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Net External Position, Financial Development, and Banking Crisis

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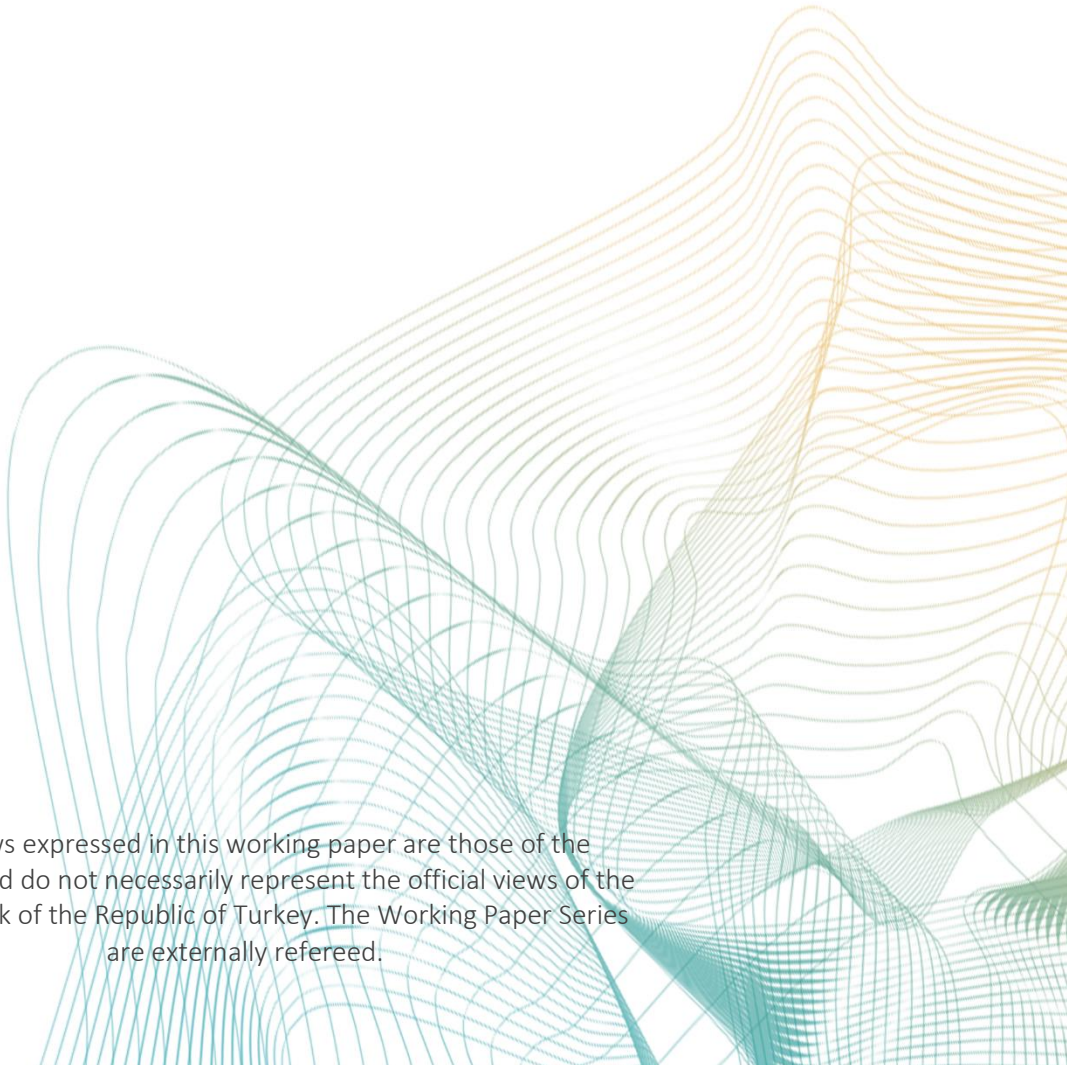

Net External Position, Financial Development, and Banking Crisis

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Abstract

Does the external position of a country that is conditioned on financial development impact the likelihood of a systemic banking crisis? We address this question using data from 149 developing and advanced countries from 1970 to 2011, as well as a variety of statistical tools. Our findings are twofold. First, we find that the net external position of a country significantly affects its likelihood of a systemic crisis depending on the level of financial development. Conditional on low to moderate financial development, countries can lower the risk of banking crises significantly by maintaining a net foreign creditor status. Second, we find that the level of financial development raises a country's crisis risk significantly while its impact depends on the net asset position. This indicates a potential amplification effect in which countries with more developed and complex financial systems that are also debtor countries have a higher potential of incurring a systemic banking crisis.

Keywords: Banking crisis, net external position, financial development, probit.
JEL Classification: E44, F34, G15, H63

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Non-technical Summary

The global financial crisis originated in advanced economies with very complex, large, and highly interconnected financial systems. Therefore, the relevance of the pace of financial development to financial crises has been questioned in the empirical literature. Furthermore, it is documented in the literature that higher net foreign liabilities increase the risk of external crises. It is observed that together with the financial globalization process that began in the early 1980s, the net foreign asset positions of countries started to change, as more advanced financial markets accumulate foreign liabilities gradually. For example, the U.S., with the highest financial development level, began to register a secular decline in their NFA position during that period.

Motivated with these observations and findings in the literature, in this paper, we focus on both the net external position of countries and the level of financial development, but not on their causal relationship. Our focus in this study is the role of these factors on the likelihood of incurring a systemic crisis and even searching for the existence of a financial development threshold at which net external position of a country affects the likelihood of systemic crises. To this end, we perform a cross-country analysis that involves 149 developing and advanced countries from 1970 to 2011, using a variety of statistical tools.

Our main findings indicate that the net external position of a country significantly affects its likelihood of a systemic crisis depending on the level of financial development. Being a creditor implies that a country could significantly lower the risk of a banking crisis depending on the level of financial development. A creditor country, with low levels of financial market depth and development, has a significantly reduced crisis risk. Second, our findings reveal that the level of financial development raises a country's crisis risk significantly while its impact depends on the net asset position of the country. This indicates a potential amplification effect in which countries with more developed and complex financial systems that are also debtor countries have a higher potential of incurring a systemic banking crisis.

1. Introduction

Do external imbalances impact a country's likelihood of incurring a systemic crisis? Such has been asserted as the central cause of the Spanish crisis, as the widening deficit position in the nonfinancial corporate sector was the main factor behind the country's increasing external imbalances (Caldentey and Vernengo, 2015). Catao and Milesi-Ferretti (2014) also found that higher net foreign liabilities (NFL) increase the risk of external crises, particularly when NFL exceed 50% of GDP, and this ratio rises 20 percentage points above the country-specific historical mean.

Global imbalances and the impact of their potential corrections were at the center of policy debates before the global financial crisis (GFC). During that period, the pattern of current account imbalances led to unprecedented and considerable cross-country differences in net foreign asset (NFA) positions as rapid expansions occurred in the net external liabilities of several countries that borrowed heavily[1] (Lane and Milesi-Ferretti, 2012). Although the debate prior to the GFC focused on whether the unwinding of global imbalances would be fast or slow, the GFC was not necessarily associated with a "disorderly unwinding"[2] of such imbalances in the aftermath (Catao and Milesi-Ferretti, 2014).

A vast literature exists on the possible reasons behind global imbalances.[3] For instance, Mendoza et al. (2009) have argued that global financial imbalances can arise from financial integration of countries with heterogeneous domestic financial-market development.[4] Globalization of capital markets has resulted in different degrees of financial development in many countries, even within advanced countries. Together with the financial globalization process that began in the early 1980s, the NFA positions of countries started to change. For example, the U.S., with the highest financial development level, began to register a secular decline in their NFA position during that period. A marked observation is that "countries with more advanced financial markets accumulate foreign liabilities in a gradual, long-lasting process" (Mendoza et al., 2009).

