Democracies and Financial Crises in the Developing World

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Abstract: Since the late 1970s, the vast majority of financial crises – especially the “crash” of the value of national currencies in financial markets – have occurred in democracies across the developing world. What is more intriguing is that such currency crashes have occurred with alarming frequency in developing country democracies when actively participating in the International Monetary Fund’s financial stabilization programs which are designed to prevent currency crises and promote exchange rate stability. This leads to the following question: when are democracies in the developing world more likely to suffer from currency crises under the IMF’s programs? I develop a simple “reduced-form” formal model that suggests that a democratic state’s likelihood of experiencing a currency crisis under an IMF program crucially depends on the extent to which legislative rules in developing country democracies allows parties in the legislature to controls the resources that finance its own internal operation and provide for the perquisites of its own (party) members. Specifically, I argue that IMF programs oblige democratic governments to implement structural reforms that can harm the economic interests of political actors in the legislature. In response, legislative parties issue political challenges to the IMF-assisted government and such challenges are credible when legislative parties have greater control over public finances that fund their operations. IMF-supported incumbents attempt to co-opt these parties with rents; this undermines the Fund’s influence, and subsequently, the government’s ability to implement IMF-structural reform obligations. Recognizing this, speculators (i.e. currency traders) initiate an attack against the program-participating democratic country’s currency, provoking a currency crisis. Statistical tests of a sample of developing country democracies (1980-2008) provide support this hypothesis.
Governments across the developing world often adopted repressive financial market controls in the immediate aftermath of World War II. Repressive market controls were put in place to primarily shield their economies from “turbulence” in the international monetary system and the possibility of financial crises that may result from such financial turbulence. But from the mid-1970s to the early 1980s, governments in the developing world began to gradually—and often tentatively—open and liberalize their domestic financial markets to international capital flows. This “new” age of financial globalization promoted economic growth as well as more domestic savings and greater allocative efficiency of capital in the developing world (IMF 2003, 2011; World Bank 2013). Yet the advent of financial globalization also exposed developing countries to the financial turbulence in international capital markets (that these countries once feared) and financial crises produced such turbulence.

In fact, the financial crises began with the hyperinflations of the former Soviet states, and spread in the form of an extremely devastating currency crisis in first Mexico in 1994 and then equally debilitating currency crashes across the nascent democracies of South-East Asia, Russia, and Latin America in the late 1990s and the first few years of the twenty-first century. In each crisis-affected country, the crash of the national currency had substantial real costs: savings were wiped out, jobs were eliminated, economic growth collapsed and political violence ensued in several crisis-affected economies (Eichengreen and Mody 2000; Fischer 2004; IMF 2011, 2015). Interestingly, conventional wisdom at the time (i.e. the late 1990s) attributed the repeated occurrence of currency crashes in developing countries— at least in part— to the domestic political instability that was engendered by the emergence and spread of democracy across the developing world (e.g. Haggard 1995; Eichengreen 1999; MacIntyre 1999a; Leblang and Satyanath 2006).

Some argued, while others asserted, that unstable governments in the democracies of the developing world generated substantial uncertainty in financial markets about their future economic state therein precipitating “speculative attacks” on their respective currencies by currency traders and
consequently, currency crises (Haggard and Kaufman 1995; Graham 1998; MacIntyre 1999a,b). This claim is not far from the truth. After all, a concise study of the outbreak of currency crises across both the newly democratized states of Turkey, Thailand and Indonesia in the late-1990s and the more established democracies of Brazil, Argentina and South Korea in the 1990s seem to confirm the view about a positive association between democracies and financial (specifically currency) crises in the developing world. Furthermore, careful examination of the relevant data reveals that as many as 132 out of 167 (that is 79.04 \%) of currency crisis episodes\(^1\) in developing countries from 1980 to 2008 have occurred in democratic states. It is not well known, however, that the vast majority (almost an astounding 71\%) of these 132 currency crisis episodes in democracies occurred when these states were actively participating in IMF programs that (in part) were designed to prevent such currency crashes in the first place. Indeed, “consolidated” democracies like Argentina, Brazil, South Korea and new democracies like Turkey, Thailand and Indonesia all experienced currency crises under IMF programs in the late 1990s.

The successive currency crashes that occurred in numerous developing country democracies under the so-called “watchful” eye of the IMF during the 1990s did lead a handful of prominent scholars to *publicly* ask why the IMF could not prevent currency crises in these states.\(^2\) This question was (and is) not rhetorical given that the IMF is obliged by Article I (section iii) of its own constitution to promote exchange rate stability and thus minimize the incidence of currency crashes. Furthermore, the IMF also publicly intervened in the reform-process across the developing country democracies mentioned above with the explicit objective of preventing a currency crisis in these cases. Yet although the question about the IMF’s inherent inefficacy in preventing currency crisis in developing country democracies is not inaccurate, it is also somewhat exaggerated. In fact, a careful analysis of 307

\(^1\) To identify the currency crisis episodes in our data, I follow Eichengreen *et al* (1995) and define currency crises as those periods when Eichengreen *et al*'s foreign exchange market pressure (EMP) index – this index is defined in the paper’s empirical section – exceeds the country-specific mean by \textit{at least} two standard deviations.

