More inclusive, more stable?

The financial inclusion - stability nexus in the global financial crisis



Abstract

Recently, it has been argued that financial inclusion contributes to financial stability. This paper assesses the relationship between inclusion and stability in the global financial crisis based on a sample of 75 countries. We find in most specifications that a higher level of financial inclusion has a moderating effect on the credit crunch in the crisis. However, financial inclusion itself is subject to a boom-bust cycle as stronger borrower growth in the pre-crisis period is followed by a deeper drop in borrower growth in the crisis. Finally, rising levels of financial inclusion before the crisis do not enhance stability if the pre-crisis period is characterized by rapid credit growth. Overall, our results provide only limited support for the hypothesis that financial inclusion contributes to financial stability.

JEL classification: G01, G21, O16

Key words: Financial inclusion, financial stability, financial crisis

1. Introduction

It may be regarded as one of the greatest paradoxes in modern financial history: a few years after the global financial system had been on the brink of collapse, only saved by massive interventions of governments and central banks (Laeven and Valencia 2012), global leaders have called for action to expand the number of participants in this very system (G20 2010). Raising financial inclusion, i.e. the number of individuals and firms using formal financial sector services (Demirgüc-Kunt 2014) has become a key objective in the post-2015 Development Agenda (GPFI 2016).

The paradox can be solved by arguing that financial inclusion has substantial benefits for agents and the economy as a whole. If these benefits outweigh the costs associated with instability, financial inclusion is a valid policy approach. However, it is also argued that under "welldesigned financial policies" (Dema 2015) inclusion will have a direct positive impact on financial stability. Thus, vigorously pursuing the financial inclusion agenda might not involve trade-offs but create a win-win situation: it provides benefits in terms of growth and development but also enhances the stability of the financial system (GPFI 2012, Rahman 2014).

This paper contributes to the emerging literature on the financial inclusion-stability nexus by testing whether and to what extent financial inclusion has mitigated the credit crunch that followed the global financial crisis. In doing so we take into account that financial instability on a systemic level is strongly associated with credit booms in the pre-crisis period (Mendoza and Terrones 2008, Schularick and Taylor 2012, Feldkircher 2014).¹ We measure the level of financial inclusion by the number of borrowers from commercial banks, expressed as a

¹ The destabilizing impact of rapid credit growth has also been observed for individual institutions; see e.g. Foos et al. (2010), Vazquez and Federico (2015).

percentage of the adult population. Progress in financial inclusion is depicted by the borrower growth rate. Our main indicator of financial instability is the severity of the credit crunch following the Lehman collapse, i.e. the difference between real credit growth in the last pre-crisis year, 2007, and real credit growth during the crisis, in 2009. We run OLS regressions based on a sample with a maximum size of 75 countries. Concretely, we test whether a higher level of financial inclusion and/or stronger progress in financial inclusion in the pre-crisis period had a moderating impact on the 2008/2009 credit crunch, controlling for the size of pre-crisis credit boom and a range of banking, macroeconomic and structural indicators of the respective economies. In addition, we analyze whether financial inclusion itself is subject to a boom-bust pattern, i.e. whether stronger borrower growth in the pre-crisis period is associated with a deeper fall in borrower growth during the crisis.

We find evidence that a higher pre-crisis level of financial inclusion had a moderating effect on the credit bust in 2009 given the size of the pre-crisis boom. Thus, the destabilizing impact of rapid credit growth was mitigated by a higher level of financial inclusion. However, this result is not robust to changes in methodology, as it does not hold when running an instrumental variable regression. We also find that countries with a more rapid rising level of financial inclusion in the pre-crisis years did not earn an inclusion dividend in the crisis as it had no moderating impact on the depth of the credit crunch in 2008/2009. This indicates that there is no room for complacency when credit booms are accompanied by rising levels of financial inclusion. Finally, there is evidence suggesting that financial inclusion itself is subject to boom-bust phenomena. Countries that recorded strong progress in financial inclusion in the pre-crisis years suffered a larger setback in the crisis years. Overall, our analysis provides only limited support for the view that banking sectors serving more borrowers are less prone to financial instability. By contrast, they clearly indicate that the financial stability risks of credit booms do not decline when credit booms reflect rapidly rising levels of inclusion.

Our results are subject to several caveats. First, the analysis is based on a limited country sample, as the compilation of data on financial inclusion started only in the early 2000s (Demirgüc-Kunt 2014). Second, the result that a higher level of inclusion dampens credit boom-bust cycles is largely based on cross-country OLS regressions. This implies that the result is subject to endogeneity and omitted variable concerns.² For example, credit growth in the pre-crisis period might at least partly be driven by progress in financial inclusion. In addition, the stability-enhancing effect of a higher level of financial inclusion might reflect a stronger political will by governments and central banks to address financial instability, given the high degree of inclusion. Thus, we doubt that financial inclusion policies can create the win-win situation some of its advocates have been referring to: providing benefits in terms of growth and development and fostering the stability of the financial system, in particular in periods of rapid credit growth.

2. Related literature

Financial inclusion ranks high on the global development agenda. Various fora and institutions, such as the Global Partnership of Financial Inclusion (GPFI), the Consultative Group for the Assistance of the Poor (CGAP) or the Alliance for Financial Inclusion (AFI), argue that extending "access to finance is the first building block for people to build a better life." (World Bank 2016). This conclusion is based on evidence demonstrating that the poor make substantial

 $^{^{2}}$ These concerns are not uncommon when exploring in more detail the impact of financial variables on growth or stability (Beck et al 2014).

use of finance in managing their daily lives (Collins et al. 2009). However, these financial services are largely provided by an unreliable and expensive informal financial sector. Hence, replacing informal with formal financial sector services is likely to raise income and welfare of the poor.³ This makes inclusive finance an area where the benefits of finance for society are still beyond doubt (Zingales 2015).⁴

More recently, the policy case for financial inclusion has also been made with the argument that a higher level of financial inclusion might deliver financial stability benefits (Hannig and Jansen 2010, GFPI 2012). Diversification effects with regard to loans and deposits are identified as the main transmission channel that lead from a higher level of financial inclusion to a more stable financial system (Cull et al. 2012). The theoretical basis for stability-enhancing diversification effects on the asset side is strong, as a diversified loan portfolio provides a key argument in explaining the *raison d'etre* of financial intermediation (Diamond 1984).⁵ There is some empirical evidence for stability enhancing diversification effects related to financial inclusion. For example, Adasme et al. (2006) find for Chile that the quality of bank loan portfolios composed of large loans. Morgan and Portines (2014) show that countries with a higher level of financial inclusion, measured as the share of SME loans in the volume of outstanding loans issued by

³ Having said this, theory and empirical evidence suggest that the interplay between the formal and the informal financial sector is not only characterized by substitution but also by complementarity (see e.g. Guérin et al. 2012, Madestam 2014).

⁴ See, however, Guérin et al. (2013), indicating that switching from informal to formal finance might not always be client welfare enhancing. In a similar vein, the long-held consensus view on a positive relationship between finance and growth has recently been qualified, as new empirical evidence suggests that the relationship between finance and growth might be non-linear and/or subject to the concrete form of finance, i.e. household or business finance (Arcand et al. 2012, Beck, R. et al. 2014, Beck, T. et al. 2014, Beck 2015, Cecchetti and Kharroubi 2012, Manganelli and Popov 2013, Rioja and Valev 2004, Rousseau and Wachtel 2011, Sassi and Gasmi 2014).

⁵ See, however, Battiston et al (2012) for theoretical arguments suggesting that credit risk diversification might not always reduce but could even increase financial stability risks. At least with regard to international diversification of banks the empirical evidence on the diversification-stability nexus is mixed (Gulamhussen et al. 2014).

commercial banks, record a higher degree of banking sector stability, with the Z-score and the non-performing loan ratio serving as financial stability indicators. However, this positive message is somewhat qualified by Sahay et al (2015) as they find that the positive impact of a higher level of financial inclusion on financial stability might be non-linear and moderated by the quality of banking supervision. Concretely, countries with a low supervisory quality do not reap the stability benefits of higher levels of financial inclusion, as for these countries more inclusion is associated with lower Z-scores, i.e. more instable banks.

On the deposit side a higher level of financial inclusion might enhance financial stability by reducing the need for banks to tap wholesale markets for funding. These markets proved to be rather instable in the global financial crisis which was triggered by a withdrawal of wholesale deposits, i.e. a run on banks by banks (Huang and Ratnovski 2011, Craig and Dinger 2013, Gertler, Kiyotaki and Prestipino 2015, Baselga-Pascual et al. 2015). Against this background, it has been argued that broadening the retail deposit base by raising the level of financial inclusion will enhance financial stability (Khan 2011). The argument is reinforced by evidence indicating that the poor show a more stable deposit behavior than richer clients (Abakaeva and Glisovic 2009). However, it remains unclear whether the stability advantage of retail deposits in the global financial crisis reflects an inherently less cyclical behavior among small and poor retail deposit market has been a result of deposit insurance and lender of last resort activities by central banks (Anginer et al. 2014, Demirgüç-Kunt et al. 2015a).⁶ Moreover, the run on *Northern Rock* demonstrates that the stability of retail deposits can be undermined by the instability of

⁶ Gorton (2008) argues that the 2007 panic in US wholesale markets can be explained by the same arguments that explain the 1907 panic in US retail markets. At that time neither deposit insurance nor a lender of last resort existed.

wholesale funding (Shin 2009).⁷ Thus, foregoing or limiting wholesale funding might represent a more promising avenue in addressing the stability risks of wholesale funding than a broadening of the depositor base via financial inclusion efforts. This also holds for institutions heavily engaged in financial inclusion activities, such as microfinance institutions (MFIs) as they often rely to a significant extent on wholesale funding "exposing both lenders and borrowers in the event of market-wide deleveraging." (Basel Committee on Banking Supervision (2015, 26).

Empirically, the stability enhancing view of financial inclusion via the deposit side receives support from Han and Melecky (2013). Based on a sample of 95 countries they provide cross-country evidence showing that the maximum size of deposit withdrawals over the period 2007 – 2010, the proxy for financial instability, is significantly negatively related to the level of financial inclusion.

However, theory also suggests that the process of financial inclusion, i.e. reaching a higher level of financial inclusion, might be prone to financial instability. One argument supporting this view refers to a decline in lending standards when banks engage in credit activities related to new, unknown as supposed to existing, known borrowers (Dell'Ariccia and Marquez 2006). Confronted with a large pool of unknown borrowers banks might reduce costly screening activities because the borrower pool includes fewer applicants that were rejected at other banks, thus making adverse selection problems less severe. After the former unknown borrowers have become known customers, screening activities because more stable. Accordingly, the process of

⁷ In Germany the Chancellor and the Minister of Finance issued a blanket guarantee for all deposits held at German banks after being confronted with the possible collapse of *Hypo Real Estate*, a bank which almost exclusively relied on wholesale funding, and signs of retail deposit withdrawals two weeks after the default of *Lehman Brothers* (Dietrich and Vollmer 2012, Engineer et al. 2013).

making the banking sector more inclusive might raise financial stability risks, while banking sectors which have achieved a higher level of inclusion should be more stable.

Alternatively, the financial stability implications of a rapid rise in financial inclusion can be compared to those of financial innovations (Beck et al. 2015). While bank loans and deposits do not represent new products, a rapid rise in financial inclusion indicates that new service providers such as microfinance banks or mobile money operators as well as new clients have entered the market. These new players might undervalue the risks associated with established products "because of the lack of data on the default and performance records" (Boz and Mendoza 2014) and lack of prior financial experience or financial literacy (Klapper et al. 2013).⁸

The years preceding the global financial crisis provide some anecdotal evidence supporting concerns that a rapid rise in financial inclusion might lead to financial instability. In Eastern Europe the episode involved consumer and business credit (Arcalean et al. 2007, Klapper et al. 2013), in the US the parallel growth in inclusion and credit was related to subprime mortgage financing (Greenspan 1997, Gramlich 2007, Reinhart and Rogoff 2008). Moreover, several crises in microfinance markets such as Bosnia and Herzegovina, Morocco and Nicaragua can be linked to fast borrower growth in the pre-crises years (Chen et al. 2010).⁹ This indicates that "promoting credit for all at all cost can lead to greater financial and economic instability" (Demirgüc-Kunt 2014, 349).

