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## **CASMEF Working Paper Series**

IMF LENDING AND BANKING CRISES

*Luca Papi, Andrea F. Presbitero, Alberto Zazzaro*

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# IMF Lending and Banking Crises\*

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## Abstract

In this paper we look at the effect of International Monetary Fund (IMF) lending programs on banking crises in a large sample of developing countries, over the period 1965-2010. The endogeneity of the Fund intervention is addressed by adopting an instrumental variable (IV) strategy, in which the degree of political similarity between IMF borrowers and the G-7 is taken as an instrument for the likelihood of a country signing an IMF lending arrangement. Controlling for the standard determinants of banking crises, the IV estimates suggest that previous IMF borrowers are significantly less likely to experience a banking crisis. We also provide evidence suggesting that compliance with conditionality matters, consistent with the importance of IMF-supported financial reform, and that the positive effect of the Fund intervention on banking sector stability works through a direct liquidity provision effect.

**JEL Classification:** *F33; F34; F35; O11*

**Key words:** *Banking crises; IMF programs; Political economy.*

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# 1 Introduction

In this paper, we look at the effects of International Monetary Fund (IMF or Fund) lending programs on the risk of banking crisis in borrowing countries and at the channels of influence of Fund interventions.

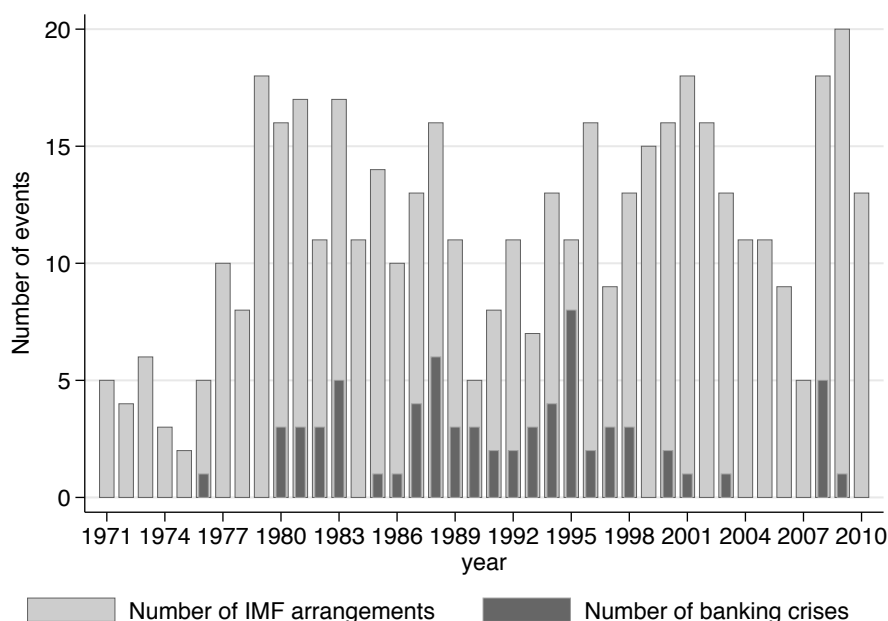
The mission assigned to the IMF by its founders in 1945 was limited to the promotion of exchange rate stability and the adjustment of external imbalances in member countries: to this end the IMF was to act as an intermediary between surplus and deficit countries and an arbiter of changes in par values between domestic currencies and the U.S. dollar. After the demise of the dollar exchange standard in 1973, the Fund had new sources of externalities to address and new public goods to provide (Bordo and James, 2000; Fratianni, 2003). Thus, the scope of IMF interventions has grown gradually, up to encompassing the much wider (and less well-defined) mission of the preservation of economic and financial stability in member countries. The Fund has pursued this objective both through its continuous country surveillance activity, involving policy recommendations and reform promotion, and by means of specific stabilization programs. The latter involved the disbursement of loans conditional upon the fulfillment of strict adjustment policies and economic reforms. According to the Fund's critics, however, the IMF lending policy is to be blamed for having imposed on recipient countries the inappropriate, ineffective and ideological economic recipes of the "Washington Consensus". In particular, the liberalization, privatization and austerity programs urged by the IMF in Mexico, South-East Asian countries, Russia and Brazil during the dramatic crises of the 1990s is thought to have triggered massive capital outflows and severe banking crises (Radelet and Sachs, 1998; Sachs, 2002; Stiglitz, 2002).

In response to these criticisms, and given the simultaneousness of currency and banking crises (Kaminsky and Reinhart, 1999), the Fund oriented its lending activity to the preservation of financial sector stability and to the prevention of liquidity crises. These targets have come back dramatically onto the Fund's agenda during the global financial crisis of 2007-09 and the successive sovereign debt crises in the eurozone that have engulfed banking systems and undermined the confidence of investors and financial markets worldwide. Many observers and scholars are now inclined to accept the idea that the IMF should be endowed with resources and instruments to credibly play the role of International lender of last resort (Fischer, 1999; Rogoff, 1999). In this perspective, a number of new lending programs have been introduced by the Fund during the last fifteen years, giving to pre-qualified countries the opportunity to apply for precautionary credit lines. Upfront access to IMF resources would mitigate the vulnerability of countries with sound policies and institutions to sudden liquidity crises and self-fulfilling bank runs, avoiding the accumulation of costly international reserves (Rodrik, 2006; Joyce and Razo-Garcia, 2011).

Despite the intense debate about the responsibility of the Fund in the banking crises of the 1990s and the need to reshape its role and lending toolkit, we are not aware of any empirical study which analyzes the relationship between IMF-supported programs and the probability of systemic banking crises over the medium run.

At first glance, the data seems to indicate a positive correlation between banking sector instability and the Fund involvement in member countries. In Figure 1 we report the number of

Figure 1: Banking crises and IMF lending arrangements



Notes: Calculations based on [Laeven and Valencia \(2012\)](#) data set and on data on IMF lending arrangements. The sample consists of 2,527 country-year observations (see Table 4).

banking crises (the dark column) and IMF arrangements (the bright column) during the period 1971-2010 that we consider in the empirical analysis. What this figure clearly displays is the well-known concentration of bank distress episodes in the early 1980s and in 1990s, plus the recent events following the US subprime crisis and the global recession, but also a peak of IMF lending programs in the crisis years. More precisely, the likelihood of a banking crisis is equal to 5.1% in country-year observations in which an IMF program is in operation and 2.3% in country-years in which there is no IMF loan agreement. However, since the role of the Fund is to intervene in critical circumstances to prevent and sort out currency and financial crises, which is the causal nexus, whether it is the presence of the IMF in a country to trigger a banking crisis or whether it is the instability of the banking sector to determine an IMF intervention, is an open question.

The Fund’s involvement in a country may have an impact on the probability of a banking crisis through a number of contrasting channels. First, IMF support is associated with the mobilization of financial resources, whose availability should prevent banking crises from materializing. The increase in financial flows may be the result of IMF direct interventions, which are usually meant to provide credit to bolster liquidity for the economy concerned, and of a catalytic effect on other official and private lenders ([Bird and Rowlands, 2002](#); [Cottarelli and Giannini, 2006](#)). However, IMF loans might also drive investors to run to the limited amount of fresh liquidity, thus triggering a banking panic ([Zettelmeyer, 2000](#)).

Second, the Fund intervention may have either a positive or negative impact on the stability of the domestic banking industry through its direct and indirect effects on economic and financial reforms promoted through conditionalities.

Finally, IMF lending could bring negative side-effects on the risk of a banking crisis by inducing moral hazard on the part of both the borrowing country and its private creditors and via bad signalling.

In sum, whether and how IMF involvement affects the probability of a systemic banking crisis is an empirical issue which might have different answers, depending on different sources of heterogeneity regarding loan size, conditionalities, lending arrangements and country's institutional environments. In this context, our contribution extends the recent empirical literature on the IMF's role in mitigating financial instability. This literature has investigated the effect of IMF-supported programs on sudden stops of financial capital flows (Eichengreen *et al.*, 2008), on currency crises (Dreher and Walter, 2010), on sovereign debt crises (Jorra, 2012), and on the spread of the 2007-08 global financial crisis (Presbitero and Zazzaro, 2012).

Taking advantage of a large dataset covering 105 low- and middle-income countries over the period 1965-2010, we estimate the determinants of banking crises, focusing on the effect of the presence of IMF programs in previous years. The endogeneity of the Fund intervention is addressed by adopting an instrumental variable strategy, in which the degree of political similarity between IMF borrowers and the G-7 is taken as an instrument for the likelihood of a country signing an IMF lending arrangement in the five years before the crisis. Our main result is that, controlling for the standard determinants of banking crises, IMF member countries which have previously borrowed are significantly less likely to incur a banking crisis.

We then document that the negative correlation between IMF interventions and the likelihood of a banking crisis is significant only above a given loan threshold. This is consistent with the positive effect of the Fund's intervention on banking sector stability working through the direct liquidity provision effect, rather than indirect channels, such as the *seal of approval* effect. However, we also find that the effect of the Fund in reducing the incidence of banking crises is significantly stronger in recipient countries which are compliant with conditionalities attached to IMF-supported loans. This result would indicate that the positive effect of the Fund's intervention on banking sector stability also works through the reforms channel. Finally, we find that the positive impact of the Fund on the stability of the banking sector of the recipient country is conditional upon the presence of a sound institutional framework, but does not depend on the type (concessional versus non-concessional) of program signed with the country.

The remainder of the paper frames the research question in the theoretical and empirical literature about IMF support and financial stability (Section 2). Section 3 describes the empirical model to estimate, its main variables and their sources. Section 4 discusses the empirical findings and presents some robustness exercises. The concluding section summarizes our main findings and suggests possible extensions to be addressed by future research.

## 2 Related literature

The bulk of the theoretical and empirical literature on the role of the IMF in preventing financial crisis has referred to the effects of IMF-supported programs. In what follows, we briefly review this literature with special attention to the channels through which IMF lending programs may

affect the probability of banking crises. At the risk of some over-simplification such channels can be grouped in three broad categories. First, the credit availability channel fuelled by both direct IMF lending and catalytic effects. Second, the reforms channel nourished by macroeconomic, structural and financial sector initiatives made possible by both the effect of direct IMF conditionality and the so-called scapegoat effect. Third, bad signals and moral hazard effects, which may increase risk taking and poor policies.

## 2.1 IMF support and banking crises: the channels of influence

### 2.1.1 Credit availability

A first strand of studies points out the positive effects of credit availability and countercyclical lending due to IMF intervention. First, once the program has been approved and credit disbursed, the amount of resources available to the country to be used to build up a certain level of emergency liquidity provision increases, thus reducing the probability of crises caused purely by illiquidity problems (Haldane, 1999; Miller and Zhang, 2000). Second, exploiting its position and reputation as most effective international lender of last resort (Rogoff, 1999; Fischer, 1999), a catalytic effect is indirectly exerted both towards other official lenders and the private sector. The existence of an IMF program acts as a *seal of approval*, reassuring investors and depositors and reducing the probability of withdrawing funds from the domestic banking sector. Similarly, IMF lending and partial bailouts may induce lenders to roll over their loans if the macroeconomic fundamentals of the member country are not too weak (Corsetti *et al.*, 2006), and if the IMF intervention does not crowd out the adjustment effort of the member country government (Morris and Shin, 2006).