\(^2\) Stiglitz 2003; Sachs 1997; Radelet and Sachs 1998.
stabilization programs? provided by the IMF to 68 developing country democracies since 1975 reveals that a currency crisis occurred in program-recipient nations within six months after the approval of 46 percent of these 307 programs that were designed to forestall a currency crisis; however, the remaining 54 percent of these programs were not associated with currency crashes.

Examples further confirm this variation. For instance, the IMF provided a substantial financial assistance packages and Stand-by Arrangement (SBA) programs to Turkey’s relatively new democratic government in 2000-01 to forestall a currency crisis in the country. Despite the IMF’s intervention, the value of the Turkish Lira crashed (that is, a currency crisis occurred in Turkey) in international capital markets just two months after the Fund provided a large financial package for Turkey in December 2000 (see figure 1). In contrast, the IMF provided a SBA program and financial assistance in 1995-96 to newly democratic Pakistan (ruled by Prime Minister Benazi Bhutto at the time) with the explicit goal of preventing a currency crisis in the country (IMF 2000). This effort was successful as the value of the Pakistani Rupee increased significantly and stabilized after the country opted to participate in the IMF’s program (see Figure 2).

Thus, despite the Fund’s trenchant critics, we learn from the example of Pakistan mentioned above that the IMF has helped to avert currency crashes in many cases (also see Dreher and Walter 2010). Yet the data also reveals that a significant share of IMF programs (46 percent) did not succeed in preventing currency crises in several program-recipient democratic regimes in the developing world. This variation thus leads to the main question addressed in this paper: when are democracies in the developing world more likely to suffer from currency crises under an IMF program? I develop a simple “reduced-form” game theoretic-model that addresses this question. The main players in this model are the IMF, a democratic country in the developing world that seeks the Fund’s assistance, and currency

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3 This includes the seven types of IMF programs that are listed in detail in the paper’s empirical section.
speculators who trade the Fund-assisted country’s currency in international capital markets. The model’s main prediction is that a democratic state’s likelihood of experiencing a currency crisis under an IMF program depends on the extent to which legislative rules in IMF-assisted developing country democracies allow parties in the legislature to control the resources that finance its own internal operation and provide for the perquisites of its own (party) members.

The rationale that leads to the prediction posited above is briefly summarized here as follows. To start with, I show and argue that IMF programs oblige democratic governments to implement structural reforms that can harm the economic interests of key players in the legislature. In response, legislative parties issue political challenges to the IMF-assisted government and such challenges are credible when legislative parties have greater control over public finances that fund their electoral operations and activities. IMF-supported incumbents attempt to co-opt these parties with rents; this undermines the Fund’s influence, and subsequently, the government’s ability to implement IMF-structural reform obligations. Recognizing this, speculators (i.e. currency traders) initiate an attack against the program-participating democratic country’s currency, provoking a currency crisis. Statistical results obtained from a dataset of 68 developing country democracies (1980-2008) strongly support the hypothesis. The results remain robust when I control for alternative explanations, use alternative measures of currency crisis, and employ estimation techniques to account for the nonrandom participation of democratic countries in IMF programs and contagion effects in the occurrence of currency crises.

This paper proceeds as follows. I first present the game model that helps me to develop the main theoretical arguments that generate the paper’s central hypothesis. I then present the data, the variables, the statistical methodology employed in this study and the main empirical results. The paper concludes by discussing numerous implications that emerge from my findings and provide avenues for future research.
1. Model and Analysis

In this section, I present a game-theoretic model. The model explores how strategic interaction between the following players – the IMF, a program-participating democratic government, and a continuum of currency speculators – influences the likelihood of a currency crisis in the democratic state that participates in an IMF financial stabilization program. The key objectives of this model are two-fold. The first is to examine how legislative rules that allow legislative parties to control public budgetary resources that fund their operations influence the IMF-assisted government’s incentive to adopt structural reforms in the IMF program. The second objective is to understand the effect that such legislative rules may have on the likelihood of a currency crisis. To this end, I thus first define the model’s key parameters and describe the political dynamics between the Fund and the government that seeks the Fund’s assistance. I then define the players’ utility functions and the timing of events. This is followed by a formal description of the model’s Nash equilibrium solution and a discussion of the comparative static results that produce the central hypothesis tested in this paper.