⁸ Mobile money is an example where financial inclusion and financial innovation go hand in hand (Mehrotra and Yetman 2015) raising questions about the proper response of supervisors and regulators and triggering a debate about financial stability implications (Dittus and Klein 2011, Khiaonarong, T. 2014, GPFI 2016)

⁹ Financial history also provides several case studies when a rapid rise in financial inclusion contributed to financial instability; see e.g. Kranton and Swamy (1999).

Finally, financial instability might undermine the progress in inclusion achieved in the pre-crisis period.¹⁰ In the three countries that recently experienced a crisis in the microfinance sector, the number of borrowers declined substantially in the crisis (Figure 1). Thus, financial inclusion might be subject to similar patterns of booms and busts which the literature has firmly identified for credit.

- Insert Figure 1 about here -

Overall, the review of the literature leads to three hypotheses on the financial inclusion – stability nexus, namely:

- H1: Financial inclusion follows similar boom-bust cycles as financial development.
- H2: A higher level of financial inclusion enhances financial stability.
- H3a: A stronger rise in financial inclusion, depicted by the number of borrowers, is associated with a higher degree of financial instability.
- H3b: A stronger rise in financial inclusion is associated with a higher degree of financial instability.

¹⁰ Similar evidence has been found for the financial development – stability nexus, as episodes of financial instability "leave a substantial and lasting imprint on financial development." (de la Torre et al. 2013, 14).

We test these hypotheses largely following the methodology employed by Han and Melecky (2013). However, as we define financial instability by the fall in credit growth after an extended period of strong credit growth, our focus is on credit volatility rather than the size of deposit withdrawals. There are three motivations for this approach. First, there is strong evidence for the proposition that credit booms predict financial instability on a systemic level (Mendoza and Terrones 2008, Schularick and Taylor 2012). Booming credit coupled with weakening fundamentals leads to instability and turmoil as uninformed depositors and funders of financial institutions become concerned about the solvency prospects of banks. Thus, they play safe and withdraw (Bagehot 1873, Calomiris and Gorton 1991, Calomiris and Kahn 1991, Shin 2009). The global financial crisis serves as a reminder that this can happen in a way largely unrelated to the actual solvency status of banks or banking sectors.¹¹ Against this background, we do not adopt bank solvency indicators, like the Z-Score, as financial instability risks associated with rapid credit growth are larger in weaker banking sectors.

Second, there is evidence suggesting that "loans and mortgages appear to be better drivers for financial inclusion than saving products" (Clamara et al. 2014). Thus, also from a financial inclusion perspective it seems useful to focus on banks' lending activities when deciphering the links between financial inclusion and stability. Third, as already discussed, the incidence and depth of deposit withdrawals is likely to reflect strength and timing of stabilizing instruments related to deposit insurance and central banks acting as lender of last resort. Thus, it is a noisy

¹¹ Countries experiencing a banking crisis in 2007-2009 as recorded in the Laeven-Valencia (2012) database show an average Z-score of 12.9 in 2006 while the average Z-score for non-crisis countries is 15.4. Vazquez and Federico (2015) provide mixed evidence on the explanatory power of the Z-score in probit regressions predicting bank failures in the global financial crisis. Results are more favorable in the analysis by Chiaramonte et al. (2015). Finally, in Caprio et al. (2014) the Z-score measure is insignificant in all country- and bank-level probit regressions that aim at explaining crises of banking sectors or individual banks.

indicator of financial instability at best, in particular with regard to the global financial crisis which hit many mature economies without triggering massive retail deposit withdrawals. Accordingly, financial instability is better captured by developments in bank lending rather than deposit funding.

3. Data and empirical strategy

Financial inclusion data is scarce. Until recently it has mainly been compiled by special surveys of households and businesses, i.e. the demand side of financial services. These surveys allow the exploration of the distinction between access to and use of finance. This is of high policy relevance in the financial inclusion debate as the non-use of services provided by the formal financial sector might reflect a voluntary decision by agents. It therefore does not necessarily indicate exclusion (de la Torre et al. 2007). The most well-known surveys on financial inclusion have been run by FinScope (http://www.finmark.org.za/finscope/) and the World Bank (the Global Financial Inclusion (Findex) Database, see Demirgüç-Kunt et al. 2015b, http://www.worldbank.org/en/programs/globalfindex).

We refrain from making use of these sources because most of these surveys lack the time dimension.¹² For example, while the Findex Database accounts for a wide range of financial inclusion indicators in more than 140 countries, it was conducted only in 2011 and 2014. . Moreover, both observations relate to the post-crisis period. Thus, the database cannot be used to study the impact of (changes in) the level of financial inclusion on the degree of financial instability experienced by a country in the global financial crisis.

¹² In addition, the FinScope surveys have been carried out done in only about 20 countries.

Against this background we base our analysis on the IMF's Financial Access Survey (FAS) database covering 189 economies over the period 2004-2014. Data is compiled from financial institutions, i.e. from the supply side, as the FAS provides information on the use of financial services provided by several types of intermediaries and on the geographical and population density of services offered (Mialou 2015). However, for many countries, information about the number of borrowers from non-bank financial intermediaries is only available for the more recent years. As a result, we focus on data for commercial banks.

However, even for commercial banks, data on financial development, i.e. credit outstanding, is more complete than data on financial inclusion, i.e. the number of people borrowing from banks. Concretely, there are only 63 countries – most of them developing and emerging market economies – with consistent data on the number of bank borrowers for at least three years during the pre-crisis period 2004 to 2007. Thus, our sample is based on 60 countries when studying the impact of the *change* in financial inclusion over the pre-crisis period (Table 1).¹³ The sample size increases to 75 countries when analyzing the stability impact of the 2008 *level* of financial inclusion, as the number of countries providing financial inclusion data for commercial banks in 2008 is larger than for the 2004-2007 period. Our restricted sample includes three countries (Italy, Portugal and the UK), the larger sample six countries (Belgium, Italy, Latvia, Nigeria, Portugal and the UK), which Laeven and Valencia (2012) identify as countries which had a banking crisis in the 2008-2010 period. In addition, Ecuador, which had a sovereign debt crisis in 2008, and the Seychelles, which suffered from a currency and sovereign debt crisis in 2008, are represented in our samples.

¹³ Three countries drop out due to missing data on some key control variables.

Insert Table 1 about here

Our main variables (see Table 2 for a description of all variables used) focus on developments in the pre-crisis boom period, 2004-2007, and developments in the crisis. We capture the boom period by the compound annual growth rate of the number of borrowers (INCLUSION0407) and the compound annual growth rate of the volume of outstanding loans in real terms (CREDITGROWTH0407).¹⁴ Developments in the crisis are illustrated by the changes in borrower (DROPBORROWERS0709) and credit (DROPCREDIT0709) growth rates from 2007 to 2009. Higher values indicate a larger drop in credit growth, i.e. higher degree of financial instability. Finally, the level of financial inclusion in the crisis is represented by the share of borrowers in total adult population for the year 2008 (*SHAREBORROWERS2008*).

Insert Table 2 about here

Borrower and credit growth across countries show a high degree of correlation over time (Figure 2) and a pronounced boom-bust pattern. In the pre-crisis period mean credit growth (borrower growth) rates reach 20% (29%) but drop to 5% (15%) in the crisis.¹⁵

Insert Figure 2 about here

¹⁴ Concretely, we take the nominal values for outstanding loans and deflate them with the CPI. Based on this we calculate the compound annual growth rate for the period 2004 to 2007.

¹⁵ Patterns are similar for median growth rates, but they show lower peaks and troughs.

Correlation analysis (Table 3) confirms the co-movement of credit and borrower growth in the pre-crisis (INCLUSION0407, CREDITGROWTH0407) and the crisis period (DROPCREDIT0709, DROPBORROWERS0709). Moreover, higher credit growth and greater progress in financial inclusion in the pre-crisis years are associated with a larger decline in borrower and credit growth during the financial crisis. By contrast, correlation coefficients between the level of financial inclusion (SHAREBORROWERS08) on the one hand and inclusion and credit developments before and during the crisis are small and insignificant. Finally, correlation analysis shows that a higher level of financial inclusion is significantly positively linked to the level of GDP per capita, while progress in financial inclusion is negatively associated with per capita income. Moreover, coefficients reinforce the view that the global financial crisis was a mature economy event as the drop in credit and borrower growth is more pronounced in richer countries.

Insert Table 3 about here

Descriptive statistics (Table 4) reveal that countries on average experienced a 14 percentage point drop in credit growth during the crisis. However, there is substantial cross-country variance: the deepest fall in credit growth amounted to 72 percentage points, while some countries saw even higher credit growth in the crisis period than in the pre-crisis years. The same holds for the change in borrower growth. With regard to the boom, the distribution of pre-crisis borrower growth (INCLUSION0407) is skewed, as mean growth (26%) is substantially above median growth (16%), indicating that few countries recorded a very rapid expansion in the number of borrowers. Examples include the Democratic Republic of Congo, Zambia and

Tajikistan with annual growth rates of 158%, 112% and 94%, respectively. By contrast, precrisis credit growth (*CREDITGROWTH0407*) has been more homogenous across countries, supporting the view that there is a global financial cycle in credit growth (Rey 2015). Mean and median growth rates are almost identical and the standard deviation is much smaller than for financial inclusion. Finally, descriptive statistics indicate that the average level of financial inclusion in the crisis (*SHAREBORROWERS08*) is substantially above the median, again indicating that some countries in the sample record comparatively high levels of inclusion.

Insert Table 4 about here

Following up on our hypotheses we run three OLS models applying robust standard errors. First, we test whether financial inclusion itself is subject to a boom-bust cycle pattern. Concretely, we run a model with the change in the borrower growth rate during the crisis in country i linked to the rate of borrower growth in the pre-crisis period. The boom-bust hypothesis would receive support with a positive coefficient for the INCLUSION0407_i variable.

(1) DROPBORROWER0709_i =
$$\beta_1 + \beta_2$$
INCLUSION0407_i + β_3 X_i + ε_i

Second, we test whether the level of financial inclusion in the crisis has the expected moderating impact on the change in credit growth during the crisis, which would be reflected in a significantly negative coefficient for SHAREBORROWERS08i,

(2) DROPCREDIT0709_i = $\beta_1 + \beta_2$ SHAREBORROWERS08_i + β_3 X_i + ε_i

Finally, we analyze whether greater *advances* in financial inclusion in the pre-crisis period, measured by borrower growth, have a stabilizing or destabilizing effect on the change in credit growth during the crisis years. Following our hypotheses 3a (3b), we expect a negative (positive) sign for β_2 in model specification (3).

(3) DROPCREDIT0709_i =
$$\beta_1 + \beta_2$$
INCLUSION0407_i + β_3 X_i + ε_i

In all models X_i is a matrix of control variables reflecting banking sector, macroeconomic and structural characteristics of country i.¹⁶ When employing the set of control variables, we always distinguish between model specifications that include pre-crisis credit growth (CREDITGROWTH0407) and specifications that do not control for the pre-crisis boom. In doing so, we aim at testing whether a possible impact of the inclusion variables on crisis developments remains significant when controlling for the size of the pre-crisis credit boom. Our third specification of each model includes an interaction term between pre-crisis credit growth and the respective financial inclusion variable to account for potential moderating effects of financial inclusion on the destabilizing impact of credit booms.