Several studies have explored empirically whether and how IMF-supported programs affect private capital flows, reaching mixed results (see Bird (2007) and Steinwand and Stone (2008) for a review). Bird and Rowlands (2008, 2009) cast doubt on the catalytic role of IMF loans by documenting that net private capital inflows are negatively correlated with the presence of an IMF lending agreement, even if the average effect is heterogeneous across different capital flows and the initial conditions of recipient countries. In a similar vein, van der Veer and de Jong (2013) show that if one limits the analysis to countries that have not restructured their debt in the same year as their signing of an IMF program, the Fund's catalysist effect on private capital flows is significantly positive.<sup>1</sup>

### 2.1.2 Conditionalities and financial reforms

Since the 1990s, IMF conditionalities have increasingly concerned to policy actions directly related to financial reforms and capital account liberalization (Joyce and Noy, 2008). Financial reforms sponsored by the Fund have comprised measures aiming to increase financial liberalization and improve the regulatory and supervisory framework. Whereas introducing financial liberalization without adequate banking sector surveillance might also contribute to banking

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<sup>1</sup>A different strand of literature has investigated whether the existence of an IMF-supported program modifies interest rate spreads, both on commercial bank loans and on international bonds, and countries' debt maturity (Mody and Saravia, 2006; Saravia, 2010). Chapman *et al.* (2012) find that increasing the scope of conditionality attached to IMF programs reduces the yield on government bonds.

sector fragility because it might increase opportunities for excessive risk-taking and fraudulent behavior, creating a more effective control system should instead make the banking sector more resilient, hence reducing the likelihood of systemic banking crises. Moreover, once a country has adopted a significant structural financial reform, the introduction of further reforming initiatives should become easier, through a sort of learning effect (Abiad and Mody, 2005).

Consequently, provided that conditionalities are correctly identified and properly implemented, the stability of the banking sector should be positively affected as a result of IMF intervention and countries more compliant with conditionalities should be less likely to experience banking crises.<sup>2</sup> However, the positive role of conditionalities has been questioned both in theory and practice. According to this critical view, the IMF would not have access to all relevant information needed to design optimal policies in time of crises and, most important, the Fund policy advice would be influenced by the vested interests of its main shareholders. In this case, compliance with IMF conditionalities could trigger the spread of the crisis and aggravate the post-crisis collapse, as happened during the Southeast Asian financial crisis of the 1990s (Radelet and Sachs, 1998; Feldstein, 1998; Stiglitz, 2002).

Indirect and mixed evidence on the importance of reform channel is provided by Demirgüç-Kunt and Detragiache (1998) and Kaminsky and Reinhart (1999), who find that financial liberalization is a determinant and a predictor of future banking crises. A more nuanced picture is provided by De Haan and Shehzad (2009), who find that most dimensions of financial reforms that enhance liberalization reduce the probability of systemic banking crises strictly conditional on adequate banking supervision.

### 2.1.3 Bad signals and moral hazard

Another strand of literature has focused on debtor and creditor moral hazard effects. First, country authorities might view IMF financial support as a substitute for their own adjustment effort (Jeanne and Zettelmeyer, 2001). In this case, IMF emergency loans weaken the incentives of national policy makers regarding their own adjustment effort, leading to laxer economic policies, IMF dependency (Vaubel, 1983; Goldstein, 2001), and in turn potential negative consequences on banking stability.

Similarly, some sort direct and indirect creditor moral hazard may occur. First, to the extent that the IMF rescue package does not provide the member country with unlimited financial resources, the investors might have incentives to liquidate their positions in the country and withdraw deposits from domestic banks (Zettelmeyer, 2000; Jeanne and Wyplosz, 2003). Second, anticipating a possible IMF bail-out in case of a crisis may lead markets to underprice sovereign risk in bond and equity markets, and investors to excessive risk-taking, making the crisis a more likely event (see Dreher (2004) and Conway (2006) for two excellent surveys of creditor moral hazard related to IMF lending). Finally, borrowing countries might suffer from

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<sup>2</sup>In addition to what may be envisaged in the attached conditionality to a specific program, the IMF might facilitate the national authorities' effort to promote special financial reforms which, in the absence of IMF support, could be politically too difficult to implement due to opposition at home. Consequently, governments of member countries, by using the international financial institution as a scapegoat (Vreeland, 1999), may want to delegate responsibility for carrying out domestic unpopular reforms to the politically unaccountable IMF, deflecting towards the latter the possible blame for the resulting social and political costs (Haggard and Kaufman, 1995; Vreeland, 2003).



some sort of stigma effect and turning to the IMF for crisis prevention might be interpreted by markets as signalling more severe troubles than hitherto publicly recognized.

## 2.2 IMF support and financial crises

To the best of our knowledge, there are no previous econometric studies analyzing the association between IMF-supported programs and banking crises. However, a limited number of recent papers have dealt with the role of the IMF in pursuing financial stability and preventing financial crises.

[Eichengreen et al. \(2008\)](#) document that countries, especially those with strong fundamentals, are less likely to experience sudden stops in international capital flows in the years following participation in an IMF program. The stabilizing role of the IMF emergency liquidity provision holds even after controlling for reverse causality.

Another piece of evidence in favor of the positive role of IMF on the financial stability of member countries is presented by [Dreher and Walter \(2010\)](#) who find that the existence of an IMF-supported program in the previous five-year period reduces the probability of a future currency crisis. The authors analyze 68 developing countries over the period 1975-2002 and show that it is the lending agreement *per se* which drives the result, rather than the amount of the disbursed loan or the degree of compliance with conditionality.

Conversely, [Jorra \(2012\)](#), focusing on 57 developing and emerging economies over the period 1975-2008, shows that IMF-supported programs significantly increase the average probability of subsequent sovereign defaults by 1.4 percentage points. This is a meaningful effect, given a sample frequency of defaults of 4.8 percent. Like in [Dreher and Walter \(2010\)](#), however, this result does not seem to be due to lack of compliance with conditionality, but it reflects the effects of IMF interventions *per se* and suggests that the IMF intervention could trigger debtor moral hazard.

Finally, [Presbitero and Zazzaro \(2012\)](#) investigate whether, during the 2008-10 financial crisis, IMF lending was directed at preventing the risk of contagion, and whether participation in IMF programs was sensitive to the political-economic interests of the IMF's main shareholders. Their findings are mixed: on the one hand, political similarity with G7 countries is positively correlated with the probability of signing a loan agreement; on the other hand, the IMF has channeled more financial resources to those countries where the economic crisis was more severe independent of the existence of balance of payment imbalances.

## 3 Data and empirical strategy

### 3.1 The empirical model

The empirical literature on the determinants of banking crises is quite extensive and, building on the influential paper by [Demirguc-Kunt and Detragiache \(1998\)](#), has identified some key variables which are correlated with a probability of banking crises.<sup>3</sup> In Table 1 we briefly summarize the results from a non-exhaustive list of recent papers, pointing out also the sample

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<sup>3</sup>For a recent review, see [Demirguc-Kunt and Detragiache \(2005\)](#).

covered and the methodology used. As is clear from the Table, almost all the studies consistently show that the likelihood of a banking crisis is higher when real interest rates and inflation are higher, after episodes of credit boom and when real GDP growth and the stock of international reserves are lower. This strand of literature has looked at the effect of several other explanatory variables, also considering the role of domestic institutions. However, so far it has ignored the potential role that International Financial Institutions (IMF, World Bank, etc.) could play in affecting the degree of domestic financial stability.

Henceforth, in what follows we assess the effect of IMF lending agreements on the probability of the occurrence of banking crises, drawing on an extensive data set covering 105 developing and emerging countries over the period 1965-2010.

The basic framework we use to look at the variables which may affect the incidence of banking crises is a pooled probit model (Demirguc-Kunt and Detragiache, 1998; Beck *et al.*, 2006; De Haan and Shehzad, 2009).<sup>4</sup> In particular, we estimate the following baseline model:

$$Pr(BANKING\ CRISIS_{i,t}) = \Phi(IMF\ PRESENCE_{i,(t-1,t-5)}, CONTROLS_{i,t-1}) \quad (1)$$

where the probability of banking crisis in the  $i$ -th country at time  $t$  is a function of the presence of the IMF in the country between  $t - 5$  and  $t - 1$  (*IMF PRESENCE*) and a set of standard macroeconomic control variables (*CONTROLS*), all one-year lagged.

The dependent variable is a dummy equal to one for country-year observations in which there is a systemic banking crisis (*BANKING CRISIS*). We adopt the methodology proposed by Laeven and Valencia (2008, 2012) and define a banking crisis episode as systemic when in a given year there are: 1) significant signs of financial distress in the banking system, and 2) major banking policy intervention measures in response to significant losses in the banking system.<sup>5</sup>

The key explanatory variable is a measure of the presence of a Fund-supported program in a given country in the five-year period before the crisis. In the baseline model, the presence of the Fund is measured by a dummy equal to one if country  $i$  has signed at least one IMF lending arrangement in the five-year period before the onset of the banking crisis (*IMF ARRANGEMENT*). Alternatively, we consider a continuous measure, defined as the logarithm of the ratio between the amount of the loan, agreed between  $t - 5$  and  $t - 1$ , and the country quota (*IMF LOAN/QUOTA*).<sup>6</sup> The set of control variables is modeled on the basis of the main findings of the empirical literature discussed in Section 2.2. The list of variables, their labels, definitions and sources are reported in Table 2.

This empirical strategy may be weakened by two problems. First, we cannot fully exploit the panel dimension of the data set controlling for country fixed-effects, since they are perfect

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<sup>4</sup>Alternative estimation strategies rely on the use of a conditional fixed-effect model (Joyce, 2011) or a random coefficient logit model (Klomp, 2010). However, these models cannot be easily extended to address the endogeneity of IMF lending.

<sup>5</sup>See Laeven and Valencia (2012, section 2) for more details on the actual definition of banking crisis episodes. Their Table A1 (p. 24) lists all the 147 systemic banking crises identified between 1970 and 2011. Although this data set is widely used, the robustness of our main results will be checked using alternative definitions of banking crises.

<sup>6</sup>We measure the loan amount as the agreed quantity, not the actual disbursement, because of data availability. This variable is set to zero if the country has not signed any agreement in the five-year period. For countries with more than one lending arrangement between  $t - 1$  and  $t - 5$ , the loan amount (as a share of the quota) is the sum of the loan-to-quota ratios.

predictors of no default for countries which never had a debt distress episode in the sample period. The inclusion of country fixed-effects, therefore, would make it necessary to drop all countries without banking crises from the sample, leading to biased estimates. Moreover, country fixed-effects will wash-out much of the cross-sectional variation in the data that we would like to utilize to examine the effects of our institutional variables (on this, see also [Noy, 2004](#); [Aizenman and Noy, 2012](#)). Hence, we will try to identify the effect of the IMF intervention on the likelihood of the crisis, controlling for a large set of explanatory variables.

Second, identification of the effect of participation in a Fund program on the probability of banking crisis using a simple probit model can be biased because of the potential endogeneity of the IMF agreement. Reverse causality may occur since the “crisis resolution role is at the core of IMF lending”.<sup>7</sup> The Fund’s presence in a country is more likely in crisis years or just before the onset of a crisis, when the government may ask the Fund for technical and financial assistance. In this case, however, the observed positive correlation between IMF lending and banking crisis would not imply any causation running from the former to the latter.

A further potential endogeneity problem is due to the fact that several macroeconomic variables, such as output growth, interest rates, and credit to the private sector, may be affected by the unfolding of the crisis. To minimize the impact of the banking crisis on the right-hand side variables we drop from the sample the years during which the crisis is spreading.<sup>8</sup>

### 3.2 The IV strategy

We tackle the endogeneity of the IMF intervention by relying on an instrumental variable (IV) approach which has been widely used in the literature on IMF lending ([Barro and Lee, 2005](#); [Eichengreen et al., 2008](#); [Dreher and Walter, 2010](#)) and on banking crises ([De Haan and Shehzad, 2009](#)). We exploit the fact that the political similarity between borrowers and the IMF major shareholders is generally found to be a significant predictor of participation in a Fund loan agreement ([Thacker, 1999](#); [Oatley and Yackee, 2004](#); [Barro and Lee, 2005](#); [Barnebeck Andersen et al., 2006](#); [Dreher et al., 2009](#); [Presbitero and Zazzaro, 2012](#)). The motivation of such correlation can be explained by the behavior of the Group of Seven (G7) governments, which trade their influence on the IMF Executive Board in exchange for support on important foreign policy issues discussed by the United Nations. The voting pattern in the United Nations General Assembly (UNGA) is taken as a proxy of the degree of similarity in foreign policy between IMF member countries and the Fund’s major shareholders, namely the US and the other G7 countries. Hence, countries which prove to be aligned with the interests of G7 governments would be more likely to be rewarded by the IMF assistance.