1.1 Utility functions and Timing of Events

The democratic government (labeled as 𝑎 for simplicity) in the model turns to the Fund for assistance when the state suffers from severe economic problems\(^4\) that have led to weak macroeconomic fundamentals \(\theta\) (that can take values over the real line \(\mathbb{R}\)).\(^5\) The Fund (denoted as 𝑖𝑚𝑓) responds to the financially-troubled government’s request for assistance by approving a financial stabilization program (e.g. Stand-By Arrangement or Extended Fund Facility) for 𝑎. Similar to other IMF programs generally provided to financially-troubled developing states, the IMF program in this case includes a loan (\(l\)) and

\(^4\) These problems include, for instance, a sharp contraction in economic output, terms-of-trade shocks and a potential balance-of-payments crisis that leads to weak macroeconomic fundamentals (Vreeland 2004; Bird et al 2004).

\(^5\) Following extant models of currency (e.g Morris and Shin 1998), \(\theta \in (-\infty, +\infty)\) where \(\theta \in (-\infty, 1]\) when macroeconomic fundamentals are weak and \(\theta \in [1, +\infty)\) when macroeconomic fundamentals are “sound”.
“a set of economic policy reforms, or conditionality, that the borrower must implement to receive IMF credit” (Copelovitch 2010: 51). The Fund in fact incorporates “performance criteria” and other performance benchmarks in the program to induce the program-recipient government to adopt reforms. These reform measures typically include reduction of the fiscal deficit, curtailing subsidies and government consumption, and increasing the transparency of domestic financial institutions and reforming monetary policy (Vreeland 2003; Copelovitch 2010). The Fund’s objectives for incorporating such reform measures in the program are two-fold.

The first is to encourage the program-recipient government to exert sufficient effort \(e\) toward implementing these reforms and invest sufficient resources (labeled \(\theta_a\)) to improve the country’s macroeconomic fundamentals. This is done to ensure that the borrowing country’s macroeconomic fundamentals recover under the program and thus become at least weakly greater than some threshold \(\bar{\theta}\) set by the Fund. The threshold \(\bar{\theta}\) is common knowledge to all the players including the speculators who are indexed as \(i\). Second, as a “lender of last resort”, the IMF offers \(l\) to encourage the IMF-assisted government “\(a\)” to adopt reforms to provide a critical signal to speculators (i.e. currency traders) that the financial problems in the program-recipient state will be resolved (Vreeland 2004; Fischer 2004). This signal may discourage speculators from initiating a speculative attack against the currency of the borrowing country; thereby reducing the possibility of a currency crisis in the Fund-assisted state.

Apart from the objectives delineated above, the program-participating government is also required by the Fund to repay a certain amount \(m\) via a repayment schedule to the IMF after

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6 I assume, without loss of generality, that \(\theta\) is linear with respect to \(\theta_a\). This is intuitive as the borrowing state’s macroeconomic fundamentals \(\theta\) will improve when a higher level of \(\theta_a\) is invested toward improving \(\theta\). Conversely, \(\theta\) will decline when \(\theta_a\) decreases.

7 As suggested by Vreeland (2004), the IMF provides structural adjustment programs—which include loans and structural reform conditions—to financially-distressed countries as it sends a “signal” to investors and creditors that the country is a good investment risk….The IMF “seal of approval” is supposed to bring in what has become known as catalytic finance.
implementing reforms under the Fund’s program. There is no *ex ante* guarantee, however, that the program-recipient government will reimburse the *entire* amount $m$. Studies published by the Fund in fact emphasize that program-participating developing states – this includes democracies that borrow from the IMF – do not always repay the full repayment amount to the Fund (IMF 1999a, 1999b, 2009). These studies further suggest that the aforementioned problem occurs in some cases as the borrowing country in question may divert some share of the capital meant for making repayments to the Fund for “directly unproductive activities” that may include rent-seeking.\(^8\) I thus formally incorporate this dynamic in the model by assuming that the borrowing government “\(a\)” may usurp or transfer rent \(r\) (where \(r \in [0,1]\)) to domestic political actors that is at least partly derived from \(m\).\(^9\) The Fund therefore anticipates in the model that it will recover the share \((1-r)m\) of the repayment amount and will account for this possibility in its utility function. The IMF’s net benefit from providing the loan \(l\) to the borrowing government is – based on the information provided above – given by \((1-r)m - l\) when \(\theta_a \geq \bar{\theta}\). The IMF’s constrained maximization problem in the model is therefore

\[
\begin{align*}
\text{max}_{\theta_a} &\quad (1-r)m - l \\
\text{subject to} &\quad l \geq 0 \quad \text{and} \quad l \leq rm
\end{align*}
\]

where \(l \geq 0\) is a non-negativity constraint and \(l \leq rm\) is the budget constraint.