[1] In Greece, Portugal and Spain, average net external liabilities were around 36% of GDP in 2000, while by the end of 2007, such liabilities amounted to 87% .
[2] This quote belongs to Catao and Milesi-Ferretti (2014).
[3] See, for instance, Mendoza et al. (2009) and references therein.
[4] The role of differences in domestic financial-market development in producing external imbalances has been examined by other studies in the literature such as Willen (2004) and Caballero et al. (2008).

The GFC originated in advanced economies with very complex, large, and highly interconnected financial systems. The pace of financial development has been examined in the empirical literature in relation to financial crises. It has been documented that financial instability synchronizes with the pace of financial deepening (Svirydzenka, 2016). A rapid pace in the growth of institutions—particularly in a financial system that is weakly regulated and supervised—can be accompanied by greater risk-taking and high leverage, thereby raising the likelihood of a crisis (Svirydzenka, 2016).

Accordingly, policy makers might ask: Should there be limits to financial development and would any tradeoffs be associated with such limits? Köse et al. (2011) provided an empirical framework to examine the existence of a financial development threshold at which financial globalization raises the risk of systemic crises.[5] Svirydzenka (2016), on the other hand, claimed that after breaching a certain level, the benefits of financial development might outweigh the costs. In the face of such opposing views, the need to revisit the role of financial development in triggering financial crises becomes very evident.

In this paper, we focus on both the net external position of countries and the level of financial development, but not on their causal relationship, as reported by Mendoza et al. (2009). Rather, we pose the following two questions. First, is there a threshold level of domestic financial development in generating vulnerabilities in the banking sector and raising the probability of systemic crisis? Second, does a country's external position affect its likelihood of a systemic crisis? In attempting to answer these questions, we contribute to the extant literature on optimal financial development echoed by Köse et al. (2011) by examining the role of financial development in heightening the risk of a systemic crisis depending on the external position of a country.

Accordingly, we use data from a sample of 149 developing and developed countries from 1970 to 2011. We do not rely on a single measure, but instead explore alternative *de facto* and *de jure* indicators that account for both institutional and economic aspects of financial development. Financial development is generally proxied by the ratio of private credit to GDP and by the ratio of stock market capitalization to GDP. This is a narrow definition of financial development. Thus, we consider a rather comprehensive index that

[5] Other studies exist that claim threshold levels, but Köse et al. (2011) is one of the leading studies that analyzes this framework empirically.

encompasses institutions—banking and nonbanking—as well as markets introduced by Svirydzenka (2016).[6] To account for the net external (debtor/creditor) position of a country, we use net foreign asset (NFA) data from Lane and Milesi-Ferretti (2007).[7]

Controlling for standard macro and institutional variables and using a pooled probit model, we first find that the net external position of a country significantly affects its likelihood of a systemic crisis. Being a creditor implies that a country could significantly lower the risk of a banking crisis depending on the level of financial development. A creditor country, with low levels of financial market depth and development, has a significantly reduced crisis risk. The threshold level of financial market depth is found to be 0.6, while it is 0.5 for the overall measure of financial development (FD). Second, we find that the level of financial development raises the crisis risk significantly, while its impact depends on the net asset position of the country. This indicates a potential amplification effect in which countries with more developed and complex financial systems that are also debtors (with negative net asset position) have a higher probability of a systemic banking crisis.

The remainder of this paper is organized as follows. In Section 2, we discuss data and methodology. In Section 3, we present empirical results while Section 4 concludes.

2. Data and Methodology

2.1. Data

The empirical literature on banking crises initially focused on emerging markets (Frankel and Rose, 1996; Kaminsky and Reinhart, 1999). However, recent studies have extended to a larger group of countries—both developing and developed (Rose and Spiegel, 2011; Frankel and Saravelos, 2012). After the GFC, several studies focused only on developed countries (Reinhart and Rogoff, 2009; Barrell et al., 2010).

The current study covers comprehensive data spanning from 1970 to 2011 in 149 countries, out of which 28 are advanced and the remainder are developing and emerging

[6] For more information, see Svirydzenka (2016). Financial institutions include banks, insurance companies, mutual funds, pension funds, and other types of nonbank financial institutions, while financial markets include stock and bond markets. Furthermore, within financial markets and financial institutions, different dimensions are measured such as depth, access, and efficiency.

[7] Net external position is defined as the sum of net claims of domestic residents on nonresidents.

countries. We only exclude low-income countries that have major data limitations. In addition, we exclude Ireland for the reason discussed in Catao and Milesi-Ferretti (2014). We also drop Iceland after 2000 because of a significant shift in NFL from around 110% in 2007 to some 700% of GDP at end-2008.[8] A complete list of countries is presented in Appendix Table A1.

2.1.1. Dependent Variable

Laeven and Valencia (2012, 2013) is our key reference for the identification of a systemic banking crisis.[9] Borderline or systemic crisis episodes were selected for the study. A detailed list of crises and their durations is also presented in Appendix Table A1. Laeven and Valencia (2013) define a banking crisis as systemic based on two conditions: (1) significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and bank liquidations); and (2) significant banking policy intervention measures in response to significant losses in the banking system. Policy interventions are important parameters in determining a banking crisis. In that respect, Laeven and Valencia (2013) examined the following six policy interventions to define a systemic crisis: extensive liquidity support, significant guarantees on liabilities, significant restructuring costs, significant asset purchases, and significant nationalizations. Cases that almost met the definition of a systemic crisis are classified as "borderline."

2.1.2. Explanatory Variables

The choice of explanatory variables is based on both theoretical and empirical literature.[10] The crisis literature has focused on the role of domestic factors such as current account deficits, credit booms, and financial system vulnerabilities. The macroeconomic indicators[11] included in all regressions are *credit growth*, *inflation*, *M2/reserves ratio*, *GDP*

[8] As noted in Catao and Milesi-Ferretti (2014), in the case of Ireland, "its debt/equity split is heavily distorted by its sizable mutual fund industry, whose liabilities are recorded as equity instruments but whose assets include both equity and debt."

[9] This definition is similar to that used by Reinhart and Rogoff (2008). For a discussion of the definition of other databases such as Caprio and Klingebiel (1996), Demirgüç-Kunt and Detragiache (1998, 2005), and Kaminsky and Reinhart (1999), see Davis and Karim (2008). Furthermore, see Chaudron and de Haan (2014), on inconsistencies between the three major databases in the identification and timing of crises.

[10] See Demirgüç-Kunt and Detragiache (1998), Aizenman and Noy (2013), Barrell et al. (2010), Caggiano et al. (2014). See also Claessens and Köse (2013), which provides a comprehensive survey of the literature on financial crises.

[11] The macroeconomic factors considered in Demirgüç-Kunt and Detragiache (1998) are inflation, rate of growth of real GDP, external terms of trade, ratio of credit to the private sector to GDP, rate of depreciation of the exchange rate, ratio of M2 to foreign exchange reserves, government surplus as a percentage of GDP, ratio

per capita, and *real effective exchange rate*. Appendix Table A3 reports the summary statistics of all variables involved in the empirical analysis.

In the aftermath of the GFC, there has been renewed interest in the role of fluctuations in monetary aggregates and credit, as these factors account for the amplification and propagation of shocks especially during times of financial distress.[12] The most influential post-GFC view is that excessive credit growth generates risks such as "imbalances" and "financial instability"[13] and involves important information for policy makers that monitor financial and economic stability, particularly in regards to the likelihood of future financial crises. In the two leading studies in this respect,[14] Schularick and Taylor (2012) and Jorda et al. (2011),[15] credit booms appear as a strong predictor of a financial crisis. Schularick and Taylor (2012) argue that "*the credit system matters above and beyond its role as propagator of shocks as in the financial accelerator model. The credit system seems all too capable of creating its very own shocks, judged by how successful past credit growth performs as a predictor of financial crises*." Similarly, Schularick and Taylor (2012) claimed that credit booms are stronger predictors of financial crisis than monetary aggregates. Jorda et al. (2010) also found that a credit boom over the previous five years is indicative of a heightened risk of a financial crisis as well as a superior predictor of a potential crisis than current account imbalances. Accordingly, the probability of a crisis is expected to increase when credit grows too fast. In this paper, we use growth of the *credit-to-GDP ratio* instead of the growth of real credit mainly due to data availability and a better measure across the sample.