In choosing the instrument set, we follow the approach proposed by [Thacker \(1999\)](#) and measure foreign policy similarity by two indicators. First, in line with the political *proximity* hypothesis, we calculate the average alignment score with G7 countries calculated on all UNGA regular votes (PROXIMITY\_G7).<sup>9</sup> This measure of political proximity between the country

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<sup>7</sup>See the IMF website at: <http://www.imf.org/external/about/lending.htm>.

<sup>8</sup>We are helped in this task by the fact that [Laeven and Valencia \(2012\)](#) indicate in their data set the starting and ending year of each crisis. For the episodes which started in 2008, we assume that they are still ongoing in 2010, if no ending year is specified.

<sup>9</sup>For a detailed description of the dataset, see [Kilby \(2009b\)](#). The data set also includes identification of

and the G7 has been widely used as a significant predictor of the presence of IMF lending arrangements (e.g., [Oatley and Yackee, 2004](#); [Barro and Lee, 2005](#)). Second, in line with the political *movement* hypothesis, we consider the change in the average alignment score with G7 countries between  $t$  and  $t - 1$  (MOVEMENT\_G7). This variable should capture the possibility that it is the change in foreign policy orientation which would be rewarded by the major IMF shareholders, in line with the evidence provided by [Thacker \(1999\)](#). To take into account some extraordinary voting pattern and strategic behavior (see below) in the political process of concessions and rewards, both measures are time averages over the five-year period  $(t - 6, t - 10)$  before the five-year period  $(t - 1, t - 5)$  in which we allow for the possibility of a Fund lending program.

The soundness of our identification strategy is grounded in the validity of the instrument set. The *relevance* of our instrument should not be an issue, given the robust evidence mentioned in favor of a positive influence of political similarity between a country and the G7 governments (or the US) and the likelihood of signing of an IMF-supported program in that country in the following years. This correlation is confirmed also in our data set and, as we will show when discussing our results, the first-stage F-statistic is generally above the [Stock and Yogo \(2005\)](#) rule of thumb of 10, suggesting that we do not have a weak instrument problem.

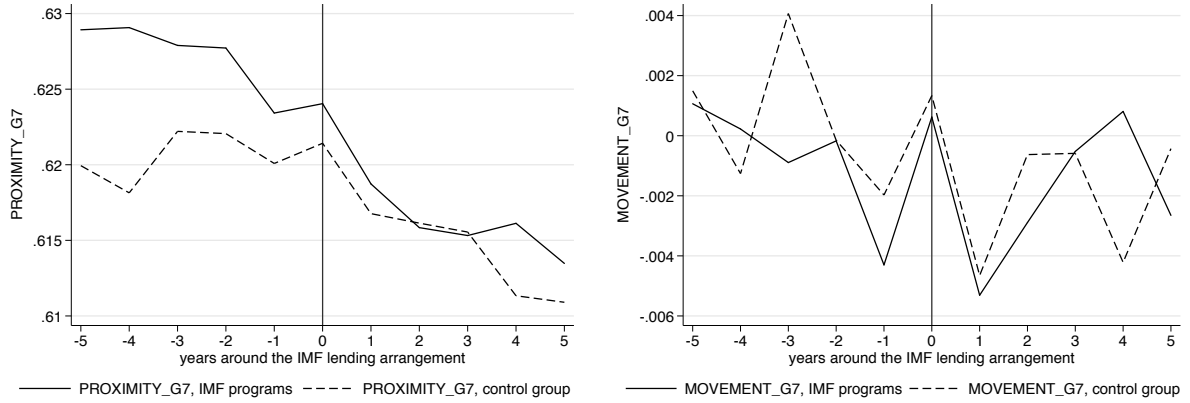
By contrast, the *exogeneity* of the instruments is in principle more questionable in our context. Generally, political similarity variables have been used as instruments in growth regressions. In those cases, the excluding restriction that the similarity in foreign policy orientation should not have a direct effect on countries' economic growth. When looking at financial stability, the excluding restriction is less tenable and it could be violated. In fact, it may be conceivable that political proximity with IMF shareholders also has direct influence on the stability of the financial sector in prospective recipient countries. If a reward mechanism exists, such that the G7 governments trade support for aligned votes in the UNGA, this support may take different forms besides the influence on the IMF Executive Board. Another possible form would be exerting influence on the domestic monetary and regulatory authorities or on foreign creditors in order to support and provide the banking system of G7 foreign policy friends with liquidity ([Copeletovich, 2010a,b](#)).<sup>10</sup> A further source of concern may be related to a strategic behavior of potential recipients of IMF-supported lending. Some countries could become closer to the US and the G7 governments when they expect financial troubles in the future, reverting their foreign policy alignment once they obtain the financial assistance from the Fund. Under this strategic friendship, our foreign policy variables could be correlated with future financial instability. In our sample, however, there is no evidence of such a behavior by IMF borrowing

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important votes as declared by the US State Department. However, since this information is not available for the whole time span, we cannot construct the alignment scores based on important UNGA votes. Therefore, we cannot use the difference between the alignment score in important votes in the UNGA and the same score in all other UNGA votes, a measure introduced by [Barnebeck Andersen et al. \(2006\)](#). As in [Thacker \(1999\)](#) and [Dreher and Jensen \(2007\)](#), the alignment score of country  $Y$  with country  $X$  is measured considering, for each vote, that country  $Y$  scores 1 if it follows  $X$ , 0.5 if it abstains or is absent when  $X$  votes (or vice versa), and 0 if it opposes  $X$ . Political similarity with the G7 is built by averaging the pairwise annual alignment scores.

<sup>10</sup>It should be noted that a similar identification strategy based on friendships with IMF major shareholders has been followed to assess the impact of IMF-supported programs on the occurrence of other possible episodes of financial crisis, like sudden stops of capital flows, currency and sovereign debt crises, for which the plausibility of the excluding restriction is equally questionable ([Eichengreen et al., 2008](#); [Dreher and Walter, 2010](#); [Jorra, 2012](#)).

Figure 2: IMF lending arrangements and foreign policy similarity



*Notes:* Calculations based on data on IMF lending arrangements and on foreign policy similarity (Kilby, 2009b). The original sample consists of 2,527 country-year observations (see Table 4). To ensure the same balanced panel before and after  $t = 0$ , we have dropped all lending arrangements signed after 2003. This leaves us with 368 arrangements. The control group ( $N = 368$ ) has been randomly selected among country-year observations in which no IMF lending arrangement was signed.

countries. To support this statement, in Figure 2 we plot the average evolution of our two instruments in the 5-year periods before and after each IMF loan agreement in our sample. For comparison, we show the evolution of PROXIMITY\_G7 and MOVEMENT\_G7 in a control group. This has been chosen randomly selecting a sample of country-year observations in which no Fund-supported lending agreements were signed. The diagrams show a small decline in the measure of proximity in the 11-year window, but this downward trend does not accelerate after the lending arrangement and it is common also to the control group.

All that said, being aware of the potential problems with our excluding restriction, we estimate an over identified model with both an IV probit and a 2SLS linear probability specification so that we can formally test for the validity of the over-identifying restrictions. As we will show below, the statistical tests indicate that our instruments are valid, such that we can apply our IV strategy to equation (1).

### 3.3 Descriptives

In the sample used in the baseline regressions (Table 4) there are 70 systemic banking crises, the first in 1976 and the last in 2009, and 455 IMF lending arrangements. The episodes of banking sector instability tend to concentrate in the early 1980s, in 1990s, and then in 2008-2010 following the recent global financial crisis. IMF activity generally peaked around the crisis years. However, it is interesting to note that the Fund's financial support remained sustained (but declining) even after the late 1990s, without any significant banking distress episodes until the 2007 financial crisis (Figure 1). This is the period during which the focus of the Fund's activity on the reforms and stability of the financial sector became dominant. Hence, the diagram would suggest that the increased attention of IMF structural conditionality on banking sector stability and regulation after the 1997 Asian crises may have brought positive effects in terms of less vulnerability to systemic banking crises (Giustiniani and Kronenberg,

2005).<sup>11</sup>

Table 3 points out the positive association between banking crises and IMF-supported programs. In the whole sample of low- and middle-income countries, the likelihood of a banking crisis is equal to 5% in country-year observations in which the IMF is lending. This value is more than twice that in country-year observations in which there is no IMF loan agreement, and the difference between these two probabilities is statistically significant. The same pattern holds when we split the sample into low-income and middle-income countries.

Focusing on the 455 Fund lending arrangements present in our sample, we provide some additional information on the degree of compliance with conditionality and on the size of the loan. We follow [Dreher and Walter \(2010\)](#) and we code a country as compliant when at most 25% of the amount agreed under an IMF arrangement remained undrawn at program expiration. The size of the loan, instead, is normalized to the country quota at the IMF.<sup>12</sup> Interestingly, only in one third of the programs for which we have data (140 out of 433) can countries be considered compliant with conditionality. The size of the loan is extremely variable, ranging from 5% to 1,560% of the country's IMF quota. The average (median) loan is equal to 130%(75%) of the quota and half of the loans are between 45% and 125%.

## 4 Empirical results

### 4.1 Main findings

The main results are reported in Tables 4 to 5, in which the presence of the Fund is measured, respectively, by a dummy equal to one if the country signed at least an IMF lending arrangement between  $t - 1$  and  $t - 5$  ( $\text{IMF\_ARRANGEMENT}_{t,t-5}$ ) and by the logarithm of the ratio between the amount of the loan resulting from the arrangement with the Fund and the country quota ( $\text{IMF\_LOAN/QUOTA}_{t-1,t-5}$ ). In both Tables, we report the results obtained estimating equation 1 using a standard probit, the IV probit and a 2SLS linear probability model.

The Wald test of exogeneity indicates that we can reject the null hypothesis of no endogeneity, supporting the necessity to adopt an IV strategy to identify the causal effect of the Fund intervention on banking sector stability. The first-stage coefficients on the excluded instruments ( $\text{PROXIMITY\_G7}_{t-6,t-10}$  and  $\text{MOVEMENT\_G7}_{t-6,t-10}$ ) and the diagnostic tests generally confirm that the instruments are relevant. They show a positive and significant correlation with the dummy for the IMF presence in the country in the interval  $(t - 1, t - 5)$ . More important, the F-test for the weak identification test is much larger than the 10 value proposed by [Stock and Yogo \(2005\)](#) as a rule of thumb. As regards the exogeneity, since the model is over-identified, we can run a standard Sargan-Hansen test of overidentifying restrictions, which indicates that we cannot reject the null hypothesis that our instruments are uncorrelated with the error term. Finally, the Kleibergen-Paap rk LM-statistic suggests that the model is not underidentified.

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<sup>11</sup>[Giustiniani and Kronenberg \(2005, p.11\)](#) note that “comparing the periods before (1995-96) and after (1997-2003) the Asian crisis, the share of banking sector conditionality has expanded from 65 percent to 80 percent of total financial sector measures [...] and that this] is indicative of a growing and more comprehensive attention of IMF programs, and hence of IMF conditionality, to the functioning of the banking industry”.

<sup>12</sup>The ratio between IMF loan and country quota is drawn directly from the IMF's historical data set. Unfortunately, we were not able to retrieve the nominal amount of the loan in current USD.