The IMF-assisted government values the Fund’s financial assistance as it may help to resolve the country’s economic woes and potentially deter a speculative run on the country’s currency by speculators. Yet the program-recipient government (\(a\)) recognizes that it is required by the Fund to

\(^8\) For example, in 1999, the IMF publicly voiced its concern that the program-participating Russian government (classified as an democratic regime in 1999) at the time diverted money that was meant to be reimbursed to the Fund for not just rent-seeking but also for transferring rent to the government’s cronies. The IMF report pointed out in this regard that, “part of the skepticism surrounding IMF lending to Russia has, not surprisingly, been prompted by the various allegations that money from the IMF has simply disappeared abroad….the money was diverted into the wrong hands or even stolen” (IMF 1999b: 274). Similarly, researchers have suggested that the military dictator Marcos in the Philippines also diverted both IMF and World Bank loans during the early 1980s for rent-seeking activities (see e.g. Boyce 1993; Kushida 2003).

\(^9\) In other words, the borrowing government does *not* return the share \(rm\) to the Fund but rather retains it for rent-seeking.
implement structural reforms by exerting reform effort $e$. Doing so may be politically costly to $a$ since implementation of certain reform measures (e.g., reducing government consumption) – as shown by extant studies\(^\text{10}\) – may hurt the economic interests of political parties in the legislature. As such, this may even threaten the political survival of the program-participating incumbent. Hence, even though the government in the model values the IMF’s assistance and the institution’s objectives, it is also interested to garner political support for its reform effort from key domestic groups in order to survive in office. 

Building on previous research on strategic interaction between the IMF and democratic governments in developing states,\(^\text{11}\) I assume in my model that the program-recipient state seeks to garner political support for the policy reforms “requested” by the IMF from not only the Fund-assisted government’s supporters in the selectorate but also legislative parties whose institutional ability to influence public finances that fund their operations (for example, campaign spending during elections) is given by the parameter $p$. More formally, the borrowing state balances its desire for the Fund’s financial support while obtaining the political support of selectorate members and parties by maximizing a weighted utility function that consists of three components. First, since it values the IMF’s assistance and objectives, it weighs the Fund’s utility function ($u^{imf}$) via the parameter $\beta \in [0,1]$ which is equivalent to $\beta u^{imf}$. Second, the government places weight $(1-\beta)$ on the collective welfare ($w$) of selectorate members who it seeks to co-opt. Third, the Fund-assisted democratic government also attempts to co-opt the legislative parties in the reform process and win the latter’s support for reforms incorporated in the IMF program. It does so by transferring to the parties the net rent amount $p(rm - (\theta_a + c(e)))$ which is affected by their (the legislative parties’) formal institutional ability $p$ to influence public finances; the components in the parentheses is the difference between the rent extracted from $m$.

\(^{10}\)See, e.g., McLeod (2000), Liew et al (2003:10). For instance, during the mid-1990s in Indonesia, the military dictator in the country, Suharto, “was against IMF reforms because the reforms would undermine his power, which was based on…a system of patronage” Liew et al (2003:10).

\(^{11}\) For this see e.g., Stone (1996, 2011); also see Vreeland (2003, 2004).
(that is $rm$) and the resources $\theta_a$ invested to improve macroeconomic fundamentals plus the direct monetary costs ($c(e)$) of exerting reform effort $e$. The program-recipient government’s weighted utility function is therefore given by $\beta((1 - r)m - l) + (1 - \beta)(w) + p(rm - \theta_a - c(e))$. It’s constrained maximization problem is thus defined as

$$
\begin{align*}
    u^a &= \max_e \beta((1 - r)m - l) + (1 - \beta)(w) + p(rm - \theta_a - c(e)) \\
    \text{subject to } & \bar{\theta} \leq \theta_a \leq rm
\end{align*}
$$

where the degree of $r$ in the $r \in [0,1]$ interval is influenced by the government’s reform effort $e$ and the loan $l$ offered by the Fund.

I next turn to define the speculators’ – that is, the currency traders who trade the program-participating country’s currency in capital markets – expected payoff function. Each speculator (labeled as $i$) observes the program-recipient government’s reform effort $e$. The degree of reform effort exerted by $a$ influences the speculators ex ante expectation about the borrowing country’s macroeconomic fundamentals ($\theta$). This expectation about $\theta$ is -- following existing models of currency crisis (see e.g. Morris and Shin, 1998) – in the form of a normal probability distribution (denoted $\Theta$) with mean $\mu$ and variance $\frac{1}{\alpha}$ where $\alpha > 0$. $\Theta$ is common knowledge to the speculators.

