crash to Debt Crisis. NBER Working Paper No. 15795. Cambridge, MA: National Bureau of Economic Research.

Schinasi, G. 2004. Defining Financial Stability. IMF Working Paper WP/04/187. Washington, DC: International Monetary Fund.

Windmeijer, F. 2005. A Finite Sample Correction for the Variance of Linear Efficient Two-Step GMM Estimators. *Journal of Econometrics* 126(1): 25-51.

World Bank. 2013. *Global Financial Development Report*. Washington, DC: World Bank.

———. Various years. *World Development Indicators*. Washington, DC: World Bank.