M2 to reserves ratio reflect the financial fragility or vulnerability of the domestic economy to withstand a reversal in capital flows, as a higher value indicates a higher vulnerability to capital outflows and hence the probability of incurring a banking crisis.[16] *Inflation*, on the other hand, is included to account for macroeconomic instability, which increases the likelihood of a crisis. According to Demirgüç-Kunt and Detragiache (1998), high inflation is likely to be associated with high nominal interest rates, which may have an

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of bank cash, reserves to bank assets, and real short-term interest rate. The authors find low GDP growth, excessively high real interest rates, and high inflation all significantly increased the likelihood of systemic problems.

[12] Mendoza and Quadrini (2010).

[13] Borio and Lowe (2002); Goodhart (2007).

[14] Other studies that associates excessive credit expansion and financial crises are Kindleberger (1978); Hume and Sentence (2009); Reinhart and Rogoff (2009).

[15] In both studies, the analysis covers 14 developed countries from 1870 to 2008.

[16] See Eichengreen and Rose (1998) and Caggiano et al (2014).

adverse impact on the economy and the banking system. We include the level of *GDP per capita* to account for stages of economic development. For instance, Demirgüc-Kunt and Detragiache (2005) found that countries with low GDP per capita are more prone to crises, which may be due to poor institutional quality. *Real effective exchange rate* (REER index) is used to proxy for trade competitiveness since investors have the view that deterioration in the competitiveness of the economy could raise its vulnerability to shocks and increase external sustainability concerns (Kaminsky, 1999).

There are some other macroeconomic indicators used in the literature on banking crises. Reinhart and Rogoff (2009) argued that widening current account imbalances was a common leading indicator of banking crises in OECD countries.[17] For instance, Obstfeld (2012) highlighted the large current account imbalance as a symptom of structural vulnerabilities and unsustainable trends, as well as financial and economic distortions that warrant careful scrutiny. Eichengreen and Rose (1998) provided similar evidence for developing economies. However, Hardy and Pazarbaşıoğlu (1999) did not attribute any significant influence to current account balance as a reason to predict banking crises for either developed or developing countries. Although we also controlled for *current account balance to GDP ratio* and *government consumption to GDP ratio*, we did not find statistically notable effects for either variable. In addition, we excluded variables such as the terms of trade and real interest rate mainly due to data limitations.

A strand of literature, such as Mannasoo and Mayes (2009), Barrell et al. (2010), Wong et al. (2010), has documented that balance sheet variables are also leading indicators of banking crises. The market structure of the banking sector may also matter. For instance, Beck et al. (2006) showed that crises are less likely in more concentrated banking systems. Therefore, we also controlled for bank competition and we used the ratio of bank credit to bank deposits as proxy for funding composition and liquidity. A higher credit/deposit ratio may indicate a lower capacity of the banking system to cope with deposit withdrawals, hence raising the probability of a crisis.

In this paper, we investigate the role of an economy's external position in terms of insulating it from a systemic banking crisis. In order to account for the *net external position (debtor/creditor)*, we generate an indicator variable using net foreign asset (NFA) data from

[17] Related to previous studies, see references in Catao et al. (2014).

the Lane and Milesi-Ferretti (2007) database that covers the period of 1970 to 2011. If the NFA position of the country is positive, then "*net asset dummy*" (NAD) takes value of 1, indicating a creditor country. In the case of a negative NFA, the NAD takes a value of zero, representing a debtor country.

The second most important indicator for the hypothesis tested in this study is the level of financial development. In a recent study, Svirydzenka (2016) provided a new dataset of financial development. One advantage of this information is to provide alternative measures of financial development using proxies to account for different aspects. In the Appendix Table A4, a map of all the financial development indicators created by Svirydzenka (2016) is provided. The pyramid in Table A4 gives an overall picture of the indicators and makes it easier to categorize different indexes. Although we made use of all of the indicators presented in Table A4 in the empirical analysis, we report only the statistically significant ones. Henceforth, measures of financial development used in this study are financial institutional access (FIA), financial development (FD), financial markets (FM), financial institutions (FI) and financial markets' depth (FMD). To account for possible interaction effects and to test whether an NFA position affects the probability of a systemic crisis conditioned on financial development, we define an interaction variable by multiplying lagged values of different measures of development with a "*net asset dummy*" variable. Additionally, we account for *de jure* financial openness using Chinn and Ito (2006). Further details on the source and definition of variables are provided in Appendix Table A2.

2.2. Methodology

A wide range of estimation methods has been used in the leading indicators literature. We grouped them into three broad categories.[18] The first and most commonly used indicator that we chose to use in this study is the limited dependent variable model.[19] Frankel and Rose (1996), Sachs et al. (1996), and Demirgüç-Kunt and Detragiache (1998) are among the seminal studies that have used the same method. Most recently, this indicator was also used in Beck et al. (2006), Davis and Karim (2008), Barrell at al. (2010), Caggiano et al. (2014)

[18] Frankel and Saravelos (2012) offered a fourth category that uses a qualitative and quantitative analysis of the behavior of various variables around a crisis occurrence by splitting countries into a crisis and non-crisis control groups.

[19] Comelli (2014) compared how two competing parametric-limited dependent variable EWS (fixed effects logit and random effects probit) that predicted in-sample and out-of-sample currency crises in emerging market economies. They found their performances are quite close and sensitive to estimation sample size.

and Catao and Milesi-Ferretti (2014). The second approach in the crisis literature is known as the signaling approach that was introduced by Kaminsky et al. (1998) and later used in several other studies. The third approach includes various methods such as binary recursive trees to determine leading-indicator crisis thresholds, Markov switching models, and Bayesian model averaging techniques.

The empirical literature on early warning systems (EWS) generally uses either the signaling approach or a logit model. It has been claimed that the binomial logit method outperforms the signals approach in crisis prediction.[20] In the current study, following Catao and Milesi-Ferretti (2014) and several others, we use pooled probit[21] model rather than fixed effect logit model. Fixed effects models are unable to deal with countries that have not experienced a crisis and hence such models exclude all non-crisis observations from the sample, as no variation exists in the dependent variable for those countries and thus potentially introduces a selection bias. The country-specific dummy and the banking crisis dummy would be perfectly correlated for the countries that have not experienced a banking crisis.[22] The number of non-crisis countries is 60 out of 149 countries in our sample. Therefore, running a fixed effects model would mean simply losing observations for the 60 countries that have never experienced a crisis.