Note that the speculators in the model decide to attack ($k_i$) the program-participating state’s currency after observing the latter’s reform effort since $e$ influences their expectation about $\theta$. If a speculator attacks the currency when fundamentals are weak ($\theta \in (0, \infty)$), the speculator obtains $b - t(e)$ (with $b > t(e)$) where $b$ is the material benefit to $i$ from the attack and $t(e)$ is the transaction cost (which is linear with respect to $e$) from the attack.

If speculators refrain from attacking, they get

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$^{12}$ $t(e) = te$ in the model. This implies that the transaction costs for a speculative attack decreases (increases) when the government’s reform effort effort declines (increases). This assumption is drawn from extant models of currency crisis (see Metz 2002; Morris and Shin 1998) which demonstrate that an anticipated decline (improvement) in macroeconomic fundamentals reduces (increases) the transaction costs of a speculative attack for speculators.
a payoff of 0. One thus needs to calculate the expected payoff of a speculator when other speculators attack – this expected payoff is denoted as \( u(k_i,k_{-i}) \) – and the expected payoff of a speculator who attacks when other speculators do not attack (this is denoted as \( u(k_i,d_{-i}) \)). Analytically, these expected payoffs are defined as follows:

\[
\begin{align*}
u(k_i,k_{-i}) &= \int_{-\infty}^{\theta_a} (b - t(e))\psi(\theta)d\theta - \int_{1}^{\infty} t(e)\psi(\theta)d\theta \\
u(k_i,d_{-i}) &= \int_{-\infty}^{0} (b - t(e))\psi(\theta)d\theta - \int_{0}^{\infty} t(e)\psi(\theta)d\theta
\end{align*}
\]

where \( \psi \) is the probability density function of \( \Theta \).\(^{14}\)

The timing of events in the model is as follows. The democratic government of a developing economy turns to the Fund for assistance when the country experiences severe economic problems. The Fund assists the government by offering loans and a financial stabilization program (observed by the speculators) to induce the government to adopt structural reforms to improve \( \theta \). The program-recipient state then exerts its optimal reform effort which is observed by the Fund and the speculators. The government’s reform effort influences each speculator’s expectation about \( \theta \). The speculators then decide whether or not to attack the program-participating country’s currency in international financial markets.

1.2 Equilibrium and Comparative Static results

The model’s equilibrium is formally characterized as:

**Lemma 1:** In the Nash equilibrium of the model, the optimal

(i) loan amount offered by the Fund to the government is \( l^* = \frac{(p-\beta)^2}{2p-\beta^2} pm \) when \( \theta_a \geq \bar{\theta} \)

\(^{13}\) Conversely, if a speculator attacks when fundamentals are sound, \( \theta \in [1, +\infty) \), then they simply incur the transaction cost \( t(\theta) \) (see Morris and Shin, 1998)

\(^{14}\) The speculator’s expected payoff functions in (3) and (4) – that is \( u(k_i,k_{-i}) \) and \( u(k_i,d_{-i}) \) – strictly decrease in \( \theta \); conversely \( u(k_i,k_{-i}) > 0 \) and \( u(k_i,d_{-i}) > 0 \) increases when \( \theta \) decreases.
(ii) reform effort exerted by the program-participating government is
\[ e^* = \frac{(p-\beta)}{2p-\beta} m \text{ when } \theta_a \geq \bar{\theta} \]

(iii) rent (extracted from m) that is extracted by the government is
\[ r^* = \frac{(p-\beta)}{(p-\beta)[1+(p-\beta)]} \]

(iv) The necessary and sufficient condition (given (e*)) for the likelihood with which speculator i will attack the program-participating state’s currency when other speculators don’t attack and attack is given by \( \theta \in (-\frac{1}{\phi(\frac{e^*}{\beta})\sqrt{\alpha}}, 1 - \frac{1}{\phi(\frac{e^*}{\beta})\sqrt{\alpha}}) \) where \( \phi \) is the cumulative distribution function of a standard normal distribution.

Proof: See Appendix

In equilibrium, the Fund and the government choose \( l^* \) and \( e^* \) taking the behavior of the other as given, bearing in mind the effect of their actions on the (i) rent \( r^* \) extracted by \( a \) and “potentially” used to co-opt supportes in the selectorate and legislative actors and (ii) behavior of the speculators. The Nash equilibrium level of \( l^* \) and \( e^* \) in Lemma 1 is in fact calculated from deriving the reaction functions of the Fund and the government which is formally derived in the appendix. Lemma 1 also shows that each speculator’s decision to attack the borrowing government’s currency is conditional on his or her expectation about \( \theta \) which is influenced by the government’s reform effort (e*). Comparative statics conducted on the equilibrium solutions reported above generate a series of formal propositions and claims that are presented below. These propositions and claims lead to our central testable hypothesis that is also stated below.