Our selection of the remaining control variables largely follows Han and Melecky (2013). The pre-crisis (2007) state of play in banking sectors is depicted by the Z-Score, a bank concentration

¹⁶ Control variables, i.e. other financial stability indicators, macroeconomic and structural indicators, are taken from the IMF (International Financial Statistics), the World Bank (World Development Indicators and Global Financial Development Database) and from Chinn and Ito (2006).

measure, as well as credit and liquid assets as a share of total deposits¹⁷. In addition, we control for structural and macroeconomic variables, such as population size, the level of economic development (GNI per capita) and capital account openness as well as pre-crisis GDP growth and inflation.¹⁸

Z-SCORE07 accounts for the solvency risk of banking sectors, with a higher z-score in 2007 indicating a lower probability of insolvency. Thus, we expect a negative coefficient. Bank concentration (CONCENTRATION07) is defined as the share of total assets in the banking system held by the three largest banks in 2007. The effect of bank concentration on financial stability is theoretically ambiguous (Beck 2008) and the empirical evidence is decidedly mixed. However, a number of recent studies show results that provide more support for the concentration-stability hypothesis (see e.g. Baselga-Pascual et al. 2015, Bretschger et al. 2012, Tabak et al. 2012). Thus, we expect a negative coefficient. We also expect that a larger retail deposit base (relative to loans outstanding) and more liquid banking sectors (liquid assets relative to deposits) show a less pronounced boom-bust cycle.¹⁹ Finally, we control for a number of structural and macroeconomic country variables, i.e. log population, log GDP per capita, capital account openness as well as real GDP growth and inflation in pre-crisis period. We expect a larger drop of credit growth in richer and more open countries as the global financial crisis was triggered in advanced economies and spread globally mainly through international financial

¹⁷ When there is missing data for the control variables in 2007, we take the year closest to 2007 as reference. This applies to *CONCENTRATION* for Cabo Verde (2008), Lesotho (2004 and 2008), Myanmar (2004), Samoa (2006), Seychelles (2009), Suriname (2008), and Zimbabwe (2009), and to *LIQUIDITY* for Cabo Verde (2008), and Zimbabwe (2009). In a limited number of cases we resort to different sources, such as local central bank reports and IMF or World Bank reports.

¹⁸ For some countries inflation data is taking from the IMF World Economic Outlook database.

¹⁹ Several studies have found these effects for different samples, time periods as well as cross-country and banklevel datasets; see for example Caprio et al. (2014), Vazquez and Federico (2015).

connections (Dooley and Hutchinson 2009, Claessens et al. 2010). Booming economies in the pre-crisis period, recording stronger GDP growth and inflation, are also expected to suffer a deeper drop in credit growth. By adding population as a control variable we test whether country size has an impact on instability, for example whether small states are different (Easterly and Kraay 2000).

4. Results

We find strong evidence suggesting that the magnitude of the decline in borrower growth during the global financial crisis is significantly linked to pre-crisis borrower growth (Table 5). Thus, financial inclusion itself followed a boom-bust pattern, as a one percentage point higher growth rate in the pre-crisis period is associated with a one percentage point larger drop in borrower growth in the crisis. This result supports hypothesis 1. Moreover, we find that other variables, including pre-crisis credit growth, have no significant influence on financial inclusion dynamics in the crisis.²⁰ Z-score is the only exception, as we find in two specifications that countries with a stronger banking sector in the pre-crisis period record a significantly higher drop in borrower growth than countries with weaker banking sectors.

Insert Table 5 about here

²⁰ Testing for multicollinearity among independent variables by calculating the variance inflation factor (VIF) suggests that the coefficients are not poorly estimated due to multicollinearity as all VIFs are lower than 3.25,

The level of financial inclusion has no direct impact on the size of the credit crunch which countries experienced in the crisis (Table 6). In all specifications the coefficient of the inclusion variable is insignificant. In line with expectations, countries with less concentrated banking sectors, a higher loan to deposit ratio and stronger GDP growth in the pre-crisis period record a more pronounced credit crunch (column 1).²¹ However, when adding pre-crisis credit growth as a control variable, the coefficient of which turns out to be highly significant and positive, only the concentration variable remains significant. In addition, countries with a more open capital account suffered a steeper decline in credit growth. Thus, the second specification of the model signals that the credit crunch was more severe in countries with more open and less concentrated financial sectors and with higher pre-crisis credit growth.

Insert Table 6 about here

This message is qualified in the last specification as the interaction variable between pre-crisis credit growth and the level of financial inclusion is negative and significant. Accordingly, a higher level of financial inclusion had a moderating impact on the drop in credit growth during the crisis. Indeed, the overall impact of stronger pre-crisis credit growth on the credit crunch becomes negative when the share of borrowers in the adult population is larger than 75%. Thus, the last specification provides support for hypothesis 2: financial inclusion contributes to financial stability as it mitigated the 2008/2009 credit crunch.

²¹ In addition, we find that countries with a smaller population show a more severe credit crunch.

Insert Table 7 about here

Finally, we find that a more rapid borrower growth in the pre-crisis period has a negative impact on financial stability (Table 7, column 1). However, this result is not robust to the inclusion of the pre-crisis credit growth variable (column 2). Moreover, the interaction term between precrisis borrower and credit growth is insignificant (column 3). Overall, the results of this model reject hypotheses 3a and 3b. Strong progress in financial inclusion as such does not pose stability risks if credit growth is accounted for. However, results also suggest that strong credit growth remains a risk to financial stability even if it is accompanied by substantial progress in financial inclusion.

5. Robustness checks

We run a series of checks to test the robustness of our results (Tables 8 - 23 in the appendix). Concretely, we test whether our results are robust to

- (1) applying a parsimonious approach, i.e. we simplify our model to the least number of explanatory variables which capture the structural part of the estimation model,
- (2) changes in the sample, namely a) limiting the set of countries to those with a population greater than 1 million, and b) excluding countries with an advanced economy status as defined by the IMF,²²

²² The respective countries are Belgium, Estonia, Israel, Italy, Latvia, Portugal, Singapore and the United Kingdom.

- (3) changes in the financial inclusion variable and changes in the dependent variable, i.e. the variable depicting financial instability.
- (4) an orthogonalization of pre-crisis borrower and credit growth.²³ Concretely, we orthogonalize pre-crisis borrower growth by regressing pre-crisis borrower growth on pre-crisis credit growth and then use the residuals of this regression (INCLRESIDUALS) as the financial inclusion variable. Similarly, we extract a credit growth variable that is orthogonal to pre-crisis borrower growth by regressing pre-crisis credit growth on pre-crisis borrower growth, and then use the residuals of this regression as the credit growth variable (CREDITGROWTHRESID).
- (5) an instrumental variable regression to account for the endogeneity problem that potentially exists between the level of financial inclusion and credit growth. In our first stage IV estimate, we use population density as the instrument as it is a significant predictor of financial inclusion (SHAREBORROWERS2008), but is uncorrelated to the dependent variable (DROPCREDIT0709) and the other covariates.

These checks are motivated by the following considerations. In pursuing the parsimonious approach (Table 8) and orthogonalizing pre-crisis borrower and credit growth (Tables 19-22) we take into account that pre-crisis credit growth and pre-crisis borrower growth are highly correlated. Thus, we take another step in determining to what extent pre-crisis borrower growth

²³ In doing so we are influenced by Bekaert et al. (2014).

independently of pre-crisis credit growth, has an impact on the drop in borrower and credit growth during the crisis (hypotheses 1 and 3). Our second robustness test is motivated by the fact that 8 of the 60 countries in the restricted sample are very small, raising questions about the representativeness of the sample (Tables 9-11). Estimating the three models and excluding advanced economies provides a test of whether our results are biased by the experience of mature economies which arguably have been most hit by the global financial crisis (Tables 12-14).

The third robustness check relates to the uncertainty on how best to measure financial inclusion and financial instability. Concretely, we substitute the share of borrowers with the Honohan index of financial inclusion (Table 15, Honohan 2008)²⁴ and replacing the 2007/2009 credit crunch variable by a variable that captures the largest drop in credit growth over the period 2006-2010, irrespective of when it was observed (Table 16).²⁵ The latter variable takes into account country specifics with regard to the exact timing of the credit crunch associated with the subprime crisis and the Lehman default. Figure 3 shows that a slight majority of countries in the expanded sample did not record the highest credit growth rate in 2007 but in the remaining years. For the credit slump the evidence confirms the conventional wisdom about the global credit contraction after the Lehman default, as most countries record their lowest credit growth rate in 2009 (Figure 4); however there is still a sizeable number of countries recording the lowest credit growth rate in the other years.

²⁴ As the Honohan index is not available for some countries of our expanded sample, the size of the sample size shrinks to 68 countries. Alternatively, the sample could be expanded by 17 countries to a total of 85 countries for which the Honohan index and all control variables are available. Results do not change when running the check with 85 countries.

²⁵ In doing so we follow Han and Melecky (2013) who apply this approach to deposit withdrawals.

Insert Figures 3 and 4 about here

Alternatively, we measure financial instability by a dummy variable (*CRISIS-IMF*) that takes the number 1 if the respective country is identified as a crisis country in the Laeven and Valencia (2012) database or became an IMF program country in the period 2007-2009 (Tables 17-18).²⁶

Finally, we run a 2SLS model to correct for the possible endogeneity of financial inclusion and pre-crisis credit growth (Table 23). In the first stage regression, we use population density 2007 (people per square km of land area) as an instrument for financial inclusion "SHAREBORROWERS2008" (results not shown). Population density facilitates the provision of financial services due to the elimination of distances (Scronce 2013) and via economies of scale in the costs of intermediation (Alter and Yontcheva 2015). We find that population density is strongly correlated with financial inclusion, and uncorrelated with our dependent variable and covariates²⁷

The majority of the tests suggest that our results are quite robust... Robustness checks on the boom-bust characteristics of financial inclusion confirm that countries with a more rapid rise in inclusion in the pre-crisis period record a deeper inclusion setback in the crisis (Tables 8 (columns 1 and 2), 9, 12, 19, 20).²⁸ This clearly supports our finding on the validity of hypothesis 1.

 $^{^{26}}$ The sample size shrinks when measuring financial inclusion by depositor growth (38 countries) or the share of depositors in the adult population (50 countries).

²⁷ The validity of the instrument is also confirmed when running the test of Montiel Olea and Pflueger (2013).

²⁸ The only exception is found when linking the fall in borrower growth during the crisis to rise in depositor growth in the pre-crisis period (Table 20).

With one exception, we also find broad support for hypothesis 2 that a higher level of financial inclusion mitigates the fall in credit growth in the crisis period (Tables 8 (columns 3 and 4), 10, 13, 17). In several specifications the mitigating effect is linked to the pre-crisis credit growth experience as it is the interaction term between the level of financial inclusion and pre-crisis credit growth showing a significantly negative coefficient. By contrast, the level of financial inclusion as a stand-alone variable is insignificant or drops out of the parsimonious model (Table 8, columns 3 and 4). However, when measuring financial inclusion via the Honohan index(Tables 15 and 16) and when identifying financial instability via the CRISIS-IMF dummy (Table 17), we also find a direct mitigating effect of a higher level of financial inclusion on the drop in credit growth. The exception to the rule is the IV specification (Table 23) where we fail to confirm that a higher level of financial inclusion mitigates the effect of the fall in credit growth in the crisis period. The interaction term between the level of financial inclusion instrumented by population density and the pre-crisis credit growth turns insignificant, suggesting that the share of borrowers in 2008 had no impact on the depth of the credit crunch. As the inclusion variable remains insignificant on a stand-alone basis, this specification raises doubts on the validity of hypothesis 2.