The results of Tables 4 to 5 are qualitatively similar. We start discussing the estimates in which the IMF intervention is measured by the dummy variable (Table 4). The first three columns report the estimates of equation 1 on the pooled sample. The non-IV probit estimates show that having signed an IMF lending agreement is not statistically correlated with the incidence of banking crises in subsequent years (column 1). However, when we take into account the potential endogeneity of IMF support, the coefficient on  $\text{IMF ARRANGEMENT}_{t-1,t-5}$  becomes negative and statistically significant, both in the IV probit and in the 2SLS estimates (columns 2 and 3). This result confirms the presence of a negative bias in the standard probit model (because of the negative correlation due to the IMF intervention in "bad times") and indicates that the Fund's assistance actually reduces the probability of incurring a banking crisis. The negative association between Fund intervention and the probability of banking crisis suggest that the positive effects of the IMF-supported program, in terms of credit availability and reform stimuli, offset the bad signals and moral hazard effects.

A similar picture emerges also when we drop the 2007-2010 period (columns 4-6), which may be considered a specific case because of the global recession, which significantly increased the number of banking crises, and the massive Fund interventions in several countries (see Figure 1). As anticipated, results are unaffected if IMF intervention is measured by the size of the loan (measured as a share of the country quota). Table 5 shows that the correlation between the size of the loan and the likelihood of banking crises is positive (and significant when excluding the 2007-2010 period), but becomes negative and significant once the endogeneity of the Fund support is taken into account.

Moving on to the set of control variables, we find that the occurrence of a banking crisis is robustly associated with fiscal imbalances ( $\text{PUBLIC DEBT}$  and  $\text{SHORT TERM DEBT}$ ), real interest rates and changes in the real exchange rate and inflation. Specifically, our results indicate that the probability of a banking crisis is higher in more indebted countries and, especially, in countries with a larger fraction of short-term external debt. In addition, higher real interest rates are associated with a higher incidence of banking crises. As regards the monetary variables, we find that the coefficients on  $\text{GDP DEFLATOR}$  and  $\text{DEPRECIATION}$  are positive and significant (the former in the IV probit, the latter in the 2SLS estimates), suggesting that real exchange rate depreciation and higher inflation are leading indicators of a banking crisis.

Contrary to what is generally found in the literature, our results do not indicate that growth slowdowns are associated with a higher probability of crises (except in the 2007-2010 period), neither is real GDP per capita. This last finding is consistent with banking crises being an equal opportunity threat for poorer and richer countries [Reinhart and Rogoff \(2008\)](#). Similarly, we do not find any statistical association between the probability of banking crises and the measure of *de jure* financial openness, credit growth, and the ratio of M2 over international reserves (in this case the coefficient is positive and statistically significant, as expected, only in the standard probit estimates).

Given that our model specification cannot exploit within country variation, the results discussed so far may be influenced by some unobserved country-specific characteristics which could affect financial stability. To mitigate this concern, in Table 6 we control for the possible in-

fluence of different aspects of the macroeconomic and institutional setting on banking sector stability. A sounder macroeconomic and institutional framework could promote banking stability (Demirguc-Kunt and Detragiache, 1998). Besides, autocratic regimes are more inclined to sign IMF lending arrangements (Moser and Sturm, 2011), while democratic ones are found to be more likely to experience banking crises (Lipsy, 2011). Finally, the effectiveness of the Fund-supported programs may depend on the macroeconomic and institutional setting (this aspect will be discussed in section 4.4).

The inclusion of different measures capturing the degree of institutional development severely reduces the sample size. Therefore, we show that our main results are robust to the inclusion of this set of additional controls, all commonly used in the economic and political science literature, but we will not include them in the baseline specification. First, we consider a measure of the degree of a country’s political, financial and economic riskiness (COUNTRY RISK). This risk rating is the Composite Index published by the International Country Risk Guide (ICRG).<sup>13</sup> Second, we use the index of access to sound money (SOUND MONEY), published by the Fraser Institute as part of the Economic Freedom of the World Index. This variable measures the growth rates of money supply and inflation, and the freedom to own foreign currency bank accounts domestically and abroad.<sup>14</sup> Third, we include the polity score from the Polity IV data set (POLITY), which ranks governing institutions from autocratic to democratic according to measures that record key qualities of executive recruitment, constraints on executive authority, and political competition (Marshall *et al.*, 2010). Fourth, we rely on the dummy DEMOCRACY, which identifies democracies and dictatorships according to the definition proposed by Cheibub *et al.* (2010).<sup>15</sup>

We find that the two variables which measure to what extent the institutional and economic environment is business friendly (COUNTRY RISK and SOUND MONEY) are negatively correlated with the likelihood of a banking crisis. This suggests that the rule of law, limited corruption and access to sound money are elements which mitigate the vulnerability of the banking system to systemic crises. By contrast, the presence of an institutionalized democratic regime, measured alternatively by a continuous index (POLITY) or by a dummy identifying democracies and autocracies (DEMOCRACY), is not correlated with a higher probability of banking crises, as suggested, instead, by Lipsy (2011). More important, in all regressions we find that the coefficient on the Fund arrangement dummy, estimated with either the IV probit or the 2SLS, remains negative and statistically significant.

## 4.2 The credit channel

As discussed in Section 2.1, the positive influence of Fund intervention on banking sector stability may be due to credit availability and the reform channels. We will address the role of conditionalities and reforms in the next section. Here we focus on credit availability and aim to

<sup>13</sup>The Composite Index is a risk rating based on a set of 22 components grouped into three major categories of risk: political, financial, and economic. The index ranges between 0 and 100, with higher values indicating lower levels of risk. For details, see <http://www.prsgroup.com>.

<sup>14</sup>See: <http://www.freetheworld.com/index.php> and Gwartney *et al.* (2012) for details.

<sup>15</sup>The sample was split by taking the median of the economic freedom index as thresholds (columns 3-4), the value of zero for the polity index (columns 5-6) and the 0/1 value of the dummy identifying democracies (columns 7-8).



see whether there is some non-linearity on the effect of IMF intervention according to the size of the loan.

To test for the role of credit availability we consider the possibility of nonlinear effects of IMF interventions on the likelihood of banking crises. The idea is that if the provision of a sufficiently large amount of emergency financial resources to increase a country's reserves would be a necessary element to nurture the confidence of creditors and create a safety net for the domestic banking system, the effect of participating in an IMF-supported program would be independent of its size. Otherwise, the intervention of the Fund *per se* is not sufficient to reduce the risk of banking crises, unless it exceeds a certain size threshold.

Empirically, we split the sample according to the size of the IMF loan at some specific exogenous threshold. Given the non-linearity of our model and the endogeneity of the key regressor, we are unable to implement more sophisticated methods used to test for the presence of an endogenous threshold (Hansen, 2000). However, we try to mitigate the effect of the arbitrariness in the choice of the threshold, splitting the sample for any value of the loan amount (as a percentage of the country quota at the IMF) in the range [40 – 120], with 10 percentage point increments.<sup>16</sup> In Table 7 we report the estimated coefficients of the key variable  $IMF\ ARRANGEMENT_{t-1,t-5}$  for the different sub-samples, together with the first-stage coefficients on the excluded instruments.

The results indicate that up to the 80 percent threshold the likelihood of a banking crisis is significantly smaller only for sufficiently large loans. By contrast, when considering loans larger than 80 percent of the country quota, the coefficient on  $IMF\ ARRANGEMENT_{t-1,t-5}$  is negative and statistically significant both below and above the quota. Thus, our results suggest that, as long as the loan amount is sufficiently small (below 80% of the country quota), IMF lending does not reduce the probability of banking crises. In other words, only significantly large IMF loans are associated with a lower probability of banking crises.

One may argue that this non-linearity is the result of a model mis-specification. However, the first-stage coefficients on the instrumental variables indicate that the lack of significance of the lending arrangement dummy in the small loan samples should not depend on the limited power of the instruments. That said, the lack of significance of the IMF dummy may still depend on the sample being relatively small (see columns 1, 3 and 5). However, comparing the sample split around the 70 and 80 percent thresholds (columns 7-10) with the split around the 90, 100 and 110 percent thresholds should make it clear that the significance of the coefficients does not depend on the number of observations in each sub-sample.

As we have seen, the credit availability channel may be the result of direct liquidity support from the Fund and of indirect effects related to the Fund's provision of a *seal of approval* and to a catalytic effect on private and public investors. The evidence that larger loans have a stronger effect in reducing the occurrence of banking crises could be read as consistent with the presence direct liquidity provision effect of IMF-supported programs on banking sector stability. By contrast, if the beneficial effect of the IMF presence were due to the provision of the *seal of approval*, vulnerability to banking crises should depend on IMF intervention *per se* and not, at

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<sup>16</sup>We choose such a threshold range since we are not interested in tails of the sample distribution of the IMF LOAN/QUOTA variable. A loan to quota ratio of 40% (120%) roughly corresponds to the 15<sup>th</sup> (67<sup>th</sup>) percentile of the sample distribution of the IMF LOAN/QUOTA variable.

least to a certain extent, on its size.

### 4.3 The conditionality/reform channel

Other than credit availability, IMF intervention could affect banking sector stability thanks to the conditions and policy advice coming along with IMF-supported programs. In particular, the conditionalities targeting on financial sector reforms may affect the likelihood of a future banking crisis, making the financial sector more resilient to international capital flows and external shocks (see above, sub-section 2.1.2). However, the effectiveness of IMF conditionalities depends on the degree of compliance of the recipient country (Dreher, 2009). Focusing specifically on financial sector conditionalities, Giustiniani and Kronenberg (2005) find that compliance with IMF-supported banking sector reform strategies has contributed to an improvement in banking sector performance over the period 1995-2003.

Unfortunately, since the MONA data set classifies compliance by conditionality categories starting from 1992, we could look at financial-sector conditionalities only at the expense of a dramatic reduction of our sample. Therefore, we consider the general degree of compliance with conditionality as coded by Dreher and Walter (2010). The results, shown in Table 8, indicate that the positive effect of IMF-supported programs on the probability of a future banking crisis critically depends on compliance with conditionality. Differently from the evidence found on the outbreak of currency and sovereign debt crises, which point to a limited importance of the distinction between compliers and non-compliers (Dreher and Walter, 2010; Jorra, 2012), we find that the effect of the IMF lending arrangement in reducing the probability of banking crises is much lower for countries which are not compliant with the Fund's conditionality. The effect of the compliance is economically significant. Considering the 2SLS estimates (column 3), the probability of banking crisis is 18.9% lower for countries which signed an IMF lending agreement and were compliant with the Fund's conditionality. A lending agreement, but without compliance, instead, lowers the probability of banking crisis only by 6.8%.

### 4.4 Concessional vs non-concessional loans and the role of institutions

Pooling all countries in the sample may mask some sort of heterogeneity and may lead to inconsistent estimates. Thus, in Tables 9 and 10 we assess whether the effect of the IMF intervention differs according to the kind of IMF arrangement and the macroeconomic and institutional characteristics of borrowing countries.

First, in Table 9 we split the sample between non-concessional loans, financed via the General Resources Account (GRA), and concessional loans, extended from the Poverty Reduction and Growth Trust (PRGT, which recently replaced the Poverty Reduction and Growth Facility - PRGF). We do not find any significant difference in the effect of Fund interventions on banking stability across arrangement type. Our IV strategy proves valid in the two sub-samples and the IV estimates show that both concessional and non-concessional IMF-supported programs are associated with a lower probability of banking crises.

In Table 10 we report the sample splitting along the four dimensions of the institutional framework introduced in section 4.1. We start by splitting the sample according to the measure of the degree of a country's political, financial and economic riskiness (COUNTRY RISK).

We observe that the effect of IMF intervention is significant only in countries with a sound institutional framework (defined as countries where the ICRG score is above the sample median, see Table 10, columns 1 and 2). This evidence would be consistent with the hypothesis that the catalytic effect of the Fund is stronger and the risks of moral hazard are lower in countries with good policies and institutions. However, this result is not robust to alternative definitions of the institutional setting (see columns 3 to 8). When we split the sample according to the index of access to sound money (SOUND MONEY), the polity score from the Polity IV data set (POLITY) and the dummy identifying democracies and dictatorships (DEMOCRACY), we find that the coefficients on the dummy for the IMF arrangement are negative and statistically significant in both sub-samples. Furthermore, the magnitude of the coefficients is generally quite similar, apart from columns 7 and 8, in which the effect of the IMF presence seems larger in democracies than in dictatorships.