To test our main hypothesis, we examine the probability of a banking crisis in a multivariate framework through examining the interaction of a net asset position with the country's financial development. To this end, the probability of the onset of a banking crisis is regressed on a set of macro and institutional variables. Our empirical model takes the following form:[23]

$$[\text{Prob}\,(CRISIS_{it}=1|\,X_{it})] = F\,(\beta X_{it-1}+\gamma NetAssetD_{it}+\alpha FD_{it-1}+\delta NetAssetD_{it}xFD_{it-1}), \quad (1)$$

where the dependent variable (CRISIS) is defined as a banking crisis dummy—a binary variable—which takes the value of one in the case of a crisis or zero if there is no crisis. Only the first year of the crisis is denoted as one, and a crisis beyond that first year until the country regains market access is excluded from the sample to avoid an endogeneity

[20] See Demirgüç-Kunt and Detragiache (2000) and Davis and Karim (2008) for more information.
[21] See Wooldridge (2010, ch.15, Section 8) for a further rationale for reliance on a pooled probit model.
[22] Davis and Karim (2008:99).
[23] A multivariate probit is used by Eichengreen and Rose (1998), Aizenman and Noy (2013), Caprio et al. (2014) among others.

problem. *X* is a vector of macroeconomic variables. To avoid a post-crisis bias, which points to the fact that a crisis occurrence will affect all of these control variables, control variables are lagged one year.[24] *NetAssetD* is the "*net asset dummy*" variable that takes a value of one if the NFA[25] position of the country is positive and zero otherwise. *FD* proxies financial development. As previously discussed, the panel is estimated using a pooled probit model. Similar to the treatment of a dependent variable, in order to reduce the impact of crises, crisis-year observations of explanatory variables beyond the first year are excluded from the sample following many studies in the literature.[26]

3. Estimation Results

Table 1 reports the correlation matrix of the variables. On the basis of the magnitude of correlation coefficients between variables, we can conclude that no evidence exists for multicollinearity.[27] Estimation results for various specifications of the pooled probit model are documented in Table 2. These estimations include all countries in the sample, and all explanatory variables except the *net asset dummy* variable were lagged by one year to avoid a potential endogeneity problem. Standard errors for parameter estimates are clustered by country.

Specification (1) in Table 2 includes standard macro variables such as current account balance, government consumption to GDP ratio, credit growth, GDP per capita, inflation, M2/reserves and the real effective exchange rate as well as indicators related to banking system structure and balance sheet, including bank concentration and bank credit-to-bank- deposits ratio. Among those variables, current account balance and government consumption to GDP ratio are not found to be statistically significant in affecting the probability of a banking crisis. Therefore, in specification (2), we omit these two variables. Coefficients of the credit growth, inflation, M2 to reserves ratio, real effective exchange rate and bank credit-to-bank-deposits ratio in all specifications from (1) to (8) are statistically

[24] In the literature, see Ito (2004), Klomp (2010), Noy (2004), Barrell et al. (2010) and Wong et al. (2010) among many others for applying the same methodology.
[25] The net foreign asset position, which is defined as foreign assets minus foreign liabilities divided by GDP.
[26] Among those, see Demirgüç-Kunt and Detragiache (1998, 2005), Barrell et al. (2010) and Catao and Milesi-Ferretti (2014).
[27] Cohen (1988) defines $0.1<|r|<0.3$ as small correlation; $0.3<|r|<0.5$ as medium/moderate correlation; $|r|>0.5$ as large/strong correlation.

significant with expected signs.[28] In line with Beck et al. (2006), bank concentration is also statistically significant in most specifications.

We extend specification (2) by adding the *net asset dummy* variable and interaction terms in the rest of the specifications in Table 2 to address the main questions of the paper. In specifications (3) to (8), both the net external position represented by the *net asset dummy* variable and its interaction with various financial development indicators (FM, FD, FI, FIA and FMD),[29] are included simultaneously. In most specifications, we find that a net external position—i.e. being a creditor or debtor country—has a significant association with the probability of a systemic banking crisis. Thus, being a creditor significantly lowers the probability of a banking crisis, while a debtor country has a higher probability.[30] The role of financial development is robust across different categories of financial development, such as FIA, FM, FD, FI and FMD.

We find that the interaction terms between a net external position and various measures of financial development are significantly positive in most specifications (such as 5, 6 and 8; i.e., for FD, FM, and FMD). We present the evidence that financial development raises the crisis risk, while being a creditor country lowers that risk. In order to interpret the impact of the interaction of these two variables, however, we need further analysis.[31]

To gain additional insight into the marginal effects of the NFA position conditioned on financial development, we calculated the marginal effects at various levels of FD, FMD, and FM[32] (see Table 3). Figure 1 also shows graphs of the marginal effects documented in Table 3. Conditional marginal effects calculated using various levels of FMD imply that being a creditor country significantly lowers the crisis risk over all FMD levels from 0.2 to 0.6. Thus, we may talk about a threshold level of 0.6, after which being a creditor country has no significant impact on crisis risk. When we repeat this analysis using the measures of

[28] We have discussed expected impacts and signs of these explanatory variables in section 2.1.
[29] Abbreviations for financial markets, financial development, financial institutions, financial institutional access, and financial markets depth.
[30] Since one of the main purposes of this study is to find out the impact of net external position of countries on the probability of banking crisis, we do not use the level of net foreign asset/liabilities variable in estimations. Involving the level of net foreign asset/liabilities indicator opens new questions beyond asking the impact of creditor/debtor position of a country as well as the difficulty of interpreting interaction terms with financial development.
[31] See Karaca-Mandic et al. (2012) and Norton et al. (2004) regarding the analysis of interaction terms in nonlinear models.
[32] We choose to report marginal effects using these three indicators of financial development, as only the interaction terms with the net asset dummy variables are found to be statistically significant in Table 2.

financial development such as FD and FM, the threshold level for FD and FM is registered as 0.5 (Table 3). Beyond this level, the impact of being a creditor has no significant impact on lowering the crisis probability.

We further examine the marginal effects in Table 4, when a country is a debtor (NAD=0) and all other variables are set to their mean values. These findings suggest that FMD, FD, and FM significantly raise the probability of a banking crisis for debtor countries. We find that the probability of having a crisis for a debtor country considering the impact of FMD is 5.2%, while that probability is almost zero for a creditor country (NAD=1) when all variables are set to their means. The probability of having a crisis for a debtor country increases to 8.2% when the impact of FD is taken into account. In other words, based on the analyses performed in Tables 3 and 4, a potential amplification effect occurs whereby countries with developed and complex financial systems, and those with a negative net asset position, have a higher potential of experiencing systemic banking crisis. These are the key findings related to our main hypothesis.

Before proceeding with the robustness checks, we need to clarify how we selected our benchmark specification for further analysis. We evaluated the overall model performances by the area under the operating characteristic curves (ROC), which are a measure of the model's predictive ability in Fig. 2. The estimated area under the receiver operating characteristic curve (AUROC) for all specifications is also reported in Table 2. Using the area under the ROCs as model performance criteria, adding the *net asset dummy* variable in the third specification does not improve the baseline the model significantly, while the model overall has significant explanatory power (the p-value of AUC is 0.033). Although the area under the ROC indicates the statistically significant predictive power of all models, there is only a marginal increase in predictive power when financial development indicators and their interactions are included throughout the specifications. Specification (8) in which the "financial markets' depth" (FMD) variable and its interaction are added to the model has the highest predictive power among all specifications.

We present the marginal effects for the benchmark specification (column 8 of Table 2) in Table 5. The marginal-effect table also shows the economically and statistically significant impact of financial development and the net asset position. Elasticities displayed

in Table 6 are low at the sample mean, as crises are rare events.[33] A 1% point increase in inflation raises the crisis probability by approximately 4.7%. As the net asset-indicator variable moves from zero to one—i.e., moving from debtor to creditor—the probability of crisis risk declines by about 1.4%. On the other hand, the impact of financial market depth can be interpreted as raising the crisis risk by 3.2% in response to a 1% point increase in the FMD.

3.1. Robustness Checks

We provide some robustness checks for the baseline probit model specification (column 8 of Table 2) in Table 7. First, we examine whether our results are affected by soundness of the financial system. In that respect, we use indicators such as bank regulatory capital, deposit money bank assets as percentage of GDP, provisions to NPL, and bank z-score to represent financial system stability. Among those variables, only the impact of provisions to the NPL ratio on the probability of a banking crisis is statistically significant and negative. In specifications from (2) to (5), our baseline results remain robust.

We provide a further robustness test by investigating the role of institutional arrangement on financial openness. To that end, we use the *de jure* measure of a country's financial openness constructed by Chinn and Ito (2006). However, we do not find a significant impact of financial openness (KAOPEN variable) on the likelihood of banking crises.