Our first comparative static exercise leads to the following result,

Proposition 1: \[ \frac{dr^*}{dp} > 0 \text{ and } (1 - r^*)m \text{ strictly decreases in } p \text{ when } \beta. \]

Proof: See Appendix

This proposition first states that the rent extracted from \( m \) by the Fund-assisted government increases in equilibrium when the extent to which the legislative parties in the IMF-supported country controls the public finance resources that fund their electoral operations and provide for their members increases (\( dr^*/dp > 0 \)). The rationale that explains this result is as follows. Specifically, recall that the
government that self-selects into the IMF’s stabilization program is required by the Fund to implement some structural reforms when it receives the Fund’s assistance. Reforms in IMF stabilization programs – this includes the program offered to the government in the model – typically include a set of key measures. These measures are reduction of (i) government expenditure and transfers (that may be) provided by the program-participating state to “politically favored” constituents in the selectorate and (ii) reduction of discretionary spending and government consumption.

Implementation of these reform measures will in all likelihood adversely affect the legislative parties. The rationale underlying this claim is simple and is as follows: if the program-recipient incumbent implements reduction of government consumption – a key reform measure in the IMF program – then it will directly diminish the public budgetary resources that the legislative parties can employ for their political (e.g. electoral) goals. Indeed, public finances allocated for “political expenditure” by legislative parties is almost always a critical component of government consumption in developing country democracies (IMF 1998, 1999, 2011; World Bank 2013). Furthermore, government consumption also includes the wages, perks and other material benefits of legislative party members (IMF 2003, 2011; World Bank 2013). This, IMF-mandated reform measures in the program offered to the government (in the model) that targets government consumption and other kinds of public expenditure and transfers will without any ambiguity whatsoever adversely affect the legislative parties. This in turn will incentivize these parties to resist fiscal reforms and put pressure on the IMF-supported government to \textit{not implement} the Fund-mandated reforms delineated earlier.

In fact, implementing the reform measures delineated above may alienate the program-recipient government in the legislature and politically weaken the government. This weakness creates an opportunity for parties in the legislature to not only extract more concessions from the government but to also threaten to obfuscate, forestall or substantially delay the Fund-assisted government’s effort to implement IMF-required reforms. Building on this claim, I argue that the greater the extent to which
legislative parties in the IMF-supported democracy can control public finance resources that fund their operations – as determined by exogenous legislative rules – the greater the *credibility* of their threat to block the Fund-assisted government’s reform effort. This is because greater institutional control over public finances in effect gives legislative parties a *credible veto* over critical areas of fiscal policy-making and the budgetary policy-making process in democracies.

As such, this “credible veto” provides an legitimate institutional platform (especially the floor of the national legislature) for members from various legislative parties (including those from the incumbent party) to publicly-voice their opposition to IMF-mandated reforms which is observed by the currency traders as well. Additionally, extant research on legislative institutions in developing country democracies emphasize that the greater the formal institutional control that legislative parties have over public resources that finance its own internal operation and provide for the perquisites of its own members, the more dependent incumbents are on these parties for designing and implementing economic policy.15 This dependence gives domestic political actors in the legislature more political leverage vis-à-vis the executive which further enhances the credibility of their threat to obfuscate and forestall program-recipient government from implementing IMF-mandated reforms.

The model suggests that it is the credibility of the threat discussed above which induces the program-participating government to derive and transfer more rent (extracted from \( m \)) to the parties. This is done to co-opt the parties in the reform process and potentially obtain their support for the reform measures incorporated in the IMF program. Note, however, that extracting and transferring more rent from the IMF’s budget pool (i.e. loan) curtails the government’s capacity to repay the amount \( m \) to the Fund (which is stated formally in the second half of proposition 1). This constricts the Fund’s budget in equilibrium and makes it more difficult for the IMF to marshal resources to provide more

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15 See, e.g., Cox and McCubbins 2007; Chavez 2008; Fish and Kroenig 2009.
assistance to the economically-distressed program-participating state.\textsuperscript{16} This erodes the influence that the Fund has on the borrowing country which has the following consequence that is formally stated as

**Proposition 2:**

(i) \( \frac{de^*}{dp} < 0 \) for \( p > \beta \).

(ii) When \( \frac{de^*}{dp} < 0 \), attacking the program-participating state’s currency becomes a strictly dominant strategy for each speculator when other speculators attack and don’t attack the currency and this increases the likelihood of a currency crisis.