In sum, while the effectiveness of the Fund-supported programs in bolstering banking sector stability seems to be impaired by a weak institutional framework, we do not find robust evidence that a stable monetary environment and the presence of democratic institutions are necessary conditions for the Fund presence to mitigate the risk of a future banking crisis.

#### 4.5 Controlling for other potential triggers of banking crises

As a robustness exercise we expand the set of control variables to take into account other possible determinants of banking crises. We add three sets of additional explanatory variables. First, we control for the presence of a deposit insurance scheme, which has been found to be positively correlated with the likelihood of banking crises (Demirguc-Kunt and Detragiache, 2002). Second, we control for the occurrence of currency crises in the previous year and for the history of past banking crises. Third, we augment the model with a measure of the degree of financial liberalization and with for three measures of financial integration. These two exercises could further address the potential endogeneity issue of the IMF programs. Indeed, IMF lending usually occurs in response to some sort of external sector crisis, such as a currency crisis or a sudden stop of financial flows. These external sector crises are often accompanied by banking crises, as in the “twin crises” (Kaminsky and Reinhart, 1999). The negative coefficient of the IMF variable that we have found may indicate that the country suffered a financial crisis that was not repeated. To assess whether or not the IMF program deserves the credit for the absence of another crisis, we add a dummy variable for past banking crises and we control for *de facto* measures of financial integration.<sup>17</sup> Finally, we try to control for the presence of common regional factors which may jointly affect the probability of a banking crisis and the Fund intervention in a country, as happened during past financial crises in East Asia or Latin America, by adding a set of regional dummies.

Table 11 reports the results of the IV probit estimation of Equation 1 and shows that the coefficient on  $\text{IMF ARRANGEMENT}_{t-1,t-5}$  is robust to the inclusion of these additional control variables. In sum, the significance of the IMF arrangement dummy variable provides further evidence that Fund-supported programs are effective in forestalling future crises.

The coefficient on the dummy for country-year observations in which a deposit insurance

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<sup>17</sup>We are indebted to Joseph Joyce for suggesting this point.

scheme is in place (DEPOSIT INSURANCE, column 1) shows that the presence of a deposit insurance induces moral hazard, since it is positively correlated with the likelihood of a banking crisis, as in [Demirguc-Kunt and Detragiache \(1998\)](#) and [Demirguc-Kunt and Detragiache \(2002\)](#).

The results reported in columns 2 and 3 support the existence of a close link between balance-of-payment and banking crises ([Kaminsky and Reinhart, 1999](#)), but they do not indicate that countries that have already experienced at least one banking crisis in the previous decade ( $\text{BANKING CRISES}_{t-1,t-10}$ ) have a higher likelihood of experiencing another crisis, contrary to what was found by [Aizenman and Noy \(2012\)](#) who, however, focus on a smaller sample. The occurrence of a currency crisis in  $t - 1$  ( $\text{CURRENCY CRISIS}_{t-1}$ ) significantly raises the probability of a banking crisis: the average partial effect associated with the estimates reported in column 1 indicates that countries with a currency crisis in  $t - 1$  are 4.2% more likely to experience a banking crisis.

In column 4 we control for the degree of financial liberalization (FINANCIAL REFORMS), as measured by an index of financial reforms compiled by [Abiad \*et al.\* \(2008\)](#)<sup>18</sup>, but we do not find that the likelihood of banking crises differs across the degree of financial liberalization. Given the lack of significance of *de jure* measures of financial openness (see Table 4) and financial liberalization, in column 5 we also control for *de facto* financial integration, as measured by the ratios over GDP of: (i) portfolio equity liabilities (PORTFOLIO LIABILITIES), (ii) debt liabilities (DEBT LIABILITIES), and (iii) foreign direct investment liabilities (FDI LIABILITIES). When looking explicitly at *de facto* financial integration, we find that foreign direct investment liabilities reinforce banking stability, while more volatile debt inflows raise the probability of a banking crisis, consistently with the evidence discussed by [Joyce \(2011\)](#) on a smaller sample of emerging markets.

Finally, in column 6 we show that Eastern European and Latin American countries are more likely to experience banking crises than other regions. However, even controlling for common regional shocks, the effect of the Fund intervention in forestalling future crises remains positive.

## 5 Conclusions

The role of the Fund in past systemic banking crises has been extensively debated and the global financial crisis has further stimulated the discussion about the on-going IMF reform process, making the development of an enhanced crisis prevention toolkit a priority. In theory, IMF lending may influence the likelihood of systemic banking crises through a plethora of contrasting effects, related to liquidity support, moral hazard, and bad and good signaling. Hence, whether and how IMF involvement affects the probability of a systemic banking crisis remains an empirical question.

In this paper we contribute to this debate, estimating the effect of IMF-supported programs on the probability of banking crises in a large sample of developing countries. Our empirical

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<sup>18</sup>[Abiad \*et al.\* \(2008\)](#) build a database of financial reforms which covers 91 economies over the period 1973–2005. Financial policy changes are recorded along seven different dimensions: credit controls and reserve requirements, interest rate controls, entry barriers, state ownership, policies on securities markets, banking regulations, and restrictions on the capital account. Liberalization scores for each category are combined in a graded index that is normalized between zero and one. This is the index used in the regressions and it has the advantage of being a continuous measure, rather than a 0/1 dummy for financially liberalized countries.

results indicate that the standard probit estimates are biased by a reverse causality going from a higher probability of a banking crisis to a more likely intervention by the Fund. In other words, it is financial fragility which may lead to the Fund's intervention in the country, rather than the other way round. When we take into account the endogeneity of the IMF's presence in a country, our results consistently show that IMF lending programs are actually associated with a lower probability of banking crises occurring in future years. This finding suggests that the bad signals and moral hazard effects, if present, are offset by the credit availability provided the IMF-supported program.

We also find that the crisis prevention role of the Fund is connected to the macroeconomic policies and financial reforms which come with the loan and to a direct liquidity support effect. In fact, other things being equal, the likelihood of a banking crisis is lower for borrowers which are compliant with IMF conditionalities than for the non-compliant ones. In addition, we find that the negative association between IMF-supported programs and the probability of banking crises is significant only when the loan is sufficiently large. This result is consistent with the benefit of the IMF intervention acting through liquidity support.

We think that our analysis could be extended along two main lines of research. Ideally, one would be interested in analyzing how IMF intervention could affect banking sector stability through the promotion of financial sector reforms. Unfortunately, data availability so far has not made it possible to build a large panel data set. As a second-best option, the role of conditionalities could be analyzed by focussing on a measure of compliance with financial sector conditionality, which could be a better proxy of the capacity of the Fund to drive the reforms of the financial sector ([Giustiniani and Kronenberg, 2005](#)).

Second, one could fully exploit the data set compiled by [Laeven and Valencia \(2012\)](#) using also the information on output losses, measured as the cumulative sum of the differences between actual and trend real GDP, expressed as a percentage of trend real GDP, in the three-year period after the crisis. This information would make it possible to assess not only the effect of the IMF intervention on the likelihood of a banking crisis, but also on its costs.

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## Tables

Table 1: Determinants of banking crises: selected review

Paper	Sample	Period	Methodology	Main results
Demirguc-Kunt and Giache (1998)	65 market economies	1980-1994	Pooled logit; $X_t$	Growth (-), RIR (+), Inflation (+), M2/reserve (+), Private credit (+), Deposit insurance (+), Law & order (-), pc GDP (-)
Hardy and Pazarbasioglu (1999)	50 countries	1980-1997	Multinomial logit with FE; $X_{t,t-1,t-2}$	Growth (-), Inflation (+), RER depreciation (+), interest rates (+), credit expansion (+), capital inflows (+)
Noy (2004)	61 non-OECD countries	1975-1997	Pooled probit; $X_{t-1}$	Growth (-), Inflation (+), M2/reserve (+), RER depreciation (+), Financial liberalization (+)
Demirguc-Kunt and Giache (2005)	94 countries	180-2002	Pooled logit; $X_t$	Growth (-), RIR (+), Inflation (+), M2/reserve (+), Private credit (+), Deposit insurance (+), Credit growth $_{t-2}$ (+), pc GDP (-)
Beck <i>et al.</i> (2006)	69 countries	1980-1997	Pooled logit; $X_t$	Growth (-), RIR (+), pc GDP (-), Banking sector concentration (-), Banking restrictions (+)
Von Hagen and Ho (2007)	47 countries	1980-2001	Conditional logit; $X_{t-1}$	Growth (-), RIR (+), Overvalued ER (-), Deposit insurance (+)
De Haan and Shehzad (2009)	85 countries	1973-2002	Probit model with RE; $X_t$	Growth (-), RIR (+), pc GDP (-), RER depreciation (+), Financial liberalization (-). Financial reforms (-, conditioned on banking supervision)
Klomp (2010)	110 countries	1970-2007	Random coefficient logit model; $X_t$	Growth (-), RIR (+), Credit growth (+), M2/reserve (+), Globalization (+)
Joyce (2011)	20 emerging markets	1976-2002	Conditional logit; $X_{t-1}$	Growth (-), Inflation (+), FDI & portfolio liabilities (-), Debt liabilities (+), financial openness (-), fixed exchange rate (+)
Duttagupta and Cashin (2011)	50 countries	1990-2005	Binary classification tree	Banking crisis increases with: high inflation, liquidity dollarization combined with nominal depreciation or bank illiquidity, low bank profitability
Aizenman and Noy (2012)	102 countries	1980-2010	Pooled logit with and w/out FE; $X_{t-1}$	Growth (-), Credit growth (+), pc GDP (-), Hyperinflation (+), Banking and currency crisis history (+)

Notes: RIR = real interest rate; RER = real exchange rate; FE = Fixed effects; RE = Random effects.  $X_t$  and  $X_{t-n}$  indicates that the main set of covariates is contemporaneous or lagged by  $n$  year(s), respectively.