With regard to our third hypothesis, robustness checks involving changes in the sample confirm that countries with more rapid advances in financial inclusion in the pre-crisis period record a larger drop in credit growth in the crisis when pre-crisis credit growth is not controlled for (column 1 of Tables 11 and 14). Pre-crisis borrower growth becomes insignificant only when using the *CRISIS-IMF* dummy as the proxy for financial instability (Table 18, column 1). Moreover, we also always find that pre-crisis borrower growth is always insignificant when

controlling for pre-crisis credit growth (column 2 of Tables 11, 14 and 18).²⁹ In the parsimonious model the pre-crisis change in financial inclusion is dropped when imposing pre-crisis credit growth as the main variable. Moreover, the interaction term between pre-crisis borrower and pre-crisis credit is never significant. This indicates that the destabilizing effect of a higher rate of pre-crisis credit growth is neither mitigated nor reinforced by progress in financial inclusion in the pre-crisis years. We also do not find a significant impact of the pre-crisis borrower growth variable on the drop in credit growth in the orthogonalization model when accounting only for that part of pre-crisis borrower growth that is unexplained by pre-crisis credit growth (Table 21). However, if we account only for that part of credit growth its not explained by borrower growth as a control variable (Table 22), pre-crisis borrower growth is significantly positively linked to the 2009 drop in credit growth (Table 22).³⁰

6. Discussion

Is a more inclusive financial system more stable? We answer this question based on an approach that links financial inclusion to credit boom-bust patterns, arguably a key indicator of financial instability. Our results indicate that the answer to this question is a cautious yes. Countries with a higher level of financial inclusion were less subject to the credit boom-bust cycle before and after the Lehman default. Thus, with the notable exception of the IV robustness check our

²⁹²⁹ The pre-crisis credit growth variable itself fails to be significant in the specification with the *CRISIS-IMF* dummy only, supporting the view that periods of turmoil are linked to strong credit growth, but not all periods of rapid credit growth end in financial turmoil (Dell'Ariccia et al. 2012).

³⁰ By contrast, pre-crisis credit growth is always significant in our orthogonalization models with the drop in credit growth as the dependent variable. This suggests that the size of credit boom predicts the fall in credit growth irrespective of any change in financial inclusion in the pre-crisis period.

analysis, confirms what other empirical studies on the inclusion-stability nexus have found: higher inclusion is associated with more stability.

Having said this, our results also provide some arguments that call for caution when introducing financial inclusion as a policy objective with the goal of reaping potential financial stability benefits from a more inclusive financial sector. First, we find that financial instability is likely to be associated with setbacks in financial inclusion and that the size of these setbacks is positively linked to the progress made in financial inclusion in the pre-crisis period. Thus, as much as a higher level of financial inclusion is conducive to financial stability, financial stability seems to act as an important precondition to actually achieve a higher inclusion level in a sustainable way.

Second, while financial stability risks associated with fast credit growth are not exacerbated when credit growth is accompanied by rising financial inclusion, the latter does not have a mitigating effect on the financial stability risks associated with rapid credit growth either. Indeed, if including only that part of pre-crisis credit growth as a control variable that is not driven by pre-crisis borrower growth, stronger borrower growth is significantly associated with a larger drop in credit during the crisis. Overall this suggests that speed, i.e. rapid credit growth, kills (Kraft and Jankov, Sahay 2015), with or without progress in financial inclusion. To put it in Reinhart's and Rogoff's (2009) terminology: This time is *not* different, when credit booms are linked with strong progress in financial inclusion. Thus, even if a higher level of financial inclusion contributes to financial stability a rapid expansion of the borrower base does not reduce financial stability risks linked to rapid credit growth. This is in line with largely anecdotal evidence suggesting that a rapid rise in financial inclusion, if associated with a credit boom, may do more harm than good.

Our results and their interpretation are subject to several caveats. First, there remains substantial uncertainty about which indicator is most qualified to capture financial inclusion and financial instability. We have partly addressed this uncertainty in our robustness checks, and our results are reassuring. Moreover, our main result, that a higher level of financial inclusion is associated with financial stability benefits, echoes the results of other studies of the inclusion-stability nexus employing different proxies for financial inclusion and instability. Second, as already mentioned, our sample is limited, as data on financial inclusion is scarce. Given the strong focus on financial inclusion and the associated data collection efforts it can be expected that future research on the inclusion-stability nexus, relying on richer datasets, will challenge our results.

Finally, our results might be driven by an omitted variable bias. The results of the IV specification provide support for this line of reasoning. For example, a higher level of financial inclusion is likely to trigger stronger policy efforts to maintain financial stability or to restore financial stability as quickly as possible when a crisis hits. In a highly inclusive financial system, stability becomes a public good (Goodhart 1999) as a crisis has an impact on the vast majority of the population, either directly, or indirectly via negative output and employment effects (IMF 2009). Thus, stabilization efforts by governments and central banks are likely to be endogenous to the level of financial inclusion.³¹

Overall, our analysis provides only limited support for the view that banking sectors serving a larger number of borrowers are less prone to financial instability. Moreover, it suggests that financial stability risks of credit booms do not decline when these booms are accompanied by

³¹ In a CGAP blog the former Governor of the Bank of Kenya refers to this endogeneity issue by making the following statement on the impact of a rising level of financial inclusion on the efforts of the government and the central bank to safeguard financial stability: "With enhanced financial inclusion comes the need to step up existing frameworks on consumer protection and deposit protection, while exploring emerging issues on competition and interoperability." (Ndungu 2012).

rising levels of inclusion. Thus, policy efforts aimed at raising financial inclusion levels do not enhance financial stability when financial imbalances arise. Coupled with rapid credit growth, financial inclusion policies do not create the win-win situation some advocates have been referring to: providing benefits in terms of growth and development and fostering the stability of the financial system.



Figure 1: Number of microfinance borrowers – crisis countries, 2005-2013

Source: Mixmarket, authors' calculations.

0.3 0.25 0.2 ---Borrowers' Growth **drowth** 0.15 Credit Growth 0.1 0.05 0 2005 2006 2007 2008 2009 2010 2011 Year

Figure 2: Growth of credit and number of borrowers, 2005-2011

Source: IMF FAS, authors' calculations based on our sample of 60 countries plus Comoros, Timor-Leste, and Kosovo.



Figure 3: Histogram of the Timing of the Peak in Credit Growth by Number of Countries

Source: IMF FAS, authors' calculations based on the expanded sample of 75 countries excluding countries for which there is no Honohan inclusion index available (Democratic Republic of Congo, Equatorial Guinea, Israel, Kuwait, Maldives, Qatar and San Marino)





Source: IMF FAS, authors' calculations based on the expanded sample of 75 countries excluding countries for which there is no Honohan inclusion index available (Democratic Republic of Congo, Equatorial Guinea, Israel, Kuwait, Maldives, Qatar and San Marino)

Table 1: List of Countries

			CENTRAL, SOUTH		T.
	AFRICA		ASIA AND PACIFIC		Lo
1	Botswana	42	Bangladesh	1	Burundi
2	Burundi	43	Indonesia	2	Democra Congo
3	Cabo Verde	44	Kuwait	3	Ethiopia
4	Democratic Republic of Congo	45	Malaysia	4	Guinea
5	Equatorial Guinea	46	Maldives	5	Haiti
6	Ethiopia	47	Myanmar	6	Madagas
7	Gabon	48	Pakistan		
8	Ghana	49	Singapore		Lower-m
9	Guinea	50	Tajikistan	13	Banglade
10	Kenya	51	Thailand	14	Bolivia
11	Lesotho			15	Cabo Ve
12	Madagascar		MIDDLE EAST AND NORTH AFRICA	16	Egypt
13	Malawi	52	Algeria	17	Georgia
14	Mauritania	53	Egypt	18	Ghana
15	Mozambique	54	Israel	19	Guatema
16	Namibia	55	Lebanon	20	Honduras
17	Nigeria	56	Libya	21	Kenya
18	Rwanda	57	Qatar	22	Indonesi
19	Seychelles	58	Saudi Arabia		
20	Sierra Leone	59	Syrian Arab Republic		
21	Swaziland	60	Tunisia		Upper-mi
22	Tanzania			34	Albania
23	Zambia		EASTERN EUROPE	35	Algeria
23	Zamota		AND CENTRAL ASIA	55	Aigena
24	Zimbabwe*	61	Albania	36	Azerbaija
		62	Azerbaijan, Republic of	37	Belize
	LATIN AMERICA	63	Estonia	38	Botswan
	AND CARIBBEAN	05	Litonia	50	Botswan
25	Argentina	64	Georgia	39	Brazil
26	Belize	65	Poland	40	Colombia
27	Bolivia	66	Turkey	41	Costa Ri
28	Brazil	67	Moldova	42	Dominic
29	Chile	68	Macedonia, FYR	43	Ecuador
30	Colombia	69	Latvia	44	Gabon
31	Costa Rica	70	Romania	45	Lebanon
32	Dominican Republic				
33	Ecuador		WESTERN EUROPE		Higł
34	Guatemala	71	Italy	58	Argentina
35	Haiti	72	Portugal	59	Belgium
36	Honduras	73	San Marino	60	Chile
37	Paraguay	74	United Kingdom	61	Equatoria
38	Peru	75	Belgium	62	Estonia
39	Suriname			63	Israel
40	Uruguay		OCEANIA	64	Italy
41	Venezuela	76	Samoa	65	Kuwait

w-income economies (\$1,045 or less) 7 Malawi atic Republic of 8 Mozambique 9 Rwanda 10 Sierra Leone 11 Tanzania scar 12 Zimbabwe* iddle-income economies (\$1,046 to \$4,125) 23 Lesotho esh 24 Mauritania 25 Moldova rde 26 Myanmar 27 Nigeria 28 Pakistan 29 Samoa la 30 Swaziland s 31 Syrian Arab Republic ia 32 Tajikistan 33 Zambia iddle-income economies (\$4,126 to \$12,735) 46 Libya 47 Malaysia an, Republic of 48 Maldives 49 Macedonia, FYR 50 Namibia а 51 Paraguay 52 Peru 53 Romania ica an Republic 54 Suriname 55 Thailand 56 Tunisia 57 Turkey h-income economies (\$12,736 or more) 68 Portugal а 69 Qatar 70 San Marino al Guinea 71 Saudi Arabia 72 Seychelles 73 Singapore 74 United Kingdom 75 Uruguay 76 Venezuela 66 Latvia 67 Poland

* Zimbabwe only for regressions that do not include pre-crisis credit growth as an independent variable. Italics represent countries included in the enlarged sample only. Source: authors' compilations