As a final robustness check, we examine whether the strength of our results would be affected by the impact of portfolio investment outflows, equity portfolio outflows, and net equity portfolio investment inflows. We find that portfolio investment outflows and net equity portfolio investment inflows significantly affect the probability of a banking crisis with expected signs—i.e., outflows raise the probability while inflows reduce its likelihood. Still, our parameter estimates for the interaction term and net asset position remain significant after controlling for capital inflows and outflows. Related to the stock market volatility variable, our finding—i.e., a negative and significant impact—is in line with

[33] See Catao and Ferretti (2014) for further discussion.

related literature that claims low risk can paradoxically increase the probability of a systemic event.[34] Along with the addition of all these variables, our baseline results do not change.

4. Conclusions

Does the external position of a country conditioned on financial development affect the likelihood of a systemic banking crisis? In this paper, we address this question using data from 149 developing and advanced countries over a sample from 1970 to 2011. We do not simply rely on a single measure of financial development, but instead explore both *de facto* and *de jure* indicators of this phenomenon to account for both institutional and economic aspects. Controlling for standard macro variables and using a pooled probit model, we first find that the net external position of a country significantly affects its likelihood of having a systemic crisis. Conditional on having low to moderate financial development, countries can lower the risk of banking crises significantly by maintaining net foreign creditor status. Secondly, we find that financial development raises the crisis risk significantly, while the crisis impact depends on the net asset position of the country. This indicates a potential amplification effect that countries with more developed and complex financial systems, which are also debtor countries, have a higher potential of a systemic banking crisis.

[34] For further discussion, see Danielsson et al. (2016) and references therein.

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Table 1: Pearson's Correlation Coefficient Matrix

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
[1]	**Credit Growth**													
[2]	**GDP per capita**	0.02	1											
[3]	**Inflation**	-0.08	-0.06	1										
[4]	**M2/reserves ratio**	-0.06	0.02	0.01	1									
[5]	**Real Effective Exchange Rate**	-0.01	-0.03	0.05	0	1								
[6]	**Bank concentration**	-0.02	-0.08	0.03	-0.15	0.03	1							
[7]	**Bank credit to bank deposits (%)**	0.07	0.06	0.03	-0.04	-0.03	-0.17	1						
[8]	**Net Asset Dummy (NAD)**	0.02	0.25	-0.01	0.05	-0.01	0.06	-0.07	1					
[9]	**Financial Institutional Access (FIA)**	0.02	0.62	-0.06	0.09	-0.02	-0.18	0.09	-0.09	1				
[10]	**Financial Development (FD)**	0.04	0.72	-0.07	0.07	-0.03	-0.14	0.19	-0.03	0.77	1			
[11]	**Financial Markets (FM)**	0.05	0.61	-0.05	0.05	-0.02	-0.14	0.18	0.06	0.54	0.92	1		
[12]	**Financial Institutions (FI)**	0.02	0.71	-0.08	0.08	-0.04	-0.12	0.16	-0.12	0.88	0.92	0.69	1	
[13]	**Financial Markets Depth (FMD)**	0.04	0.58	-0.06	0.09	-0.02	-0.11	0.14	0.07	0.53	0.87	0.91	0.69	1

Table 2: Pooled Probit Model Regression Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Current Account Bal./GDP	-0.021							
	(0.016)							
Govt Cons./GDP	-0.020							
	(0.021)							
Credit Growth	0.550*	0.571**	0.548*	0.560**	0.711**	0.666**	0.620**	0.700**
	(0.283)	(0.281)	(0.281)	(0.274)	(0.295)	(0.287)	(0.293)	(0.283)
GDP per capita	0.281***	0.209**	0.221***	-0.115	-0.186	-0.034	-0.078	-0.094
	(0.098)	(0.082)	(0.081)	(0.144)	(0.143)	(0.123)	(0.140)	(0.117)
Inflation	1.971**	2.109**	2.110**	2.711***	3.211***	2.740**	3.029***	3.326***
	(0.979)	(0.897)	(0.896)	(0.861)	(1.037)	(1.083)	(0.965)	(1.232)
M2/reserves ratio	0.002***	0.002***	0.002***	0.001***	0.002***	0.002***	0.001***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
Real Effective Exchange Rate	0.010**	0.011**	0.011**	0.013**	0.011**	0.011**	0.012**	0.010**
	(0.004)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Bank concentration	-0.009**	-0.008**	-0.008**	-0.006	-0.007	-0.007*	-0.008*	-0.008**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Bank credit to bank deposits (%)	0.005***	0.004**	0.004**	0.005***	0.004**	0.004**	0.004*	0.005***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Net Asset Dummy (NAD)			-0.159	-0.479	-1.511*	-1.721*	-0.723	-2.691**
			(0.223)	(0.477)	(0.874)	(1.004)	(0.764)	(1.107)
Financial Inst. Access (FIA)				1.727***				
				(0.580)				
NAD*FIA				0.798				
				(0.618)				
Financial Development (FD)					2.263**			
					(0.894)			
NAD*FD					1.936*			
					(1.137)			
Financial Markets (FM)						1.275*		
						(0.679)		
NAD*FM						2.163*		
						(1.204)		
Financial Instituitons (FI)							1.775**	
							(0.742)	
NAD*FI							0.931	
							(0.976)	
Financial Markets Depth (FMD)								1.399**
								(0.578)
NAD*FMD								3.413**
								(1.336)
Constant	-5.330***	-5.043***	-5.091***	-3.445**	-2.745**	-3.465***	-3.495**	-3.001***
	(1.330)	(1.172)	(1.170)	(1.562)	(1.300)	(1.181)	(1.476)	(1.141)
Observations	682	712	712	712	712	712	712	712
Pseudo R2	0.179	0.166	0.169	0.221	0.224	0.218	0.197	0.244
AUC	b1=0.851	b2=0.845	b3=0.846	b4=0.879	b5=0.874	b6=0.862	b7=0.875	b8=0.885
AUC_SE	0.0347	0.0338	0.0331	0.0270	0.0314	0.0350	0.0258	0.0299

Notes: Panel excluding after the first year of crisis. The dependent variable is binary, a crisis dummy that takes value one at the onset of a systemic banking crisis and zero otherwise. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 3: Conditional Marginal Effects of Net Asset Dummy at Various Levels of FMD, FD and FM

	FMD		FD		FM	
	dy/dx	**Std. Err.**	**dy/dx**	**Std. Err.**	**dy/dx**	**Std. Err.**
Finan. Dev. at 0.1	-0.0065	0.0044	-0.0022	0.0025	-0.0077	0.0053
Finan. Dev. at 0.2	-0.0095**	0.0049	-0.0043	0.0037	-0.0107**	0.0055
Finan. Dev. at 0.3	-0.0137***	0.0054	-0.0080*	0.0048	-0.0145***	0.0057
Finan. Dev. at 0.4	-0.0191***	0.0062	-0.0133**	0.0062	-0.0188***	0.0069
Finan. Dev. at 0.5	-0.0253***	0.0084	-0.0197**	0.0097	-0.0226**	0.0107
Finan. Dev. at 0.6	-0.0296**	0.0135	-0.0238	0.0171	-0.0236	0.0169
Finan. Dev. at 0.7	-0.0242	0.0225	-0.0183	0.0293	-0.0176	0.0243
Finan. Dev. at 0.8	0.0052	0.0386	0.0070	0.0503	0.0011	0.0336
Finan. Dev. at 0.9	0.0764	0.0732	0.0607	0.0874	0.0392	0.0528

*** p<0.01, ** p<0.05, * p<0.1

Figure 1: Conditional Marginal Effects of Net Asset Dummy at Various Levels of FMD, FD and FM