Table 2: Variables: definition and sources

Variables	Definition	Sources
BANKING CRISIS	Dummy equal to one for country-year observations in which there is a systemic banking crisis, and zero otherwise	<a href="#">Laeven and Valencia (2012)</a>
IMF ARRANGEMENT $_{t-1,t-5}$	Dummy equal to one for countries which signed an IMF loan agreement in the previous five-year period, and zero otherwise.	IMF historical data set
IMF LOAN/QUOTA $_{t-1,t-5}$	Logarithm of 1 + the amount approved, as a share of the country quota, by the IMF arrangement signed in the previous five-year period. The variable is set to zero if the country has not signed any agreement in the previous five-year period. In case of multiple agreements, we take the sum of the loan-to-quota ratios	IMF historical data set
NON-COMPLIANCE $_{t-1,t-5}$	Dummy equal to 1 if the country was compliant with its IMF program in the previous 5 years. A country is coded as compliant when at most 25% of the amount agreed under an IMF arrangement remained undrawn at program expiration and as zero otherwise	<a href="#">Dreher and Walter (2010)</a>
PROXIMITY_G7 $_{t-6,t-10}$	Average alignment score, measured as the share of alignment votes with G7 countries on regular UNGA votes between $t-6$ and $t-10$	<a href="#">Kilby (2009a)</a>
MOVEMENT_G7 $_{t-6,t-10}$	Change in the average alignment score with G7 countries between $t-6$ and $t-10$	<a href="#">Kilby (2009a)</a>
GDP PC	Logarithm of real GDP per capita, in constant UDS	World Development Indicators
GDP GROWTH	Annual growth rate of real GDP	World Development Indicators
PUBLIC DEBT	Total public debt (% of GDP)	<a href="#">Abbas et al. (2011)</a>
SHORT TERM DEBT	Short-term debt (% of total external debt)	World Development Indicators
REAL INTEREST RATE	Real interest rate as the nominal interest rate (according to data availability, Treasury Bill rate, discount rate, or deposit rate) minus the GDP deflator.	International Financial Statistics and World Development Indicators
CREDIT GROWTH	Change in domestic credit to private sector (% of GDP) between $t$ and $t-1$	World Development Indicators
INFLATION	GDP deflator	World Development Indicators
DEPRECIATION	Rate of change of the nominal official exchange rate (for the US this is the rate of change of the nominal effective exchange rate)	World Development Indicators
FINANCIAL OPENNESS	The Chinn-Ito <i>de jure</i> measure of financial openness	<a href="#">Chinn and Ito (2010)</a>
M2/RESERVE	Money and quasi money (M2) to total reserves ratio	World Development Indicators
COUNTRY RISK	The Composite Index published by the International Country Risk Guide (ICRG)	<a href="#">The PRS Group</a>
SOUND MONEY	An index consisting of the following indicators: (i) Average annual growth of the money supply in the last five years minus average, (ii) annual growth of real GDP in the last ten years, (iii) Standard inflation variability in the last five years, (iv) Recent inflation rate, and (v) Freedom to own foreign currency bank accounts domestically and abroad	<a href="#">Fraser Institute, Gwartney et al. (2012)</a> , and <a href="#">Teorell et al. (2011)</a>
POLITY	Polity score, based on six measures that record key qualities of executive recruitment, constraints on executive authority, and political competition. The index is part of the Polity IV project and ranges from -10 (hereditary monarchy) to +10 (consolidated democracy).	<a href="#">Marshall et al. (2010)</a> and <a href="#">Teorell et al. (2011)</a>
DEMOCRACY	Dummy variable coded 1 if the regime qualifies as democratic	<a href="#">Cheibub et al. (2010)</a>
CURRENCY CRISIS	Dummy equal to one for country-year observations in which there is a currency crisis, and zero otherwise.	<a href="#">Laeven and Valencia (2012)</a>
BANK CRISES $_{t-1,t-10}$	Dummy equal to one for country-year observations in which there is at least a systemic banking crisis between $t-1$ and $t-10$ , and zero otherwise.	<a href="#">Laeven and Valencia (2012)</a>
DEPOSIT INSURANCE	Dummy equal to one for countries that adopted explicit deposit insurance systems in year $t$ and zero otherwise	<a href="#">Demirguc-Kunt et al. (2008)</a>
FINANCIAL REFORMS	An index of financial liberalization, based on eight dimensions and scaled between 0 (fully repressed) and 1 (fully liberalized)	<a href="#">Abiad et al. (2008)</a>
PORTFOLIO LIABILITIES	Portfolio equity liabilities (% of GDP)	<a href="#">Lane and Milesi-Ferretti (2007, updated data set)</a>
DEBT LIABILITIES	Debt liabilities (% of GDP)	<a href="#">Lane and Milesi-Ferretti (2007, updated data set)</a>
FDI LIABILITIES	Foreign direct investment liabilities (% of GDP)	<a href="#">Lane and Milesi-Ferretti (2007, updated data set)</a>

Table 3: IMF lending arrangements and banking crises

	No program		IMF program agreed		T-test on means
	Obs.	%	Obs.	%	
<b>Whole sample</b>					
Tranquil year	2,025	97.73	432	94.95	0.001***
Crisis year	47	2.27	23	5.05	
Total	2,072	100.00	455	100.00	
<b>Middle-income countries</b>					
Tranquil year	1,410	97.65	259	94.53	0.004***
Crisis year	34	2.35	15	5.47	
Total	1,444	100.00	274	100.00	
<b>Low-income countries</b>					
Tranquil year	615	97.93	173	95.58	0.080*
Crisis year	13	2.07	8	4.42	
Total	628	100.00	181	100.00	

*Notes:* Statistics based on the sample used in the baseline regressions. The last column reports the p-values of the mean comparison test on the probability of systemic banking crisis in country-year observations in which an IMF program has been agreed or not.

Table 4: Baseline regressions: IMF lending dummy

Dep Var: Prob(BANKING CRISIS)	(1)	(2)	(3)	(4)	(5)	(6)
	Whole sample			pre-2007		
	Probit	IVprobit	2SLS	Probit	IVprobit	2SLS
IMF ARRANGEMENT <sub>t-1,t-5</sub>	0.020 [0.127]	-1.086*** [0.404]	-0.067** [0.028]	0.068 [0.138]	-1.432*** [0.327]	-0.100*** [0.035]
GDP PC <sub>t-1</sub>	-0.014 [0.052]	-0.107 [0.067]	-0.007* [0.005]	-0.001 [0.057]	-0.109 [0.071]	-0.008 [0.006]
GDP GROWTH <sub>t-1</sub>	-0.429 [0.840]	-0.559 [0.877]	-0.017 [0.062]	-1.116 [0.865]	-0.734 [0.864]	-0.037 [0.071]
PUBLIC DEBT <sub>t-1</sub>	0.075 [0.103]	0.249* [0.128]	0.014 [0.010]	0.112 [0.106]	0.392*** [0.129]	0.027** [0.014]
SHORT TERM DEBT <sub>t-1</sub>	1.344*** [0.371]	1.066** [0.434]	0.085** [0.035]	1.201*** [0.453]	0.701 [0.549]	0.066 [0.049]
REAL INTEREST RATE <sub>t-1</sub>	0.252** [0.124]	0.564** [0.225]	0.047** [0.023]	0.217* [0.124]	0.599*** [0.233]	0.054** [0.026]
CREDIT GROWTH <sub>t-1</sub>	0.002 [0.001]	0.001 [0.001]	0.000 [0.000]	0.001 [0.001]	0.000 [0.001]	0.000 [0.000]
INFLATION <sub>t-1</sub>	0.136 [0.184]	0.447* [0.235]	0.027 [0.023]	0.060 [0.218]	0.465* [0.242]	0.031 [0.026]
DEPRECIATION <sub>t-1</sub>	0.130 [0.151]	0.119 [0.130]	0.024** [0.010]	0.167 [0.192]	0.127 [0.144]	0.026*** [0.010]
FINANCIAL OPENNESS <sub>t-1</sub>	-0.042 [0.040]	-0.016 [0.045]	-0.001 [0.003]	-0.035 [0.044]	-0.007 [0.050]	-0.000 [0.004]
M2/RESERVE <sub>t-1</sub>	0.652*** [0.216]	0.476 [0.326]	0.093 [0.059]	0.618*** [0.209]	0.333 [0.349]	0.088 [0.063]
First-stage coefficients						
PROXIMITY_G7 <sub>t-6,t-10</sub>		1.171*** [0.266]	1.188*** [0.263]		1.091*** [0.273]	1.109*** [0.276]
MOVEMENT_G7 <sub>t-6,t-10</sub>		1.831*** [0.512]	1.732*** [0.537]		1.720*** [0.491]	1.622*** [0.553]
Observations	2,527	2,527	2,527	2,169	2,169	2,169
Wald test of exogeneity (p-value)		0.019			0.001	
K-P weak identification (F-test)			21.276			17.872
K-P underidentification (p-value)			0.000			0.000
Overidentification tests (p-value)			0.131			0.292

*Notes:* The table reports the regression coefficients and, in brackets, the associated clustered (at country level) standard errors. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. At the bottom of the table we report some diagnostic tests. For the IV probit we report the p-value of the Wald test for the null hypothesis of no endogeneity. For the 2SLS we report the p-value of: 1) the Kleibergen-Paap rk Wald F-statistic testing for weak identification; 2) the Kleibergen-Paap rk LM-statistic testing the null hypothesis that the excluded instruments are not correlated with the endogenous regressor; and 3) the Sargan test of overidentifying restrictions, testing the null hypothesis that the excluded instruments are not correlated with the error term (i.e. they are valid instruments). A constant is included but not showed.

Table 5: Baseline regressions: IMF loan amount

Dep Var: Prob(BANKING CRISIS)	(1)	(2)	(3)	(4)	(5)	(6)
	Whole sample			pre-2007		
	Probit	IVprobit	2SLS	Probit	IVprobit	2SLS
IMF LOAN/QUOTA <sub>t-1,t-5</sub>	0.170 [0.110]	-1.157*** [0.409]	-0.073** [0.034]	0.218* [0.120]	-1.521*** [0.322]	-0.111** [0.044]
GDP PC <sub>t-1</sub>	-0.021 [0.048]	-0.025 [0.062]	-0.002 [0.004]	-0.013 [0.052]	-0.019 [0.068]	-0.002 [0.006]
GDP GROWTH <sub>t-1</sub>	-0.248 [0.842]	-1.196 [0.883]	-0.063 [0.068]	-0.941 [0.875]	-1.488** [0.747]	-0.103 [0.073]
PUBLIC DEBT <sub>t-1</sub>	0.055 [0.107]	0.298** [0.128]	0.017 [0.011]	0.094 [0.109]	0.422*** [0.119]	0.030** [0.015]
SHORT TERM DEBT <sub>t-1</sub>	1.397*** [0.374]	0.936** [0.422]	0.080** [0.035]	1.262*** [0.454]	0.573 [0.504]	0.061 [0.049]
REAL INTEREST RATE <sub>t-1</sub>	0.216* [0.116]	0.664** [0.286]	0.054* [0.028]	0.179 [0.115]	0.732** [0.306]	0.066* [0.034]
CREDIT GROWTH <sub>t-1</sub>	0.002 [0.001]	0.000 [0.001]	0.000 [0.000]	0.001 [0.001]	-0.000 [0.001]	0.000 [0.000]
INFLATION <sub>t-1</sub>	0.110 [0.180]	0.514** [0.250]	0.031 [0.025]	0.037 [0.215]	0.568** [0.261]	0.039 [0.030]
DEPRECIATION <sub>t-1</sub>	0.123 [0.147]	0.148 [0.112]	0.026*** [0.009]	0.155 [0.187]	0.154 [0.118]	0.029*** [0.009]
FINANCIAL OPENNESS <sub>t-1</sub>	-0.043 [0.040]	-0.032 [0.043]	-0.002 [0.003]	-0.034 [0.043]	-0.035 [0.047]	-0.002 [0.004]
M2/RESERVE <sub>t-1</sub>	0.647*** [0.205]	0.560 [0.340]	0.100* [0.061]	0.611*** [0.198]	0.446 [0.364]	0.099 [0.067]
First-stage coefficients						
PROXIMITY_G7 <sub>t-6,t-10</sub>		1.080*** [0.295]	1.101*** [0.292]		0.963*** [0.265]	0.981*** [0.271]
MOVEMENT_G7 <sub>t-6,t-10</sub>		1.986*** [0.476]	1.874*** [0.513]		1.813*** [0.430]	1.728*** [0.497]
Observations	2,527	2,527	2,527	2,169	2,169	2,169
Wald test of exogeneity (p-value)		0.004			0.000	
K-P weak identification (F-test)			13.702			12.599
K-P underidentification (p-value)			0.000			0.000
Overidentification tests (p-value)			0.175			0.405

*Notes:* The table reports the regression coefficients and, in brackets, the associated clustered (at country level) standard errors. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. At the bottom of the table we report some diagnostic tests. For the IV probit we report the p-value of the Wald test for the null hypothesis of no endogeneity. For the 2SLS we report the p-value of: 1) the Kleibergen-Paap rk Wald F-statistic testing for weak identification; 2) the Kleibergen-Paap rk LM-statistic testing the null hypothesis that the excluded instruments are not correlated with the endogenous regressor; and 3) the Sargan test of overidentifying restrictions, testing the null hypothesis that the excluded instruments are not correlated with the error term (i.e. they are valid instruments). A constant is included but not showed.