Table 2: List of Variables

VARIABLE	DESCRIPTION	SOURCE
Dimensional Combilition In disentence (anisis)		
DROPCREDITGROWTH 0709	The difference between real credit annual growth rate in the post crisis period (2009) and its value in the pre-crisis period (2007)	IMF Financial Access Survey (FAS), authors' calculations
DROP BORROWERS 0709	The difference between number of borrowers annual growth rate in the post crisis period (2009) and its value in the pre-crisis period (2007)	IMF Financial Access Survey (FAS), authors' calculations
H-M CREDIT DROP	Maximum annual credit growth minus minimum annual credit growth between 2006 and 2010, considering that maximum growth occurred before the minimum growth.	IMF Financial Access Survey (FAS), authors' calculations
Financial Inclusion Variables		
INCLUSION0407	Borrowers compound annual growth rate between 2004 and 2007.	IMF Financial Access Survey (FAS), authors' calculations
SHARE BORROWERS 08	Number of borrowers from commercial banks divided by adult population in 2008	IMF Financial Access Survey (FAS), authors' calculations
HONOHAN	Percent of people with access to financial services	Honohan, P. (2008)
Financial Stability Indicators (pre-cris CREDIT GROWTH 0407	vis) Real outstanding loans compound annual growth rate between 2004 and 2007.	IMF Financial Access Survey (FAS), authors' calculations
ZSCORE07	ZSCORE07	Global Financial Development Database
LIQUIDITY07	The ratio of liquid assets to total deposits plus short term funding in 2007	Global Financial Development Database
CONCENTRATION07	Assets of three largest commercial banks as a share of total commercial banking assets in 2007	Global Financial Development Database
LOANSTODEPTS07	The financial resources provided to the private sector by domestic money banks as a share of total deposits in 2007	Global Financial Development Database
Macroeconomic Variables		
UDPGKUW IH0407	Average GDP growin between 2004 and 2007	World Development Indicators
INTERTION0407	Average consumer prices index annual percent change between 2004 and 2007	world Development indicators
<i>Structural Variables</i> POPULATION07	Log Population in number of people in 2007	World Development Indicators
GDPPERCAPITA07	Log gross domestic product per capita in 2007, current prices (U.S. dollars)	IMF WEO Database
KAOPEN	Chinn-Ito country index measuring a country's degree of capital account openness updated to 2013	Chinn and Ito (2006)
Interaction Terms INTERCREDITBORRW0407	Interaction between CREDIT GROWTH0407 and INCLUSION0407	Authors' calculation
INTERSHARE 08CREDIT GRW	Interaction between SHARE BORROWERS 08 and CREDIT GROWTH 0407	Authors' calculation
INTHONOHANCREDIT	Interaction between HONOHAN and CREDIT GROWTH 0407	Authors' calculation

Source: authors' compilation

Table 3: Correlation matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 DROP CREDIT 0709	1															
2 DROP BORROWERS 0709	0.4229*	1														
3 H-M CREDIT DROP	0.4495*	0.3574*	1													
4 INCLUSION 0407	0.3218*	0.5374*	0.6250*	1												
5 SHARE BORROWERS 08	0.1021	-0.0091	-0.0063	-0.2307	1											
6 HONOHAN	-0.028	-0.1601	-0.3373*	-0.4095*	0.6414*	1										
7 CREDIT GROWTH0 407	0.5951*	0.5203*	0.6680*	0.6078*	-0.0184	-0.3358*	1									
8 ZSCORE07	-0.0011	0.0883	-0.2946*	-0.196	0.2643*	0.2924*	-0.2407	1								
9 LIQUIDITY07	-0.1506	0.0219	0.3725*	0.2256	-0.1824	-0.2367	0.1311	0.0257	1							
10 CONCENTRATION07	-0.1669	-0.0338	0.1307	-0.0662	-0.0573	-0.1801	0.0198	0.0528	0.3509*	1						
11 LOANSTODEPTS07	0.3682*	0.1764	0.0503	0.0572	0.2396	0.3042*	0.2824*	-0.0645	-0.4870*	-0.1375	1					
12 GDPGROWTH0407	0.2725*	0.3668*	0.2221	0.2482	-0.0132	-0.2121	0.5264*	0.0194	0.0482	-0.0511	0.0502	1				
13 INFLATION0407	-0.2412	0.0328	0.1197	0.2518	-0.3863*	-0.5546*	0.0677	-0.3464*	0.2299	-0.0922	-0.3367*	0.1236	1			
14 LGPOPULATION 07	-0.1672	-0.0183	-0.2823*	0.0094	-0.1617	0.104	-0.1995	-0.2194	-0.1363	-0.6004*	0.0268	-0.0517	0.2381	1		
15 LOG GDPPERCAPITA07	0.2415	-0.0022	0.0131	-0.3233*	0.6626*	0.7799*	0.0642	0.3288*	-0.1478	-0.0591	0.3473*	0.1428	-0.5973*	-0.2915*	1	
16 KAOPEN	0.195	0.1858	-0.038	-0.0566	0.3861*	0.4510*	-0.1103	0.2990*	-0.196	-0.1206	0.2767*	-0.0427	-0.2891*	0.0208	0.4747*	1

Source: authors' compilations.

*Indicate significance at 5% level

Table 4: Descriptive Statistics

VARIABLE	Obs	Mean	Median	Std. Dev.	Min	Max
DROP CREDIT 0709	59	0.16	0.16	0.28	(0.88)	0.72
DROP BORROWERS 0709	60	0.15	0.09	0.62	(3.56)	1.59
H-M CREDIT DROP	59	0.33	0.24	0.32	0.01	1.69
Inclusion Variables						
INCLUSION 0407	60	0.27	0.17	0.29	(0.02)	1.58
SHARE BORROWERS 08	60	0.18	0.12	0.21	0.00	0.92
HONOHAN	53	35.47	30.00	21.85	5.00	98.00
Financial Stability Indicators (pre-crisis)						
CREDIT GROWTH0 407	59	0.18	0.15	0.16	(0.04)	0.59
ZSCORE07	60	13.80	12.42	8.70	0.75	45.04
LIQUIDITY07	60	40.65	38.13	19.56	10.79	89.00
CONCENTRATION07	60	72.85	75.56	20.15	35.20	100.00
LOANSTODEPTS07	60	86.16	80.44	40.60	25.98	187.76
Macroeconomic Variables						
GDPGROWTH0407	60	6.39	5.94	4.10	(4.66)	24.04
INFLATION0407	60	7.10	6.44	5.28	0.88	29.64
Structural Variables						
POPULATION 2007	60	6.85	6.98	0.79	4.48	8.17
GDPPERCAPITA07	60	3.53	3.58	0.66	2.24	4.91
KAOPEN	60	0.11	(0.37)	1.58	(1.89)	2.39

Source: authors' compilations.

Table 5: Borrower growth in the financial crisis

_	DROP IN BORROWER GROWTH 0709						
INCLUSION0407	1.129***	0.970***	1.035*				
	(4.69)	(3.21)	(1.86)				
Financial Stability Indicators (pre-crisis))						
CREDIT GROWTH 0407		0.4590 (1.55)	0.5240 (1.11)				
INTERCREDITBORRW0407			-0.1980 (-0.13)				
ZSCORE07	0.0115	0.00578*	0.00596*				
	(1.56)	(1.81)	(1.97)				
LIQUIDITY07	-0.0023	-0.0019	-0.0019				
	(-0.92)	(-1.17)	(-1.09)				
CONCENTRATION07	0.0032	0.0000	0.0001				
	(0.77)	(-0.00)	(0.07)				
LOANSTODEPTS07	0.0012	0.0002	0.0003				
	(0.85)	(0.21)	(0.25)				
Macroeconomic Variables							
GDPGROWTH0407	0.0373	-0.0103	-0.0104				
	(0.97)	(-1.02)	(-1.05)				
INFLATION0407	0.0006	0.0044	0.0046				
	(0.04)	(0.76)	(0.81)				
Structural Variables							
POPULATION07	0.0557	0.0183	0.0224				
	(0.65)	(0.28)	(0.40)				
GDPPERCAPITA07	0.0005	-0.0133	-0.0124				
	0.00	(-0.15)	(-0.14)				
KAOPEN	0.0610	0.0286	0.0279				
	(1.44)	(1.36)	(1.39)				
_cons	-1.1880	-0.2030	-0.2710				
	(-0.92)	(-0.26)	(-0.42)				
N	60	59	59				
R-square	0.4276	0.6685	0.6688				

t statistics in parentheses

* *p*<0.10, ***p*<0.05, *** *p*<0.01

This table reports the estimated coefficients of the OLS model presented in equation (1). The dependent variable is the drop in the borrower growth rate from 2007 to 2009. Our main variable of interest is financial inclusion expressed as the compound borrower growth rate 2004 to 2007. Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the inclusion and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.
	DROP	CREDITGROWI	ТН 0709
SHARE BORROWERS 08	-0.0766	-0.1100	0.1350
	(-0.67)	(-1.03)	(1.23)
Financial Stability Indicators (pre-crisis)			
CREDIT GROWTH 0407		0.977*** (6.10)	1.197*** (6.87)
INTERSHARE 08CREDIT GRW			-1.603*** (-2.99)
ZSCORE07	-0.0034	0.0014	0.0008
	(-1.12)	(0.48)	(0.26)
LIQUIDITY07	0.0021	-0.0001	-0.0001
	(1.40)	(-0.05)	(-0.04)
CONCENTRATION07	-0.00477**	-0.00345**	-0.00346**
	(-2.47)	(-2.19)	(-2.34)
LOANSTODEPTS07	0.00153*	0.0003	0.0005
	(1.78)	(0.47)	(0.77)
Macroeconomic Variables			
GDPGROWTH0407	0.0194**	0.00	0.00
	(2.30)	(0.53)	(0.42)
INFLATION0407	-0.0136	-0.0122	-0.0091
	(-1.08)	(-1.39)	(-1.01)
Structural Variables			
POPULATION07	-0.102**	(0.04)	(0.05)
	(-2.39)	(-0.81)	(-1.18)
GDPPERCAPITA07	-0.0537	-0.0262	-0.0060
	(-0.69)	(-0.44)	(-0.10)
KAOPEN	0.0231	0.0277**	0.0280**
	(1.33)	(2.21)	(2.26)
_cons	1.210**	0.6150	0.5940
	(2.49)	(1.34)	(1.42)
Ν	75	75	75
<i>R-square</i>	0.2943	0.518	0.5455

Table 6: Credit growth drop in the financial crisis and the level of financial inclusion

t statistics in parentheses

This table reports the estimated coefficients of the OLS model presented in equation (2). The dependent variable is the drop in credit growth from 2007 to 2009. Our main variable of interest is the level of financial inclusion expressed as the share of borrowers in the adult population in 2008. Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the inclusion and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

	DROP	CREDITGROWT	H 0709
INCLUSION0407	0.247**	-0.048	-0.242
	(2.40)	(-0.41)	(-0.59)
Financial Stability Indicators (pr	e-crisis)		
CREDIT GROWTH 0407	,	1.121***	0.929**
		(3.69)	(2.05)
INTERCREDITBORRW0407			0.582
			(0.57)
ZSCORE07	-0.002	0.001	0.000
	(-0.66)	(0.17)	(0.06)
LIQUIDITY07	0.000	-0.001	-0.001
-	(0.25)	(-0.45)	(-0.62)
CONCENTRATION07	-0.00433*	-0.00408**	-0.00454*
	(-1.91)	(-2.07)	(-1.81)
LOANSTODEPTS07	0.002	0.000	0.000
	(1.45)	(0.46)	(0.28)
Macroeconomic Variables			
GDPGROWTH0407	0.0163**	0.001	0.001
	(2.22)	(0.09)	(0.16)
INFLATION0407	-0.014	-0.014	-0.014
	(-1.11)	(-1.46)	(-1.48)
Structural Variables			
POPULATION07	-0.117**	-0.077	-0.089
	(-2.20)	(-1.28)	(-1.25)
GDPPERCAPITA07	-0.031	-0.079	-0.082
	(-0.44)	(-1.37)	(-1.38)
KAOPEN	0.024	0.0374**	0.0397**
	(1.39)	(2.39)	(2.45)
_cons	1.186**	1.137*	1.337*
	(2.08)	(1.97)	(1.79)
N	59	59	59
R-square	0.407	0.536	0.542

Table 7: Credit growth drop in the financial crisis and pre-crisis borrower growth

t statistics in parentheses

This table reports the estimated coefficients of the OLS model presented in equation (3). The dependent variable is the drop in credit growth from 2007 to 2009. Our main variable of interest is financial inclusion expressed as the compound borrower growth rate 2004 to 2007. Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the inclusion and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