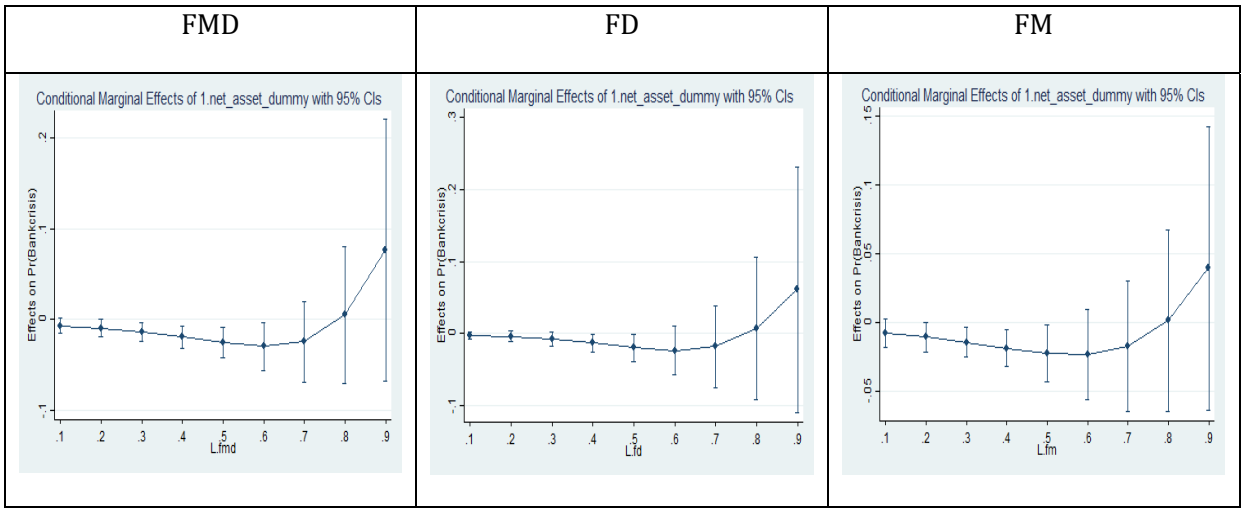


Table 4: Conditional Marginal Effects of FMD, FD and FM at Various Levels of Net Asset Dummy

	FMD		FD		FM	
	dy/dx	**Std. Err.**	**dy/dx**	**Std. Err.**	**dy/dx**	**Std. Err.**
Net Asset Dummy = 0	0.0517***	0.0188	0.0827***	0.0285	0.05125**	0.0236
Net Asset Dummy = 1	0.0014	0.0034	0.0222	0.0244	0.00890	0.0150

*** p<0.01, ** p<0.05, * p<0.1

Figure 2: ROC Curves for Various Model Specifications

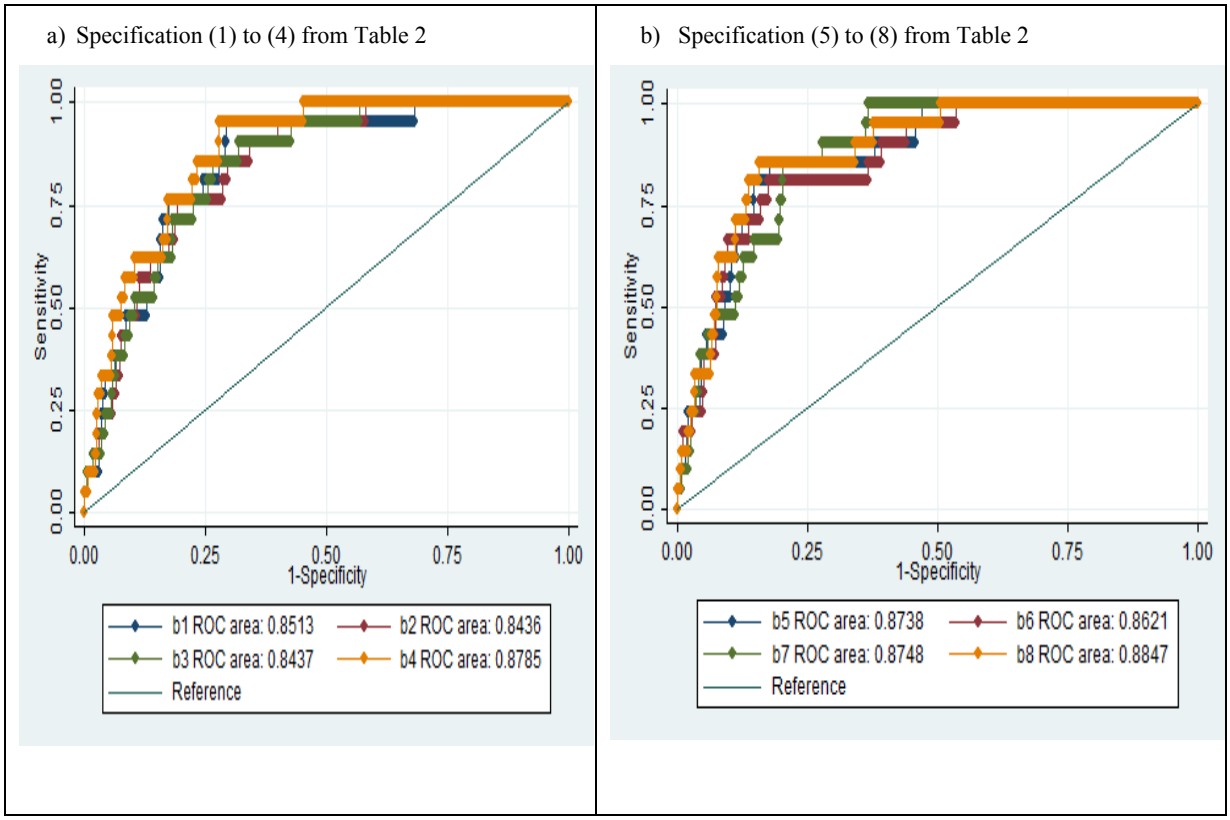


Table 5: Conditional Marginal Effects for a Sample Specification

Variable	dy/dx	Std. Err.
Credit growth	0.01000	0.00647
GDP per capita	-0.00135	0.00171
Inflation	0.04753*	0.02646
M2/reserves ratio	0.00003**	0.00002
REER	0.00014	0.00010
Bank Concentration	-0.00011	0.00008
Bank credit to bank deposit ratio	0.00007*	0.00004
Net Asset - Indicator Var. (NAD)	-0.01449***	0.00548
Financial Market Depth (FMD)	0.03206***	0.01306