Table 6: Baseline regressions: controlling for institutions

Dep Var: Prob(BANK CRISIS)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IVprobit	2SLS	IVprobit	2SLS	IVprobit	2SLS	IVprobit	2SLS
IMF ARRANGEMENT <sub>t-1,t-5</sub>	-1.460*** [0.462]	-0.109** [0.047]	-1.568*** [0.363]	-0.143** [0.063]	-1.539*** [0.354]	-0.123*** [0.046]	-1.152*** [0.443]	-0.075** [0.033]
GDP PC <sub>t-1</sub>	0.001 [0.084]	0.001 [0.007]	0.013 [0.070]	0.001 [0.007]	-0.055 [0.074]	-0.005 [0.007]	-0.127 [0.078]	-0.009 [0.006]
GDP GROWTH <sub>t-1</sub>	0.295 [1.337]	0.052 [0.118]	-0.861 [0.893]	-0.065 [0.092]	-0.630 [0.927]	-0.035 [0.083]	-0.622 [0.889]	-0.024 [0.066]
PUBLIC DEBT <sub>t-1</sub>	0.077 [0.146]	0.004 [0.014]	0.485*** [0.148]	0.045** [0.023]	0.420*** [0.123]	0.033** [0.015]	0.264* [0.137]	0.016 [0.011]
SHORT TERM DEBT <sub>t-1</sub>	0.084 [0.765]	0.010 [0.065]	0.397 [0.708]	0.047 [0.075]	0.874 [0.541]	0.095* [0.049]	1.028** [0.445]	0.086** [0.036]
REAL INTEREST RATE <sub>t-1</sub>	0.123 [0.216]	0.005 [0.020]	0.333 [0.212]	0.033 [0.029]	0.465** [0.190]	0.046* [0.024]	0.558** [0.224]	0.048** [0.024]
CREDIT GROWTH <sub>t-1</sub>	0.001 [0.001]	0.000 [0.000]	0.001 [0.001]	0.000 [0.000]	0.001 [0.001]	0.000 [0.000]	0.001 [0.001]	0.000 [0.000]
GDP DEFLATOR <sub>t-1</sub>	-0.053 [0.322]	-0.021 [0.023]	0.267 [0.241]	0.028 [0.033]	0.334 [0.217]	0.023 [0.025]	0.440* [0.243]	0.027 [0.024]
DEPRECIATION <sub>t-1</sub>	0.165 [0.171]	0.028*** [0.008]	0.060 [0.190]	0.010 [0.025]	0.123 [0.133]	0.026*** [0.010]	0.119 [0.139]	0.024** [0.010]
FINANCIAL OPENNESS <sub>t-1</sub>	-0.012 [0.055]	-0.000 [0.004]	0.079 [0.065]	0.009 [0.007]	-0.011 [0.043]	-0.001 [0.004]	-0.012 [0.045]	-0.000 [0.003]
M2/RESERVE <sub>t-1</sub>	0.391 [0.389]	0.105 [0.078]	0.265 [0.344]	0.083 [0.069]	0.405 [0.362]	0.093 [0.068]	0.514 [0.328]	0.096 [0.060]
COUNTRY RISK <sub>t-1</sub>	-0.021*** [0.008]	-0.002** [0.001]						
SOUND MONEY <sub>t-1</sub>			-0.094*** [0.034]	-0.010*** [0.004]				
POLITY <sub>t-1</sub>					0.014 [0.011]	0.001 [0.001]		
DEMOCRACY <sub>t-1</sub>							0.109 [0.140]	0.007 [0.010]
First-stage coefficients								
PROXIMITY_G7 <sub>t-6,t-10</sub>	1.017*** [0.330]	1.032*** [0.337]	0.747** [0.302]	0.760** [0.316]	0.769*** [0.266]	0.791*** [0.274]	1.080*** [0.269]	1.099*** [0.264]
MOVEMENT_G7 <sub>t-6,t-10</sub>	2.485*** [0.857]	2.428*** [0.906]	1.528*** [0.560]	1.456** [0.677]	1.848*** [0.454]	1.769*** [0.507]	1.608*** [0.502]	1.488*** [0.525]
Observations	1,396	1,396	1,633	1,633	2,214	2,214	2,429	2,429
Wald test of exogeneity (p-value)	0.027		0.003		0.003		0.026	
K-P weak identification (F-test)		10.530		7.867		13.842		18.959
K-P underidentification (p-value)		0.001		0.003		0.000		0.000
Overidentification tests (p-value)		0.823		0.570		0.519		0.097

Notes: The table reports the regression coefficients and, in brackets, the associated clustered (at country level) standard errors. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. At the bottom of the table we report some diagnostic tests. For the IV probit we report the p-value of the Wald test for the null hypothesis of no endogeneity. For the 2SLS we report the p-value of: 1) the Kleibergen-Paap rk Wald F-statistic testing for weak identification; 2) the Kleibergen-Paap rk LM-statistic testing the null hypothesis that the excluded instruments are not correlated with the endogenous regressor; and 3) the Sargan test of overidentifying restrictions, testing the null hypothesis that the excluded instruments are not correlated with the error term (i.e. they are valid instruments). A constant is included but not showed.

Table 7: Sample splits according to the size of the loan

Dep Var: Prob(BANK CRISIS)	Loan size (as a % of the country quota at the Fund)					
	< 40 (1)	>= 40 (2)	< 50 (3)	>= 50 (4)	< 60 (5)	>= 60 (6)
IMF ARRANGEMENT $_{t-1,t-5}$	-0.784 [1.430]	-1.247*** [0.398]	-0.983 [1.225]	-1.225*** [0.408]	-0.870 [0.863]	-1.269*** [0.411]
First-stage coefficients						
PROXIMITY_G7 $_{t-6,t-10}$	0.861** [0.349]	1.082*** [0.279]	0.860** [0.368]	1.112*** [0.276]	1.137*** [0.326]	1.031*** [0.302]
MOVEMENT_G7 $_{t-6,t-10}$	0.517 [0.855]	2.292*** [0.559]	0.752 [0.849]	2.412*** [0.567]	0.775 [0.814]	2.584*** [0.574]
Observations	1,292	2,305	1,382	2,215	1,496	2,101
Wald test of exogeneity (p-value)	0.751	0.008	0.572	0.009	0.552	0.008
	< 70 (7)	>= 70 (8)	< 80 (9)	>= 80 (10)	< 90 (11)	>= 90 (12)
IMF ARRANGEMENT $_{t-1,t-5}$	-0.518 [0.882]	-1.249*** [0.410]	-0.826 [0.709]	-1.171** [0.472]	-1.088* [0.564]	-1.154** [0.554]
First-stage coefficients						
PROXIMITY_G7 $_{t-6,t-10}$	1.205*** [0.299]	1.030*** [0.306]	1.292*** [0.304]	0.893*** [0.299]	1.305*** [0.297]	0.757*** [0.282]
MOVEMENT_G7 $_{t-6,t-10}$	1.041 [0.816]	2.572*** [0.586]	1.250 [0.776]	2.655*** [0.578]	1.745** [0.704]	2.434*** [0.581]
Observations	1,632	1,965	1,753	1,844	1,891	1,706
Wald test of exogeneity (p-value)	0.679	0.008	0.364	0.020	0.163	0.040
	< 100 (13)	>= 100 (14)	< 110 (15)	>= 110 (16)	< 120 (17)	>= 120 (18)
IMF ARRANGEMENT $_{t-1,t-5}$	-1.076* [0.593]	-1.134** [0.535]	-1.081* [0.593]	-1.047* [0.573]	-1.117* [0.587]	-1.023* [0.572]
First-stage coefficients						
PROXIMITY_G7 $_{t-6,t-10}$	1.292*** [0.298]	0.769*** [0.272]	1.289*** [0.298]	0.763*** [0.273]	1.258*** [0.301]	0.812*** [0.275]
MOVEMENT_G7 $_{t-6,t-10}$	1.562** [0.702]	2.590*** [0.574]	1.534** [0.707]	2.706*** [0.577]	1.622** [0.692]	2.668*** [0.589]
Observations	1,914	1,683	1,960	1,637	1,998	1,599
Wald test of exogeneity (p-value)	0.195	0.032	0.164	0.058	0.156	0.056

*Notes:* The table reports the regression coefficients and, in brackets, the associated clustered (at country level) standard errors. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. All regressions include the standard set of control variables, as in the baseline specification of Table 4, not reported for reasons of space. At the bottom of the table we report the p-value of the Wald test for the null hypothesis of no endogeneity.

Table 8: The role of compliance with conditionality

Dep Var: Prob(BANKING CRISIS)	(1)	(2)		(3)	(4)	(5)		(6)
	Probit	Whole sample		2SLS	Probit	pre-2007		2SLS
IMF ARRANGEMENT $_{t-1,t-5}$	-0.141 [0.152]	-2.368*** [0.541]	-0.189** [0.095]	-0.059 [0.166]	-2.805*** [0.344]	-0.307** [0.149]		
NON-COMPLIANCE $_{t-1,t-5}$	0.214* [0.129]	1.636*** [0.350]	0.131** [0.064]	0.161 [0.141]	2.005*** [0.255]	0.221** [0.105]		
GDP PC $_{t-1}$	-0.016 [0.052]	-0.153** [0.062]	-0.013* [0.007]	-0.003 [0.057]	-0.143** [0.059]	-0.016 [0.010]		
GDP GROWTH $_{t-1}$	-0.439 [0.841]	-0.209 [0.727]	0.002 [0.066]	-1.095 [0.875]	0.229 [0.750]	0.041 [0.094]		
PUBLIC DEBT $_{t-1}$	0.078 [0.101]	0.308*** [0.109]	0.024* [0.014]	0.115 [0.104]	0.418*** [0.112]	0.046* [0.024]		
SHORT TERM DEBT $_{t-1}$	1.343*** [0.371]	0.588 [0.479]	0.068* [0.037]	1.184*** [0.457]	0.090 [0.480]	0.026 [0.058]		
REAL INTEREST RATE $_{t-1}$	0.245** [0.125]	0.477** [0.189]	0.051* [0.026]	0.214* [0.125]	0.459** [0.193]	0.063* [0.034]		
CREDIT GROWTH $_{t-1}$	0.002 [0.001]	0.001 [0.001]	0.000 [0.000]	0.001 [0.001]	0.001 [0.001]	0.000 [0.000]		
INFLATION $_{t-1}$	0.131 [0.183]	0.403** [0.205]	0.032 [0.028]	0.060 [0.216]	0.401* [0.208]	0.043 [0.036]		
DEPRECIATION $_{t-1}$	0.129 [0.149]	0.073 [0.101]	0.023** [0.010]	0.164 [0.189]	0.052 [0.100]	0.023** [0.011]		
FINANCIAL OPENNESS $_{t-1}$	-0.044 [0.040]	-0.002 [0.045]	0.000 [0.004]	-0.036 [0.044]	0.001 [0.046]	0.000 [0.005]		
M2/RESERVE $_{t-1}$	0.640*** [0.212]	0.179 [0.301]	0.079 [0.059]	0.610*** [0.207]	0.030 [0.267]	0.068 [0.064]		
First-stage coefficients								
PROXIMITY_G7 $_{t-6,t-10}$		0.447** [0.200]	0.471** [0.190]		0.376** [0.178]	0.399** [0.181]		
MOVEMENT_G7 $_{t-6,t-10}$		0.734** [0.303]	0.594* [0.344]		0.656** [0.267]	0.543* [0.326]		
Observations	2,527	2,527	2,527	2,169	2,169	2,169		
Wald test of exogeneity (p-value)		0.031			0.003			
K-P weak identification (F-test)			5.176			3.749		
K-P underidentification (p-value)			0.011			0.024		
Overidentification tests (p-value)			0.133			0.316		

*Notes:* The table reports the regression coefficients and, in brackets, the associated clustered (at country level) standard errors. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. At the bottom of the table we report some diagnostic tests. For the IV probit we report the p-value of the Wald test for the null hypothesis of no endogeneity. For the 2SLS we report the p-value of: 1) the Kleibergen-Paap rk Wald F-statistic testing for weak identification; 2) the Kleibergen-Paap rk LM-statistic testing the null hypothesis that the excluded instruments are not correlated with the endogenous regressor; and 3) the Sargan test of overidentifying restrictions, testing the null hypothesis that the excluded instruments are not correlated with the error term (i.e. they are valid instruments). A constant is included but not showed.