Appendix: Robustness checks

	DROP BORROW	ER GROWTH 0709	DROP CREDIT	GROWTH 0709	DROP CREDITO	GROWTH 0709
Main Variable:	INCLUSION0407	CREDIT GROWTH 0407	SHARE OF BORROWERS 08	CREDIT GROWTH 0407	INCLUSION0407	CREDIT GROWTH 0407
	1	2	3	4	5	6
	pr< 0.10	pr< 0.10	pr< 0.10	pr< 0.10	pr< 0.10	pr< 0.10
INCLUSION0407	1.054***	0.988***			0.0006	
	(5.15)	(4.06)			(0.01)	
SHARE BORROWERS 08			-0.1130 (-1.20)			
CREDIT GROWTH 0407		0.2090	1.038***	1.016***	1.124***	1.125**
		(0.80)	(8.31)	(7.72)	(5.52)	(7.37)
INFLATION0407			-0.0122*		-0.0132**	-0.0132*
			(-1.82)		(-2.12)	(-2.17)
CONCENTRATION07			-0.00261**	-0.00230**	-0.00244*	-0.00244*
			(-2.54)	(-2.27)	(-1.97)	(-2.02)
KAOPEN	0.0362**	0.0376**	0.0279***	0.0331**	0.0302**	0.0302*
	(2.18)	(2.23)	(2.70)	(2.42)	(2.10)	(2.17)
_cons	-0.0793*	-0.100**	0.258***	0.131*	0.216**	0.216*
	(-1.87)	(-2.44)	(3.14)	(1.83)	(2.37)	(2.40)
N	59	59	75	75	59	59
R-square	0.6399	0.6442	0.5037	0.4607	0.5017	0.5017

Table 8: Parsimonious Estimation Results

t statistics in parentheses

* p<0.10, **p<0.05, *** p<0.01

This table reports the parsimonious estimation results for equations (1) to (3). In panel 1, the dependent variable is the drop in borrower growth from 2007 to 2009. In column 1, our main variable of interest is financial inclusion expressed as the compound borrower growth rate 2004 to 2007, while in column 2 we focus on CREDIT GROWTH 0407 as our main explanatory variable. Columns 3, 4, 5 and 6 present the results of the parsimonious model with the drop in credit growth from 2007 to 2009 being the dependent variable. In columns 3 and 4, we estimate the variables that affect the drop in credit growth 0709 alternating between INCLUSION0407 and CREDIT GROWTH 0407 as the main variables of interest in the model. Columns 5 and 6 display the estimates with the level of inclusion (SHARE BORROWERS 08) and CREDIT GROWTH 0407 serving as the main explanatory variables. We control for a set of financial stability indicators as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

Table 9: Drop in borrower growth in the financial crisis

Excluding countries with a population < 1 million

	DROP IN BORROWER GROWTH 0709			
INCLUSION0407	1.127***	0.918^{***}	1.068*	
	(4.40)	(2.88)	(1.89)	
Financial Stability Indicators (p	pre-crisis)			
CREDIT GROWTH 0407		0.621*	0.7760	
		(1.86)	(1.56)	
INTERCREDITBORRW0407			-0.4530	
			(-0.30)	
ZSCORF07	0.0108	0.0045	0 0048	
	(1.38)	(1.29)	(1.50)	
LIQUIDITY07	-0.0010	-0.0006	-0.0003	
	(-0.33)	(-0.31)	(-0.13)	
CONCENTRATION07	0.0030	-0.0007	-0.0003	
	(0.66)	(-0.26)	(-0.14)	
LOANSTODEPTS07	0.0014	0.0005	0.0006	
	(0.94)	(0.46)	(0.55)	
Macroeconomic Variables				
GDPGROWTH0407	0.0446	-0.0138	-0.0140	
	(0.96)	(-1.19)	(-1.17)	
INFLATION0407	-0.0033	0.0039	0.0042	
	(-0.19)	(0.56)	(0.60)	
Structural Variables				
POPULATION07	0.0792	-0.0308	-0.0202	
	(0.48)	(-0.30)	(-0.23)	
GDPPERCAPITA07	-0.0221	-0.0107	-0.0080	
	(-0.16)	(-0.10)	(-0.08)	
KAOPEN	0.0718	0.0342	0.0331	
	(1.37)	(1.31)	(1.31)	
2022	1 2 4 5 0	0 1270	0.0222	
_cons	-1.3430 (-0.76)	(0.13)(0)	-0.0323	
	(0.70)	(0.12)	(0.05)	
Ν	52	51	51	
R-square	0.4403	0.6784	0.6801	

t statistics in parentheses

This table reports the estimated coefficients of the OLS model presented in equation (1) excluding countries with population of less than 1 million. The dependent variable is the drop in the borrower growth rate from 2007 to 2009. Our main variable of interest is financial inclusion expressed as the compound borrower growth rate 2004 to 2007. Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the inclusion and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

Table 10: Credit growth drop in the financial crisis and the level of financial inclusion.

SHARE BORROWERS 08	DROPCREDITGROWTH 0709			
	-0.0472 (-0.42)	-0.0647 (-0.68)	0.1280 (1.01)	
Financial Stability Indicators (pr	e-crisis)			
CREDIT GROWTH 0407		1.074***	1.252***	
		(7.11)	(7.16)	
INTERSHARE 08CREDIT GRW			-1.482** (-2.04)	
ZSCORE07	-0.0028	0.0024	0.0021	
	(-0.88)	(0.82)	(0.74)	
LIQUIDITY07	0.0021	0.0001	-0.0004	
	(1.19)	(0.06)	(-0.25)	
CONCENTRATION07	-0.00468**	-0.00340**	-0.00315*	
	(-2.28)	(-2.02)	(-1.96)	
LOANSTODEPTS07	0.00170*	0.0005	0.0006	
	(1.94)	(0.87)	(1.14)	
Macroeconomic Variables				
GDPGROWTH0407	0.0210**	0.0032	0.0042	
	(2.10)	(0.43)	(0.55)	
INFLATION0407	-0.0144	-0.0124	-0.0098	
	(-1.10)	(-1.50)	(-1.16)	
Structural Variables				
POPULATION07	-0.0777	0.0029	0.0021	
	(-1.54)	(0.06)	(0.04)	
GDPPERCAPITA07	-0.0694	-0.0492	-0.0308	
	(-0.84)	(-0.83)	(-0.54)	
KAOPEN	0.0245	0.0356**	0.0353**	
	(1.17)	(2.54)	(2.51)	
cons	1.049*	0.3310	0.2230	
_	(1.89)	(0.65)	(0.47)	
N	67	67	67	
<i>R-square</i>	0.2959	0.571	0.5876	

Excluding countries with a population < 1 million

t statistics in parentheses

This table reports the estimated coefficients of the OLS model presented in equation (2) excluding countries with population of less than 1 million. The dependent variable is the drop in credit growth rate from 2007 to 2009. Our main variable of interest is the level of financial inclusion expressed as the share of borrowers in the adult population in 2008. Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the inclusion and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

Table 11: Credit growth drop in the financial crisis and pre-crisis borrower growth

	DROP	CREDITGROWT	H 0709
INCLUSION0407	0.268**	-0.0980	-0.2040
	(2.57)	(-0.81)	(-0.48)
Financial Stability Indicators (n	pre-crisis)		
CREDIT GROWTH 0407		1.346***	1.237***
		(4.48)	(2.77)
INTERCREDITBORRW0407			0.3200
			(0.30)
ZSCORE07	-0.0018	0.0012	0.0009
	(-0.48)	(0.26)	(0.22)
LIQUIDITY07	0.0004	-0.0002	-0.0004
	(0.23)	(-0.09)	(-0.20)
CONCENTRATION07	-0.00431*	-0.00438**	-0.00461*
	(-1.85)	(-2.08)	(-1.74)
LOANSTODEPTS07	0.0018	0.0008	0.0007
	(1.66)	(0.96)	(1.08)
Macroeconomic Variables			
GDPGROWTH0407	0.0167*	-0.0026	-0.0024
	(1.79)	(-0.30)	(-0.29)
INFLATION0407	-0.0141	-0.0140	-0.0142
	(-1.08)	(-1.52)	(-1.52)
Structural Variables			
POPULATION07	-0.0955	-0.0729	-0.0803
	(-1.63)	(-1.11)	(-1.02)
GDPPERCAPITA07	-0.0420	-0.107*	-0.109*
	(-0.52)	(-1.81)	(-1.82)
KAOPEN	0.0273	0.0515***	0.0523***
	(1.28)	(2.84)	(2.79)
_cons	1.026*	1.161*	1.2810
	(1.70)	(1.85)	(1.59)
Ν	51	51	51
R-sauare	0.4272	0.6069	0.6086

Excluding countries with a population < 1 million

t statistics in parentheses

This table reports the estimated coefficients of the OLS model presented in equation (3) excluding small countries with population of less than 1 million. The dependent variable is the drop in credit growth rate from 2007 to 2009. Our main variable of interest is financial inclusion expressed as the compound borrower growth rate 2004 to 2007. Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the inclusion and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

Table 12: Drop in borrower growth in the financial crisis

Excluding advanced economies

	DROP IN E	BORROWER GR	OWTH 0709
INCLUSION0407	1.181***	0.986***	1.082*
	(4.65)	(3.17)	(1.83)
<i>Financial Stability Indicators (pre-crisis)</i>		0.4600	0.5560
CREDIT GROWTH 0407		(1.57)	(1.09)
INTERCREDITBORRW0407			-0.2860 (-0.18)
ZSCORE07	0.0137	0.00650*	0.00676**
	(1.55)	(1.84)	(2.04)
LIQUIDITY07	-0.0042	-0.0026	-0.0025
	(-1.25)	(-1.31)	(-1.28)
CONCENTRATION07	0.0044	0.0003	0.0005
	(0.87)	(0.10)	(0.20)
LOANSTODEPTS07	0.0005	0.0000	0.0000
	(0.32)	(-0.03)	(0.02)
<i>Macroeconomic Variables</i> GDPGROWTH0407	0.0417	-0.0080	-0.0081
INEL ATIONO407	(1.01)	(-0.76)	(-0.76)
INFLATION0407	(0.05)	(0.71)	(0.77)
Structural Variables	0.0529	0.0117	0.0165
POPULATION07	(0.54)	(0.17)	(0.28)
GDPPERCAPITA07	-0.0050	-0.0237	-0.0243
	(-0.04)	(-0.24)	(-0.24)
KAOPEN	0.0586	0.0270	0.0257
	(1.40)	(1.22)	(1.19)
_cons	-1.1800	-0.1230	-0.2060
	(-0.79)	(-0.14)	(-0.29)
N	55	54	54
R-square	0.4429	0.6691	0.6698

t statistics in parentheses

This table reports the estimated coefficients of the OLS model presented in equation (1) excluding advanced economies. The dependent variable is the drop in the borrower growth rate from 2007 to 2009. Our main variable of interest is financial inclusion expressed as the compound borrower growth rate 2004 to 2007. Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the inclusion and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

Table 13: Credit growth drop in the financial crisis and the level of financial inclusion.