Note: Table reports marginal effects for specification (8) from Table 2 for illustration. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Robustness Checks: Additional Controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Credit Growth	0.700**	0.909**	0.744**	0.631*	0.641**	0.658**	0.707**	0.709**	0.628**	0.894***
	(0.283)	(0.368)	(0.298)	(0.332)	(0.270)	(0.300)	(0.289)	(0.291)	(0.288)	(0.332)
GDP per capita	-0.094	-0.114	-0.140	-0.131	-0.081	-0.242	-0.085	-0.083	-0.132	-0.227
	(0.117)	(0.146)	(0.125)	(0.156)	(0.121)	(0.154)	(0.118)	(0.117)	(0.126)	(0.189)
Inflation	3.326***	5.382***	3.521***	5.851***	5.041***	4.007***	3.319***	3.318***	3.402***	10.357***
	(1.232)	(1.454)	(1.216)	(1.839)	(1.423)	(1.124)	(1.228)	(1.201)	(1.155)	(2.307)
M2/reserves ratio	0.002***	0.002***	0.002***	0.027***	0.002***	0.019***	0.004***	0.004***	0.016***	0.016**
	(0.001)	(0.001)	(0.001)	(0.007)	(0.001)	(0.004)	(0.001)	(0.001)	(0.005)	(0.007)
Real Effective Exchange Rate	0.010**	0.009**	0.010**	0.019**	0.029***	0.009*	0.010**	0.010**	0.009*	0.033*
	(0.005)	(0.004)	(0.005)	(0.009)	(0.009)	(0.005)	(0.005)	(0.005)	(0.005)	(0.017)
Bank concentration	-0.008**	-0.006*	-0.009**	-0.018***	-0.009**	-0.009**	-0.008*	-0.007*	-0.009**	-0.009*
	(0.004)	(0.004)	(0.004)	(0.006)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Bank credit to bank deposits (%)	0.005***	0.006***	0.004*	0.007***	0.005***	0.006***	0.005***	0.005***	0.006***	0.008***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Net Asset - Indicator Var. (NAD)	-2.691**	-2.825**	-2.461**	-3.101***	-3.185***	-2.371***	-2.656**	-2.481**	-2.519***	-2.193**
	(1.107)	(1.211)	(1.070)	(1.192)	(1.129)	(0.883)	(1.058)	(1.049)	(0.955)	(0.857)
Financial Markets Depth (FMD)	1.399**	1.690**	1.267**	0.734	1.317**	1.048	1.339**	1.336**	1.008	1.744**
	(0.578)	(0.688)	(0.565)	(0.712)	(0.594)	(0.680)	(0.575)	(0.572)	(0.633)	(0.699)
NAD*FMD	3.413**	3.655**	3.022**	4.547***	4.166***	3.481***	3.456***	3.265***	3.431***	3.495***
	(1.336)	(1.434)	(1.319)	(1.497)	(1.341)	(1.092)	(1.278)	(1.261)	(1.141)	(1.082)
Bank regulatory capital		-0.040								
		(0.049)								
Deposit money bank assets to GDP			0.004							
			(0.003)							
Provisions to NPL (%)				-0.008***						
				(0.003)						
Bank z-score					-0.006					
					(0.012)					
KAOPEN						0.165				
						(0.123)				
Portfolio investment outflows (% of GDP)							0.006**			
							(0.003)			
Equity portfolio outflows (% of GDP)								0.016		
								(0.013)		
Net equity portfolio investment inflows (% of GDP)									-0.036***	
									(0.012)	
Stock price volatility										-0.055***
										(0.019)
Constant	-3.001***	-2.761**	-2.608**	-2.778*	-4.836***	-2.060	-3.102***	-3.121***	-2.619**	-4.192**
	(1.141)	(1.185)	(1.243)	(1.644)	(1.083)	(1.285)	(1.160)	(1.150)	(1.137)	(1.795)
Observations	712	536	710	471	668	706	679	668	671	395
Pseudo R2	0.244	0.281	0.249	0.283	0.267	0.264	0.247	0.250	0.259	0.324
AUC	0.885	0.900	0.885	0.904	0.895	0.904	0.887	0.886	0.893	0.914
AUC_SE	0.0299	0.0251	0.0297	0.0239	0.0261	0.0214	0.0304	0.0307	0.0277	0.0249

Notes: Panel excluding after the first year of crisis. The dependent variable is binary, a crisis dummy that takes value one at the onset of a systemic banking crisis and zero otherwise. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

APPENDIX 1

Table A1: Systemic Banking Crisis (starting date)

Advanced	**Year of crisis**	***EMEs and Developing***		***EMEs and Developing***	**Year of crisis**
Austria	2008	Bolivia	1986, 1994	Latvia	1995, 2008
Belgium	2008	Bosnia & Herzegovina	1992	Lebanon	1990
Denmark	2008	Bulgaria	1996	Lithuania	1995
Finland	1991	Cameroon	1987, 1995	Macedonia, FYR	1993
France	2008	Congo, Republic of	1992	Malaysia	1997
Germany	2008	Côte d'Ivoire	1988	Mauritania	1984
Greece	2008	Chile	1976, 1981	Mexico	1981, 1994
Iceland*	2008	China, Mainland	1998	Morocco	1980
Israel	1977	Colombia	1982, 1998	Mongolia	2008
Italy	2008	Costa Rica	1987, 1994	Nicaragua	1990, 2000
Japan	1997	Croatia	1998	Nigeria	1991, 2009
Korea, Republic of	1997	Czech Republic	1996	Panama	1988
Luxembourg	2008	Djibouti	1991	Paraguay	1995
Netherlands	2008	Dominican Republic	2003	Peru	1983
Norway	1991	Ecuador	1982, 1998	Philippines	1983, 1997
Portugal	2008	Egypt	1980	Poland	1992
Slovenia	1992, 2008	El Salvador	1989	Romania	1990
Spain	1977, 2008	Equatorial Guinea	1983	Russia	1998, 2008
Sweden	1991, 2008	Estonia	1992	São Tomé & Príncipe	1992
Switzerland	2008	Georgia	1991	Senegal	1988
United Kingdom	2007	Ghana	1982	Slovak Republic	1998
United States	1988, 2007	Guyana	1993	Sri Lanka	1989
EMEs and Developing		Hungary	1991, 2008	Swaziland	1995
Albania	1994	India	1993	Thailand	1983, 1997
Algeria	1990	Indonesia	1997	Tunisia	1991
Argentina	1980, 1989, 1995, 2001	Israel	1977	Turkey	1982, 2000
Armenia	1994	Jamaica	1996	Ukraine	1998, 2008
Azerbaijan, Rep. of	1995	Jordan	1989	Uruguay	1981, 2002
Brazil	1990, 1994	Kazakhstan	2008	Venezuela	1994
Belarus	1995	Kuwait	1982	Zimbabwe	1995

Countries included in sample without crisis event

Australia, Canada, Cyprus, China, Hong Kong, New Zealand, Singapore, Angola, Bahamas, Bahrain, Kingdom of Barbados, Belize, Bhutan, Brunei Darussalam, Botswana, Cabo Verde, Cyprus, Dominica, Fiji, Gabon, Grenada, Guatemala, Honduras, Iran, Iraq, Kiribati, Kosovo, Lao People's Dem.Rep, Lesotho, Libya, Malta, Mauritius, Moldova, Montenegro, Namibia, Oman, Pakistan, Papua New Guinea, Qatar, Samoa, Saudi Arabia, Serbia, Seychelles, Solomon Islands, South Africa, St. Kitts and Nevis, St. Lucia, St. Vincent & Grens. Syrian Arab Republic, Sudan, Suriname, Tonga, Trinidad and Tobago, Tuvalu, Turkmenistan, United Arab Emirates, Uzbekistan, Vanuatu, Vietnam, Yemen, Republic of Zambia

Source: Laeven and Valencia (2012).