Table 9: Baseline regressions: disentangling between concessional and non-concessional lending

Dep Var: Prob(BANKING CRISIS)	(1)	(2)	(3)	(4)	(5)	(6)
	Probit	IVprobit	2SLS	Probit	IVprobit	2SLS
IMF ARRANGEMENT <sub>t-1,t-5</sub>	0.084 [0.127]	-1.070*** [0.380]	-0.067** [0.028]	0.084 [0.145]	-1.310*** [0.414]	-0.076** [0.034]
GDP PC <sub>t-1</sub>	-0.009 [0.054]	-0.103 [0.067]	-0.007 [0.005]	-0.016 [0.064]	-0.161* [0.085]	-0.010* [0.006]
GDP GROWTH <sub>t-1</sub>	-0.248 [0.873]	-0.517 [0.908]	-0.012 [0.063]	-0.976 [0.991]	-0.679 [0.919]	-0.029 [0.061]
PUBLIC DEBT <sub>t-1</sub>	-0.029 [0.123]	0.182 [0.164]	0.008 [0.012]	-0.000 [0.132]	0.240* [0.139]	0.011 [0.011]
SHORT TERM DEBT <sub>t-1</sub>	1.332*** [0.378]	1.086** [0.427]	0.087** [0.036]	1.293*** [0.426]	0.964** [0.436]	0.069** [0.033]
REAL INTEREST RATE <sub>t-1</sub>	0.206* [0.112]	0.539** [0.221]	0.043** [0.021]	0.224* [0.116]	0.608*** [0.229]	0.046** [0.022]
CREDIT GROWTH <sub>t-1</sub>	0.001 [0.001]	0.001 [0.001]	0.000 [0.000]	0.002 [0.001]	0.001 [0.001]	0.000 [0.000]
INFLATION <sub>t-1</sub>	0.049 [0.224]	0.392 [0.252]	0.021 [0.021]	0.179 [0.125]	0.513** [0.217]	0.028 [0.023]
DEPRECIATION <sub>t-1</sub>	0.171 [0.196]	0.148 [0.166]	0.025*** [0.009]	0.066 [0.076]	0.096 [0.067]	0.022*** [0.008]
FINANCIAL OPENNESS <sub>t-1</sub>	-0.035 [0.042]	-0.011 [0.045]	-0.000 [0.003]	-0.025 [0.045]	0.012 [0.053]	0.001 [0.003]
M2/RESERVE <sub>t-1</sub>	0.687*** [0.219]	0.472 [0.340]	0.095 [0.062]	0.670*** [0.247]	0.304 [0.362]	0.083 [0.070]
First-stage coefficients						
PROXIMITY_G7 <sub>t-6,t-10</sub>		1.210*** [0.266]	1.225*** [0.264]		1.146*** [0.296]	1.163*** [0.294]
MOVEMENT_G7 <sub>t-6,t-10</sub>		1.899*** [0.520]	1.800*** [0.548]		1.710*** [0.538]	1.606*** [0.584]
Observations	2,383	2,383	2,383	2,234	2,234	2,234
Wald test of exogeneity (p-value)		0.010			0.009	
K-P weak identification (F-test)			23.016			15.892
K-P underidentification (p-value)			0.000			0.000
Overidentification tests (p-value)			0.161			0.301

*Notes:* The table reports the regression coefficients and, in brackets, the associated clustered (at country level) standard errors. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. At the bottom of the table we report some diagnostic tests. For the IV probit we report the p-value of the Wald test for the null hypothesis of no endogeneity. For the 2SLS we report the p-value of: 1) the Kleibergen-Paap rk Wald F-statistic testing for weak identification; 2) the Kleibergen-Paap rk LM-statistic testing the null hypothesis that the excluded instruments are not correlated with the endogenous regressor; and 3) the Sargan test of overidentifying restrictions, testing the null hypothesis that the excluded instruments are not correlated with the error term (i.e. they are valid instruments). A constant is included but not showed.

Table 10: Sample splits according to the institutional setting

Dep Var: Prob(BANK CRISIS)	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	YES	NO	YES	NO
IMF ARRANGEMENT $_{t-1,t-5}$	-1.914 [1.363]	-1.552*** [0.504]	-1.661*** [0.535]	-1.219** [0.605]	-1.640*** [0.312]	-1.642*** [0.425]	-1.596*** [0.341]	-0.914* [0.531]								
GDP PC $_{t-1}$	-0.025 [0.154]	0.002 [0.133]	0.143* [0.073]	-0.133 [0.135]	-0.017 [0.082]	-0.036 [0.108]	-0.128 [0.094]	-0.133 [0.108]								
GDP GROWTH $_{t-1}$	0.378 [1.520]	0.132 [1.689]	-1.259 [0.947]	-0.039 [2.111]	-1.123 [1.021]	0.028 [1.665]	-1.268 [1.040]	-0.001 [1.771]								
PUBLIC DEBT $_{t-1}$	0.066 [0.140]	0.311 [0.365]	0.539*** [0.164]	0.441 [0.285]	0.421* [0.240]	0.506*** [0.117]	0.371** [0.170]	0.227 [0.218]								
SHORT TERM DEBT $_{t-1}$	-1.319 [3.203]	-0.217 [0.997]	0.148 [0.978]	1.185 [0.968]	0.180 [0.664]	1.236 [0.907]	0.333 [0.701]	1.314* [0.721]								
REAL INTEREST RATE $_{t-1}$	0.072 [0.424]	0.618 [0.437]	0.334* [0.180]	0.798 [0.561]	0.888 [0.635]	0.429 [0.272]	1.257* [0.658]	0.383 [0.267]								
CREDIT GROWTH $_{t-1}$	0.000 [0.002]	0.009** [0.004]	0.001 [0.001]	0.001 [0.003]	-0.000 [0.001]	0.006* [0.003]	-0.000 [0.001]	0.006* [0.003]								
INFLATION $_{t-1}$	-0.048 [0.451]	0.333 [0.699]	0.333 [0.251]	0.701 [1.447]	0.389 [0.639]	0.645* [0.369]	0.815 [0.660]	0.582 [0.480]								
DEPRECIATION $_{t-1}$	0.113* [0.062]	0.470 [0.462]	0.008 [0.237]	-0.149 [0.948]	0.367** [0.185]	-0.182 [0.240]	0.313 [0.193]	-0.152 [0.312]								
FINANCIAL OPENNESS $_{t-1}$	-0.047 [0.076]	-0.022 [0.065]	0.060 [0.116]	0.040 [0.062]	0.042 [0.068]	0.048 [0.062]	-0.027 [0.059]	-0.012 [0.077]								
M2/RESERVE $_{t-1}$	0.770 [0.549]	-0.956* [0.548]	0.460 [0.293]	0.124 [0.530]	0.241 [0.323]	1.844 [1.372]	0.336 [0.344]	2.019 [1.484]								
First-stage coefficients																
PROXIMITY_G7 $_{t-6,t-10}$	0.628 [0.740]	1.164*** [0.397]	0.515 [0.380]	1.016** [0.436]	0.624* [0.366]	0.881*** [0.339]	0.520* [0.314]	1.656*** [0.397]								
MOVEMENT_G7 $_{t-6,t-10}$	1.308 [0.980]	3.475*** [1.020]	1.707** [0.794]	1.093 [1.217]	2.315*** [0.563]	1.556** [0.658]	2.374*** [0.560]	-0.041 [0.791]								
Observations	714	721	780	789	999	1,143	1,308	1,039								
Wald test of exogeneity (p-value)	0.463	0.029	0.059	0.062	0.001	0.021	0.003	0.123								

Notes: The table reports the regression coefficients and, in brackets, the associated clustered (at country level) standard errors. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. At the bottom of the table we report the p-value of the Wald test for the null hypothesis of no endogeneity. A constant is included but not showed.

Table 11: Robustness: additional controls

Dep Var: Prob(BANK CRISIS)	(1)	(2)	(3)	(4)	(5)	(6)
	IVprobit					
IMF ARRANGEMENT $_{t-1,t-5}$	-1.438*** [0.391]	-0.906* [0.467]	-1.118*** [0.399]	-1.532*** [0.293]	-1.158*** [0.439]	-2.080*** [0.168]
GDP PC $_{t-1}$	-0.101 [0.071]	-0.129* [0.077]	-0.108 [0.067]	0.042 [0.093]	-0.034 [0.075]	-0.328*** [0.086]
GDP GROWTH $_{t-1}$	-0.779 [0.863]	-0.314 [0.973]	-0.464 [0.900]	0.072 [1.336]	-0.201 [0.966]	-0.815 [0.739]
PUBLIC DEBT $_{t-1}$	0.433*** [0.138]	0.105 [0.128]	0.230* [0.132]	0.605*** [0.147]	-0.094 [0.175]	0.441*** [0.107]
SHORT TERM DEBT $_{t-1}$	0.468 [0.572]	1.328*** [0.515]	1.018** [0.435]	0.071 [0.752]	0.772* [0.454]	0.039 [0.522]
REAL INTEREST RATE $_{t-1}$	0.514** [0.227]	0.462** [0.197]	0.557** [0.222]	0.392** [0.199]	0.457** [0.221]	0.482*** [0.172]
CREDIT GROWTH $_{t-1}$	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]	-0.000 [0.001]
GDP DEFLATOR $_{t-1}$	0.391* [0.229]	0.341 [0.240]	0.479** [0.226]	0.564** [0.252]	0.331 [0.245]	0.376* [0.193]
DEPRECIATION $_{t-1}$	0.118 [0.127]	0.127 [0.157]	0.081 [0.079]	-0.147 [0.203]	0.127 [0.157]	0.087 [0.084]
FINANCIAL OPENNESS $_{t-1}$	-0.010 [0.051]	-0.037 [0.047]	-0.013 [0.045]	-0.041 [0.066]	-0.028 [0.048]	0.007 [0.036]
M2/RESERVE $_{t-1}$	0.428 [0.344]	0.561* [0.331]	0.478 [0.325]	0.715*** [0.128]	0.318 [0.334]	0.322 [0.326]
DEPOSIT INSURANCE $_{t-1}$	0.384*** [0.140]					
BANK CRISES $_{t-1,t-10}$		-0.089 [0.176]				
CURRENCY CRISIS $_{t-1}$			0.354* [0.197]			
FINANCIAL REFORMS $_{t-1}$				0.065 [0.262]		
PORTFOLIO LIABILITIES $_{t-1}$					0.747 [1.078]	
DEBT LIABILITIES $_{t-1}$					0.628*** [0.144]	
FDI LIABILITIES $_{t-1}$					-1.121*** [0.323]	
ECA countries						1.155*** [0.210]
LAC countries						0.700*** [0.222]
MENA countries						-0.182 [0.263]
SSA countries						0.076 [0.171]
First-stage coefficients						
PROXIMITY_G7 $_{t-6,t-10}$	0.984*** [0.285]	1.453*** [0.294]	1.168*** [0.266]	1.254*** [0.264]	1.089*** [0.265]	0.409* [0.224]
MOVEMENT_G7 $_{t-6,t-10}$	1.476*** [0.474]	0.618 [0.623]	1.826*** [0.511]	0.846 [0.680]	1.758*** [0.515]	0.999*** [0.373]
Observations	1,973	2,202	2,527	1,122	2,510	2,527
Wald test of exogeneity (p-value)	0.005	0.063	0.016	0.000	0.033	0.001

*Notes:* The table reports the regression coefficients and, in brackets, the associated clustered (at country level) standard errors. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. At the bottom of the table we report the p-value of the Wald test for the null hypothesis of no endogeneity. A constant is included but not showed. In column (6) the excluded geographical region is “East Asia & Pacific”. The other regions are: “Europe & Central Asia” (ECA), “Latin America & Caribbean” (LAC), “Middle East & North Africa” (MENA), and “Sub-Saharan Africa” (SSA).