**Proof:** See Appendix

It was suggested above that the greater the institutional leverage that legislative parties in the IMF-supported democracy have with respect to controlling public finance resources that fund their operations (formally denoted by the parameter \( p \)), the more likely that this will erode the Fund’s influence with respect to the borrowing democratic government. The decline in the Fund’s influence lowers the IMF’s leverage over policymakers for the program-participating democratic state’s policymakers and this limits the Fund’s ability to “encourage” these policymakers to exert sufficient reform effort. As a consequence, the borrowing government places less weight (\( \beta \)) on the IMF’s objectives. Instead, it focuses more on (i) co-opting the parties in the legislature and (ii) addressing these parties’ interests—which are often incompatible with the IMF-program reform measures. The end result of the political dynamic described above is that the program-participating democratic government’s reform effort (\( e^* \)) declines in equilibrium (which is observed by the currency speculators) when the parameter \( p \) increases. This in turn has two effects.

First, the credibility of the government’s commitment to implement reform measures incorporated in the IMF’s program decreases when its reform effort falters. Second, the credibility of the signal provided by the IMF program to speculators – i.e. the signal that informs speculators (and investors) that the borrowing country will solve its financial problems – erodes rapidly as well. This leads

\textsuperscript{16} This claim is demonstrated formally in the “proof of claim 1” in the appendix.
to a “self-reinforcing creditors’ panic…causing a liquidity squeeze”\textsuperscript{17} in international financial markets among speculators and investors who may invest or buy the program-recipient country’s currency. It also exacerbates uncertainty \textit{ex ante} among speculators about the government’s ability \textit{ex post} to resolve the country’s severe economic problems and improve the country’s macroeconomic fundamentals. The simple reduced-form model reveals that such uncertainty invites a speculative attack against the borrowing country’s currency assets which increases the likelihood of a currency crisis.\textsuperscript{18} The preceding discussion leads to:

\textbf{Hypothesis 1:} Developing country democracies observed under IMF programs are far more likely to experience a currency crisis the greater the formal institutional control that legislative parties in these states have over public resources that finance its own internal operation and provide for the perquisites of its own members.

\section*{2. Statistical Methodology}

A key econometric challenge that scholars face when ascertaining the IMF’s effect on economic outcomes is that an IMF stabilization program itself may be epiphenomenal: that is, the factors that lead a country to select into an IMF program may also determine the likelihood of a currency crisis. It has also been noted in the theoretical section that the participation of countries (including developing country democracies) in IMF programs is not random as they select into IMF programs when they experience severe economic problems. One thus requires a modeling strategy that accounts for countries’ nonrandom participation in IMF programs. A variety of statistical strategies can allow one to address selection bias in an empirical setting such as ours. However, in conjunction with selection bias, the empirical research design required to evaluate the main hypothesis faces two additional econometric challenges.

\textsuperscript{17} Glick (1998:19).
\textsuperscript{18} We prove this claim formally in the “proof of claim 2” in the appendix.
The first challenge is that it has been recognized by scholard that currency crises are influenced by contagion in that they can spread from one country to other geographically neighboring countries (Ito and Hashimoto 2002; Glick and Rose 1999). I find that contagion in currency crisis is indeed prevalent across the developing democracies as tests reveal the presence of spatial (i.e. geographic) dependence in our dependent variable – denoted currency crisis (described below) – in my pooled sample of developing country democracies (defined below). This is not surprising given that recent episodes of currency crises occurred and spread across neighboring developing country democracies in, for instance, Latin America and South-East Asia in the late 1980s. Thus one needs to account for spatial dependence in our model. Second, tests conducted on my data indicate that democratic country participation in IMF programs exhibits clustering—a common form of spatial dependence—in which several democracies within a region participate in IMF programs during the same time period. For example, numerous democracies in Latin America, South and Southeast Asia participated in IMF programs in the mid-to-late 1990s. Since participation of democratic states in IMF programs is characterized by clustering, one should control for this possibility as well to avoid bias.

To address these challenges, I estimate a spatial autoregressive error bivariate probit model (hereafter SAE bivariate probit model) that specifies spatially autocorrelated disturbances in both a selection and outcome equation. This model, developed by Wang, Iglesias and Wooldridge (2009), is defined (after dropping subscript \( t \) for time for notational convenience) as:

\[
\begin{align*}
    y_{1i}^* &= X_{i1}\beta_1 + \varepsilon_{1i}, \quad \varepsilon_{1i} = \lambda \sum_{j \neq i} W_{ij} \varepsilon_{j1} + u_{1i} \\
    y_{2i}^* &= X_{i2}\beta_2 + \varepsilon_{2i}, \quad \varepsilon_{2i} = \lambda \sum_{j \neq i} W_{ij} \varepsilon_{j2} + u_{2i}
\end{align*}
\]

(5)

(6)

\(^{19}\) Kelejian and Prucha’s (2001) modified Moran-I test for spatial autocorrelation in discrete choice models rejects the null of no spatial autocorrelation for currency crisis in our sample of democratic country-years.