Table A2: Variable Definitions and Sources

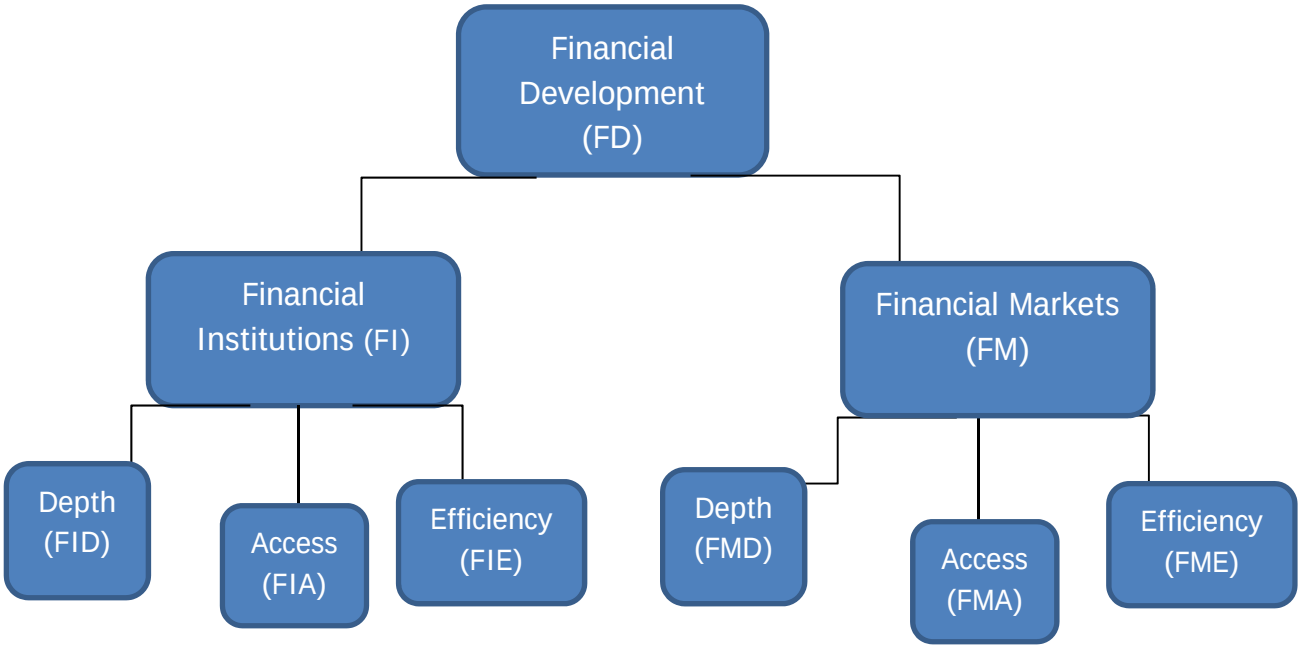
Variable Name	Definition	Source
Banking Crisis	Systemic Banking Crisis, Banking crisis dummy (1=banking crisis, 0=none)	Laeven and Valencia (2012)
Current Account Bal./ GDP	Current Account Balance (percent of GDP)	IMF-IFS
Govt. Cons./GDP	Government Consumption to GDP ratio	World Development Indicators
GDP per capita		As above
Credit Growth	Growth of private credit by deposit money banks to GDP (%) - First difference of natural logs of bank private credit	Bank private credit data is from International Financial Statistics (IFS) - International Monetary Fund (IMF)
Inflation	Inflation, Annual Percentage change of Consumer Price Index (2010=100, average)	International Financial Statistics (IFS), International Monetary Fund (IMF)
M2/Reserves	Money and quasi money (M2) to total reserves ratio	World Development Indicators
Real Effective Exchange Rate	Real effective exchange rate index (2010 = 100)	As above
Bank Concentration	Bank Concentration (%)	Global Financial Development Database - World Bank
Bank credit to bank deposits (%)		As above
Bank Regulatory Capital	Bank regulatory capital to risk-weighted assets (%)	As above
Deposit money bank assets to GDP	Deposit money bank assets to GDP (%)	As above
Provisions to NPL (%)	Provisions to nonperforming loans (%)	As above
Bank z-score		As above
Portfolio investment outflows (% of GDP)		The Capital Flows database for IMF WP 13/183
Equity portfolio outflows (% of GDP)		The Capital Flows database for IMF WP 13/183
Net equity portfolio investment inflows (% of GDP)		The Capital Flows database for IMF WP 13/183
Stock price volatility		Global Financial Development Database - World Bank
FD	Financial Development	IMF
FI	Financial Institutions	IMF
FM	Financial Markets	IMF
FIA	Financial Institutional Access	IMF
FMD	Financial Markets Depth, comprised of data from stock market capitalization to GDP, stocks traded to GDP, international debt securities of government to GDP, total debt securities of financial corporation to GDP, total debt securities of nonfinancial corporation to GDP.	IMF
KAOPEN	Financial Openness Index: the first principal component of the four indicators – existence of multiple exchange rates, restrictions on the current and capital accounts and requirements to surrender export proceeds, which is reported in the IMF's Annual Report on Exchange Arrangements and Restrictions.	http://web.pdx.edu/~ito/kaopen_2007.xls

Table A3: Summary Statistics

All Countries	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
Banking Crisis	5,873	0.0192406	0.1373812	0	1
Current Account Bal./GDP	4,706	-2.208119	12.55907	-244.5755	106.8357
Govt. Cons./GDP	4,604	16.7802	6.846215	1.37519	84.5081
Credit Growth	4,337	0.1236694	0.2300976	-3.302704	3.383259
GDP per capita	4,877	8.263687	1.371225	4.9733	11.36361
Inflation	4,315	0.3505682	3.451937	-0.8099731	117.4964
M2/reserves ratio	4,415	10.5352	68.08279	0.164645	3691.14
Real Effective Exchange Rate	2,402	2304.28	86379.09	18.7135	4200000
Bank concentration	1,507	73.10328	21.72974	14.71041	100
Bank credit to bank deposits (%)	4,702	97.0939	56.29745	1.138304	898.0129
Net Asset Dummy (NAD)	5,873	0.3866848	0.4870319	0	1
FD	4,287	0.2588926	0.206527	0	1
FIA	4,287	0.2559673	0.2645426	0	1
FM	4,287	0.172688	0.2226156	0	1
FIA	4,287	0.3400467	0.2226791	0	0.996428
FMD	4,287	0.1565774	0.2258387	0	0.9875258
Developed Countries	Obs.	Mean	Std. Dev.	Min	Max
Banking Crisis	848	0.0247642	0.1554973	0	1
Current Account Bal./GDP	821	0.0736934	5.002209	-14.95126	20.86026
Govt. Cons./GDP	837	18.49567	3.595466	9.43059	27.6323
Credit Growth	757	0.1186987	0.1605773	-0.9063053	1.479952
GDP per capita	831	10.23154	0.3908735	8.920922	11.36361
Inflation	785	0.0611266	0.06673	-0.0134672	0.5753328
M2/reserves ratio	588	24.9216	79.82365	1.66145	1186.73
Real Effective Exchange Rate	650	99.4326	14.2254	66.8308	151.684
Bank concentration	234	64.02678	26.59769	20.52139	100
Bank credit to bank deposits (%)	786	108.3099	39.54097	27.47056	313.3344
Net Asset Dummy (NAD)	848	0.3584906	0.4798402	0	1
FD	630	0.5715128	0.1994014	0.1173217	1
FIA	630	0.6016799	0.2908453	0	1
FM	630	0.4617141	0.2596793	0	1
FIA	630	0.6701626	0.177944	0.200825	0.996428
FMD	630	0.4459388	0.3025705	0	0.9875258
Developing Countries	Obs.	Mean	Std. Dev.	Min	Max
Banking Crisis	5,025	0.0183085	0.1340777	0	1
Current Account Bal./GDP	3,885	-2.690324	13.58144	-244.5755	106.8357
Govt. Cons./GDP	3,767	16.39903	7.322477	1.37519	84.5081
Credit Growth	3,580	0.1247204	0.242261	-3.302704	3.383259
GDP per capita	4,046	7.859513	1.129709	4.9733	11.3119
Inflation	3,530	0.4149341	3.813489	-0.8099731	117.4964
M2/reserves ratio	3,827	8.324797	65.82822	0.164645	3691.14
Real Effective Exchange Rate	1,752	3122.288	101136.8	18.7135	4200000
Bank concentration	1,273	74.7717	20.28592	14.71041	100
Bank credit to bank deposits (%)	3,916	94.84268	58.83783	1.138304	898.0129
Net Asset Dummy (NAD)	5,025	0.3914428	0.4881217	0	1
FD	3,657	0.2050367	0.1530374	0	0.8278011
FIA	3,657	0.1964105	0.2081959	0	1
FM	3,657	0.1228968	0.1721079	0	0.888669

FIA	3,657	0.2831769	0.1751259	0	0.8424223
FMD	3,657	0.1067284	0.164704	0	0.8836709

Table A4: Financial Development Index Pyramid taken from Svirydzenka (2016)



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