T 1 1'	1 1	•
Excluding	advanced	economies
Excluding	uuvuneeu	comonnes

	DROPCREDITGROWTH 0709			
SHARE BORROWERS 08	-0.086	-0 183	0 255	
	(-0.34)	(-0.83)	(0.91)	
Financial Stability Indicators (pre-	crisis)			
CREDIT GROWTH 0407	,	0.975***	1.185***	
		(6.15)	(6.76)	
INTERSHARE 08CREDIT GRW			-1.811**	
			(-2.24)	
ZSCORE07	-0.004	0.001	0.000	
	(-1.22)	(0.17)	(0.13)	
LIQUIDITY07	0.00321*	0.001	0.001	
	(1.84)	(0.38)	(0.53)	
CONCENTRATION07	-0.00514**	-0.00395**	-0.00347**	
	(-2.38)	(-2.37)	(-2.15)	
LOANSTODEPTS07	0.00245**	0.001	0.001	
	(2.31)	(1.33)	(1.52)	
Macroeconomic Variables				
GDPGROWTH0407	0.017	0.002	0.001	
	(1.67)	(0.29)	(0.18)	
INFLATION0407	-0.013	-0.011	-0.008	
	(-0.95)	(-1.19)	(-0.89)	
Structural Variables				
POPULATION07	-0.105**	-0.052	-0.050	
	(-2.15)	(-1.08)	(-1.08)	
GDPPERCAPITA07	-0.043	-0.022	-0.003	
	(-0.44)	(-0.30)	(-0.04)	
KAOPEN	0.028	0.0303**	0.0319**	
	(1.47)	(2.17)	(2.41)	
_cons	1.127*	0.667	0.479	
	(2.00)	(1.37)	(1.01)	
Ν	67	67	67	
R-square	0.323	0.541	0.560	

t statistics in parentheses

This table reports the estimated coefficients of the OLS model presented in equation (2) excluding advanced economies. The dependent variable is the drop in credit growth rate from 2007 to 2009. Our main variable of interest is the level of financial inclusion expressed as the share of borrowers in the adult population in 2008. Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the inclusion and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

Table 14: Credit growth drop in the financial crisis and pre-crisis borrower growth

Excluding advanced economies

	DROPCREDITGROWTH 0709			
DIGULIGIONA (AF		0.055		
INCLUSION0407	0.239**	-0.057	-0.244	
	(2.22)	(-0.47)	(-0.33)	
Financial Stability Indicators (pr	e-crisis)			
CREDIT GROWTH 0407	,	1.126***	0.938*	
		(3.60)	(1.88)	
NITED ODEDITEO DE WO 407			0.550	
IN TERC REDITBORR W0407			0.559	
			(0.50)	
ZSCORE07	-0.002	0.001	0.000	
	(-0.49)	(0.20)	(0.09)	
	0.001	0.000	0.001	
LIQUIDITY07	0.001	(0.000)	-0.001	
	(0.40)	(-0.23)	(-0.32)	
CONCENTRATION07	-0.00427*	-0.00430**	-0.00472*	
	(-1.78)	(-2.10)	(-1.81)	
LOANSTODEPTS07	0.002	0.001	0.000	
	(1.37)	(0.48)	(0.40)	
Macroeconomic Variables				
GDPGROWTH0407	0.0151*	0.000	0.001	
	(1.75)	(0.04)	(0.07)	
NEL ATIONO407	0.012	0.012	0.014	
INFLATION0407	-0.013	-0.013	-0.014	
	(-1.04)	(-1.57)	(-1.57)	
Structural Variables				
POPULATION07	-0.111*	-0.083	-0.092	
	(-2.00)	(-1.40)	(-1.36)	
GDPPFRCAPITA07	-0.026	-0.089	-0.088	
	(-0.33)	(-1.33)	(-1.26)	
	× ,		· · · · ·	
KAOPEN	0.025	0.0367**	0.0393**	
	(1.40)	(2.15)	(2.15)	
cons	1 088	1 203*	1 364*	
	(1.67)	(1.97)	(1.88)	
	× /	× ,		
Ν	54	54	54	
R-square	0.412	0.539	0.544	

t statistics in parentheses

This table reports the estimated coefficients of the OLS model presented in equation (3) excluding advanced economies. The dependent variable is the drop in credit growth rate from 2007 to 2009. Our main variable of interest is financial inclusion expressed as the compound borrower growth rate 2004 to 2007. Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the inclusion and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

Table 15: Credit growth drop in the financial crisis and the Honohan indicator of inclusion.

	DROP	DROPCREDITGROWTH 0709			
HONOHAN	-0.00427*** (-2.71)	-0.00271** (-2.50)	-0.001 (-0.74)		
Financial Stability Indicators ((pre-crisis)				
CREDIT GROWTH 0407		0.995***	1.325***		
		(6.62)	(7.22)		
INTHONOHANCREDIT			-0.0126***		
			(-2.99)		
ZSCORE07	-0.003	0.001	0.000		
	(-0.95)	(0.43)	(0.10)		
LIQUIDITY07	0.002	0.001	0.001		
	(1.38)	(0.40)	(0.35)		
CONCENTRATION07	-0.00461**	-0.00351**	-0.00330**		
	(-2.25)	(-2.13)	(-2.05)		
LOANSTODEPTS07	0.00173**	0.000	0.001		
	(2.09)	(0.64)	(1.21)		
Macroeconomic Variables					
GDPGROWTH0407	0.0188**	0.005	0.005		
	(2.27)	(0.70)	(0.68)		
INFLATION0407	-0.0183*	-0.0148**	-0.0134*		
	(-1.79)	(-2.00)	(-1.80)		
Structural Variables					
POPULATION07	-0.108**	-0.061	-0.067		
	(-2.09)	(-1.13)	(-1.28)		
KAOPEN	0.0378**	0.0420***	0.0423***		
	(2.09)	(3.69)	(3.85)		
_cons	1.198**	0.745	0.705		
	(2.57)	(1.67)	(1.61)		
N	68	68	68		
R-square	0.357	0.566	0.586		

t statistics in parentheses

The Honohan indicator is highly correlated with GDP per capita (Table 4). Thus, we drop GDP per capita as a control variable in the regression.

This table reports the estimated coefficients of the OLS model presented in equation (2). The dependent variable is the drop in credit growth rate from 2007 to 2009. Our main variable of interest is the financial access indicator constructed by Honohan (2008). Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the inclusion and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

Table 16: Maximum credit growth drop over 2006-2010 and Honohan indicator of inclusion.

HONOHAN	H-M CREDIT DROP Max Drop on Outstanding Loans 0610			
	-0.00231** (-2.28)	-0.00136* (-1.85)	-0.0008 (-0.81)	
Financial Stability Indicators (pre-crisis)		0 (00***	0.710***	
CREDIT GROWTH 0407		0.608*** (4.19)	0.712*** (5.04)	
INTHONOHANCREDIT			(0.00) (-0.96)	
ZSCORE07	-0.00793***	-0.00528**	-0.00558**	
	(-3.60)	(-2.28)	(-2.36)	
LIQUIDITY07	0.00227*	0.0012	0.0012	
	(1.95)	(1.14)	(1.11)	
CONCENTRATION07	-0.0009	-0.0002	-0.0001	
	(-0.64)	(-0.17)	(-0.11)	
LOANSTODEPTS07	0.00128**	0.0005	0.0005	
	(2.59)	(1.09)	(1.27)	
<i>Macroeconomic Variables</i>	0.0178***	0.00945**	0.00954**	
GDPGROWTH0407	(3.74)	(2.30)	(2.21)	
INFLATION0407	0.0035	0.00563*	0.00606*	
	(0.77)	(1.85)	(1.90)	
<i>Structural Variables</i>	-0.0979***	-0.0690*	-0.0711*	
POPULATION07	(-2.80)	(-1.83)	(-1.87)	
KAOPEN	0.0304**	0.0330***	0.0330***	
	(2.18)	(2.79)	(2.78)	
_cons	0.872***	0.596*	0.583*	
	(2.67)	(1.76)	(1.74)	
N	68	68	68	
R-squared	0.4811	0.6216	0.6253	

t statistics in parentheses

*p<0.10, **p<0.05, ***p<0.01

The Honohan indicator is highly correlated with GDP per capita (Table 4). Thus, we drop GDP per capita as a control variable in the regression.

This table reports the estimated coefficients of the OLS model presented in equation (2). The dependent variable is the maximum credit drop in the period 2006-2010. Our main variable of interest is the financial access indicator constructed by Honohan (2008). Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the Honohan indicator and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

R-square	0.3846	0.4017	0.4042
N	75	75	75
	(-2.20)	(-2.19)	(-2.23)
_cons	-8.847**	-9.197**	-9.133**
	(1.13)	(1.15)	(1.17)
KAOPEN	0.1470	0.1500	0.1600
	(2.45)	(2.60)	(2.63)
GDPPERCAPITA07	1.436**	1.487***	1.553***
	(1.21)	(1.21)	(1.00)
Structural Variables POPULATION07	0.4250	0.4640	0.3870
<i>G</i>	(0.08)	(-2.06) 0.0269 (0.70)	(0.90)
INFLATION0407	(-2.25) 0.0251		0.0379
			(-2.16)
GDPGROWTH0407	-0.127**	-0.148**	-0.151**
Macroeconomic Variables			
LOANSTODEP1S0/	(2.35)	(2.02)	(2.07)
I O ANSTODEDTS07	0.0116**	0.0105**	0.0107**
CONCENTRATION07	0.0042	0.0041	0.0037
	(0.30)	(0.13)	(0.05)
LIQUIDITY07	0.0035	0.0017	0.0007
	(-1.55)	(-1.26)	(-1.33)
ZSCORE07	-0.0354	-0.0323	-0.0327
INTERSHARE 08CREDIT GRW		(0.59)	-7.3500 (-1.21)
			(1.29)
Financial Stability Indicators (pre-c CREDIT GROWTH 0407	erisis)	0.8740	2.1350
	(-1.93)	(-2.01)	(-1.49)
SHARE BORROWERS 08	-3.630*	-3.732**	-2.3890
	Cl	RISIS COUNTRI	ES

Table 17: Crisis countries and the level of financial inclusion

t statistics in parentheses

This table reports the estimated coefficients of a Probit model. The dependent variable is a dummy variable equal to 1 when a country experienced a banking crisis following Laeven and Valencia (2012) or concluded a Stand-by or Flexible Credit Line arrangements with the IMF in the period 2007-2009 (Belgium, Colombia, Costa Rica, Ecuador, Gabon, Georgia, Guatemala, Italy, Latvia, Nigeria, Pakistan, Poland, Portugal, Romania, Seychelles, UK). Our main variable of interest is the level of financial inclusion expressed as the share of borrowers in adult population in 2008. Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the level of inclusion and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

	C	RISIS COUNTRI	ES
INCLUSION0407	1.5210	0.5420	-0.6220
	(1.37)	(0.76)	(-0.22)
Financial Stability Indicators (pre	e-crisis)		
CREDIT GROWTH 0407		3.0650 (0.97)	2.1900 (0.52)
INTERCREDITBORRW0407			3.2870 -0.4400
ZSCORE07	-0.0432	-0.0412	-0.0432
	(-1.28)	(-1.10)	(-1.09)
LIQUIDITY07	-0.0213	-0.0259	-0.0285
	(-1.19)	(-1.30)	(-1.49)
CONCENTRATION07	0.0384**	0.0332*	0.0311
	(1.97)	(1.86)	(1.60)
LOANSTODEPTS07	0.0043	0.0011	0.0000
	(0.66)	(0.16)	(-0.01)
Macroeconomic Variables			
GDPGROWTH0407	-0.206**	-0.317*	-0.323*
	(-2.08)	(-1.81)	(-1.88)
INFLATION0407	0.0060	-0.0086	-0.0181
	(0.08)	(-0.12)	(-0.22)
Structural Variables			
POPULATION07	0.6450	0.6480	0.5990
	(1.45)	(1.42)	(1.20)
GDPPERCAPITA07	1.596**	1.303**	1.311**
	(2.18)	(2.11)	(2.13)
KAOPEN	0.0928	0.0999	0.0986
	(0.58)	(0.64)	(0.62)
_cons	-12.60**	-10.30*	-9.3320
	(-2.03)	(-1.93)	(-1.50)
Ν	60	59	59
<i>R-square</i>	0.3753	0.4017	0.4042

Table 18: Crisis countries and pre-crisis borrower growth

t statistics in parentheses

This table reports the estimated coefficients of a Probit model. The dependent variable is a dummy variable equal to 1 when a country experienced a banking crisis following Laeven and Valencia (2012) or concluded a Stand-by or Flexible Credit Line arrangement with the IMF in the period 2007-2009 (Colombia, Gabon, Georgia, Guatemala, Italy, Poland, Portugal, Seychelles, UK). Our main variable of interest is financial inclusion expressed as the compound borrower growth rate 2004 to 2007. Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the inclusion and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

Table 19: Drop in borrower growth in the financial crisis and pre-crisis borrower growth (orthogonalized)

	DROP IN BORROWERS GROWTH 0709		
INCLRESIDUALS	0.984***	0.970***	1.106**
	(3.67) erisis)	(3.21) 1.580*** (4.56)	(2.25)
Financial Stability Indicators (pre-cr			
CREDIT GROWTH 0407			1.625*** (5.14)
INTERINCLUSIONRESCREDIT			-0.4230 (-0.26)
ZSCORE07	-0.0007 (-0.19)	0.00578* (1.81)	0.00582* (1.78)
LIQUIDITY07	0.0022 (0.90)	-0.0019 (-1.17)	-0.0020 (-1.19)
CONCENTRATION07	-0.0027 (-0.98)	0.0000 (-0.00)	0.0003 (0.12)
LOANSTODEPTS07 Macroeconomic Variables	0.00287* (1.75)	0.0002 (0.21)	0.0002 (0.19)
GDPGROWTH0407	0.0204*** (2.92)	-0.0103 (-1.02)	-0.0111 (-1.11)
INFLATION0407	0.0021 (0.22) -0.0948 (-1.59)	0.0044 (0.76) 0.0183 (0.28)	0.0040 (0.61)
Structural Variables			
POPULATION07			0.0281 (0.48)
GDPPERCAPITA07	-0.0693 (-0.67)	-0.0133 (-0.15)	-0.0058 (-0.07)
KAOPEN	0.0273 (1.00)	0.0286 (1.36)	0.0255 (1.24)
_cons	0.8210 (1.02)	-0.1480 (-0.19)	-0.2590 (-0.38)
N	59	59	59
<i>R-square</i>	0.4841	0.6685	0.6694

t statistics in parentheses

This table reports the estimated coefficients of the OLS model presented in equation (1). The dependent variable is the drop in the borrower growth rate from 2007 to 2009. Our main variable of interest, INCLRESIDUALS, represents the residuals of regressing the compound borrower growth rate 2004 to 2007 on the compound real credit growth rate 2004 to 2007. Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the orthogonalized pre-crisis borrower growth rate and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

Table 20: Drop in borrower growth in the financial crisis and pre-crisis credit growth (orthogonalized)

	DROP IN BORROWERS GROWTH 0709		
INCLUSION0407	1.129*** (4.69)	1.116*** (4.07)	1.185*** (5.05)
Financial Stability Indicators (pre-cris	sis)		
CREDIT GROWTH RESID		0.4590 (1.55)	0.1800 (0.44)
INTERINCLUSIONCREDITRESD			0.7890 -0.6200
ZSCORE07	0.0115 (1.56)	0.00578* (1.81)	0.00531* (1.70)
LIQUIDITY07	-0.0023 (-0.92)	-0.0019 (-1.17)	-0.0025 (-1.45)
CONCENTRATION07	0.0032 (0.77)	0.0000 (-0.00)	0.0001 (0.03)
LOANSTODEPTS07	0.0012 (0.85) 0.0373 (0.97) 0.0006 (0.04)	0.0002 (0.21) -0.0103 (-1.02) 0.0044 (0.76)	-0.0003 (-0.31)
Macroeconomic Variables			
GDPGROWTH0407			-0.0123 (-1.25)
INFLATION0407			0.0048 (0.79)
Structural Variables			
POPULATION07	0.0557 (0.65)	0.0183 (0.28)	0.0269 (0.43)
GDPPERCAPITA07	0.0005 0.00	-0.0133 (-0.15)	0.0118 (0.14)
KAOPEN	0.0610 (1.44)	0.0286 (1.36)	0.0274 (1.26)
_cons	-1.1880 (-0.92)	-0.1580 (-0.20)	-0.2490 (-0.34)
N	60	59	59
<i>R-square</i>	0.4276	0.6685	0.6736

t statistics in parentheses

This table reports the estimated coefficients of the OLS model presented in equation (1). The dependent variable is the drop in the borrower growth rate from 2007 to 2009. Our main variable of interest is financial inclusion expressed as the compound borrower growth rate 2004 to 2007. Column 1 displays the baseline results, column 2 introduces orthogonalized pre-crisis CREDIT GROWTH resulting from regressing the compound real credit growth rate 2004 to 2007 on the compound borrower growth rate 2004 to 2007, and then using the residuals of this regression as control variable (CREDIT GROWTH RESID). Column 3 adds an interaction term between the inclusion and the orthogonalized credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

	DROP IN CREDITGROWTH 0709		
INCLRESIDUALS <i>Financial Stability Indicators (pre-o</i> CREDIT GROWTH 0407 INTERINCLUSIONRESCREDIT	$\begin{array}{c} -0.0385\\ (-0.21)\\ \hline \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	$\begin{array}{c} -0.0480\\ (-0.41)\\ 1.066^{***}\\ (4.56)\\ \end{array}$ $\begin{array}{c} 0.0008\\ (0.17)\\ -0.0007\\ (-0.45)\\ \hline 0.00408^{**}\\ (-2.07)\\ 0.0004\\ (0.46)\\ \end{array}$ $\begin{array}{c} 0.0007\\ (0.09)\\ -0.0136\\ (-1.46)\\ \hline 0.00770\\ (-1.28)\\ \hline -0.0791\\ (-1.37)\\ \end{array}$	-0.3290 (-0.86)
			0.972*** (3.40)
			0.8740 -0.8400
ZSCORE07			0.0007 (0.16)
LIQUIDITY07			-0.0005 (-0.36)
CONCENTRATION07 LOANSTODEPTS07			-0.00471* (-1.91)
			0.0004 (0.50)
Macroeconomic Variables			
GDPGROWTH0407			0.0024 (0.32)
INFLATION0407			-0.0127 (-1.38)
Structural Variables			
POPULATION07			-0.0972 (-1.35)
GDPPERCAPITA07			-0.0946 (-1.53)
KAOPEN	0.0366* (1.84)	0.0374** (2.39)	0.0438** (2.50)
_cons	1.788*** (2.98)	1.135* (1.97)	1.364* (1.91)
N	59	59	59
<i>R-square</i>	0.3671	0.5361	0.544

Table 21: Credit growth drop in the financial crisis and pre-crisis borrower growth (orthogonalized)

t statistics in parentheses

This table reports the estimated coefficients of the OLS model presented in equation (3). The dependent variable is the drop in credit growth from 2007 to 2009. Our main variable of interest, INCLRESIDUALS, represents the residuals of regressing the compound borrower growth rate 2004 to 2007 on the compound real credit growth rate 2004 to 2007. Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the orthogonalized precrisis borrower growth rate and the credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

	DROP IN CREDITGROWTH 0709		
INCLUSION0407	0.247** (2.40)	$\begin{array}{c} 0.310^{***} \\ (3.55) \\ 1.121^{***} \\ (3.69) \\ \end{array}$ $\begin{array}{c} 0.0008 \\ (0.17) \\ -0.0007 \\ (-0.45) \\ -0.00408^{**} \\ (-2.07) \\ 0.0004 \\ (0.46) \\ \end{array}$ $\begin{array}{c} 0.0007 \\ (0.09) \\ -0.0136 \\ (-1.46) \\ \end{array}$ $\begin{array}{c} -0.0770 \\ (-1.28) \\ -0.0791 \\ (-1.37) \end{array}$	0.280** (2.32)
Financial Stability Indicators (pre-cr	isis)		
CREDIT GROWTH RESID	$\begin{array}{c} -0.0025 \\ (-0.66) \\ 0.0004 \\ (0.25) \\ -0.00433* \\ (-1.91) \\ 0.0015 \\ (1.45) \\ \end{array}$ $\begin{array}{c} 0.0163** \\ (2.22) \\ -0.0136 \\ (-1.11) \\ -0.117** \\ (-2.20) \\ -0.0312 \\ (-0.44) \end{array}$		1.245*** (2.97)
			-0.3500 (-0.48)
ZSCORE07			0.0010 (0.21)
LIQUIDITY07			-0.0004 (-0.29) -0.00412** (-2.02) 0.0006 (0.67)
CONCENTRATION07 LOANSTODEPTS07			
GDPGROWTH0407			0.0016 (0.20)
INFLATION0407			-0.0138 (-1.50)
Structural Variables			
POPULATION07			-0.0809 (-1.29) -0.0902 (-1.42)
GDPPERCAPITA07			
KAOPEN			0.0237 (1.39)
_cons	1.186** (2.08)	1.248** (2.17)	1.288** (2.12)
N	59	59	59
R-square	0.4073	0.5361	0.5381

Table 22: Credit growth drop in the financial crisis and the pre-crisis credit growth (orthogonalized)

t statistics in parentheses

This table reports the estimated coefficients of the OLS model presented in equation (3). The dependent variable is the drop in credit growth from 2007 to 2009. Our main variable of interest is financial inclusion expressed as the compound borrower growth rate 2004 to 2007. Column 1 displays the baseline results, column 2 introduces orthogonalized pre-crisis CREDIT GROWTH resulting from regressing the compound real credit growth rate 2004 to 2007 on the compound borrower growth rate 2004 to 2007, and then using the residuals of this regression as control variable (CREDIT GROWTH RESID). Column 3 adds an interaction term between the inclusion and the orthogonalized credit growth variable. We control for a set of financial stability indicators for the pre-crisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.

SHARE BORROWERS 08	-0.092	-0.007	0 154
	(-0.55)	(-0.05)	(1.05)
Financial Stability Indicators (pr	e-crisis)		
CREDIT GROWTH 0407		0.973***	1.366***
		(6.64)	(3.01)
INTERSHARE 08CREDIT GRW			-2.792
			(-0.98)
ZSCORE07	-0.003	0.001	0.000
	(-1.21)	(0.51)	(0.11)
LIQUIDITY07	0.002	0.000	0.000
	(1.46)	(0.03)	(-0.18)
CONCENTRATION07	-0.00476***	-0.00354**	-0.00332**
	(-2.60)	(-2.37)	(-2.36)
LOANSTODEPTS07	0.00153*	0.000	0.001
	(1.92)	(0.53)	(1.02)
Macroeconomic Variables			
GDPGROWTH0407	0.0193***	0.004	0.001
	(2.69)	(0.73)	(0.20)
INFLATION0407	-0.014	-0.013	-0.006
	(-1.20)	(-1.59)	(-0.83)
Structural Variables	0 102**	0.020	0.061
POPULATION07	-0.102**	-0.039	-0.061
CODDEDCADITA07	0.050	0.049	0.044
GDPPERCAPITA0/	-0.030	-0.048	-0.430
VAODENI	0.023	0.0268**	0.0202**
KAOPEN	(1.38)	(2.18)	(2.12)
2075	1 200***	0.682	()
	(2.61)	(1.57)	(1.21)
N	75	75	75
R-squared	0 587	0.515	0.523

Table 23: Credit growth drop in the financial crisis and the level of financial inclusion (IV approach)

DROPCREDITGROWTH 0709

Instrumented: Share_Borr_2008		
Instruments:	ZSCORE07	INFLATION0407
	LIQUIDITY07	POPULATION07
	CONCENTRATION07	GDPPERCAPITA07
	LOANST ODEPT S07	KAOPEN
	GDPGROWTH0407	DENSITY 07

This table reports the estimated coefficients of the IV 2SLS model presented in equation (2). The dependent variable is the drop in credit growth from 2007 to 2009. Our main variable of interest is the level of financial inclusion expressed as the share of borrowers in the adult population in 2008 and instrumented by population density. Column 1 displays the baseline results, column 2 introduces the compound real credit growth rate 2004 to 2007 as control variable, and column 3 adds an interaction term between the inclusion instrumented by population density and the credit growth variable. We control for a set of financial stability indicators for the precrisis period as well as for macroeconomic and structural variables. Robust standard errors are provided in parentheses.
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