\(^{20}\) Kelejian and Prucha’s (2001) test also rejects the null of no spatial autocorrelation in IMF program participation.
where \( w_{ij} \) are elements of the spatial weights matrix \( W \) and \( \lambda \) is the spatial autoregressive error coefficient.\(^{21}\) Equation (5) is the selection equation in which the binary dependent variable \( y_{it} = 1 \) indicates participation in an IMF stabilization program and takes the value of zero otherwise. Equation (6) is the outcome equation in which the binary variable \( y_{i2} \) is equal to 1 when a currency crisis occurs, and is zero otherwise.

Numerous measures can be used to operationalize elements of the spatial weights matrix \( (w_{ij}) \) in spatial econometric models (see, e.g., Franzese and Hays 2006). Since currency crises may spread across democratic countries in the same region, it is plausible that geographic proximity may influence the spread of currency crises across such states. Thus I operationalize spatial contiguity in the spatial weights matrix as the inverse distance between states \( i \) and \( j \), where \( w_{ij} = 1/d_{ij} \). As the distance between \( i \) and \( j \) increases (decreases), \( w_{ij} \) decreases (increases), giving less (more) spatial weight to the state pair when \( i \neq j \). A “minimum distance database” of the shortest distance between the two closest physical locations is used for every pair of independent polities in the world.\(^{22}\) For robustness tests, I use directed trade-flow shares of country \( j \) in country \( i \)’s total as an alternative measure of spatial contiguity since studies suggest that trade links can also be a channel for contagion in currency crises (Glick and Rose 1999). The log likelihood function of the SAE bivariate probit model and the procedure employed to estimate this model are briefly described formally in the appendix.\(^{23}\)

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\(^{21}\) \( u_{i1} \) and \( u_{i2} \) are i.i.d. \( N(0, \Sigma) \). Klaauw and Koning’s (2006) likelihood ratio test for the distributional assumption of bivariate normality between the selection and outcome equation in the SAE bivariate probit model fails to reject the null of bivariate normality between the selection and outcome equation.

\(^{22}\) Gleditsch and Ward (2006). The database records the shortest distance in kilometers between points on the outer boundaries for two polities, regardless of whether the states are separated by land or sea. We update their database for the countries in our sample until 2007.

\(^{23}\) I report heteroscedastic-robust standard errors for the SAE bivariate probit models that are presented in the tables in the appendix.
3. Sample and Dependent Variable

I compile a time-series cross-sectional (TSCS) sample of 68 developing countries that are observed as democracies during the 1980 to 2008 period to test hypothesis 1 since this hypothesis focuses on democracies in the developing world. The democracies in the sample satisfy Cheibub et al’s (2010) criteria for a democracy which are: (i) the chief executive and legislature must be directly elected; (ii) there must be more than one party in the legislature and (iii) incumbents must allow a lawful alternation of office if defeated in elections. The cross-sectional size and temporal range of our sample of developing democracies – listed in table 1 – includes all democracies in the developing world observed during the 1975-2006 period for which data to operationalize the dependent and independent variables (described below) are available. The results reported below remain robust if countries are coded as democracies when their Polity score is greater than or equal to +4, +5 and +6 in the -10 (full autocracy) to +10 (full democracy) Polity scale. To conserve space, we just report the results obtained from our sample of developing democracies that satisfy Cheibub et al’s (2010) criteria for a democracy.

<<Insert Table 1 about here>>

The dependent variable that is employed to test hypothesis 1 is a dichotomous variable –labeled as currency crisis – which is operationalized as follows. First, following Eichengreen et al (1995), we construct an exchange market pressure (EMP) index, which is a weighted average of the depreciation rate of nominal exchange rates ($\%\Delta e_{i,t}$), the percentage change in international reserves ($\%\Delta r_{i,t}$), and the change in the interest rate ($\Delta n_{i,t}$) relative to the interest rate in a stable reference country.  This index is defined more formally as

$$EMP_{i,t} = [(\alpha \%\Delta e_{i,t}) + (\beta \Delta(n_{i,t} - n_{US,t})) - (\gamma (\%\Delta r_{i,t} - \%\Delta r_{US,t}))]$$

(7)

24 I use the US $ or the Deutsche Mark /Euro as the reference currency for our sample of developing states. The US $ is the reference currency for all states except the Eastern European countries. For Eastern Europe, the Deutsche Mark (until 1998) and the Euro (from 1999 onwards) act as reference currencies.
Where \( i = \text{country}, t = \text{time (year)}, \) and \( \alpha, \beta, \gamma \) are the respective weights which equalize the conditional volatilities of each component. The second step is to specify the critical value of the EMP index such that index values above this level qualify as a currency crisis. Following existing studies, the dichotomous variable \textit{currency crisis} is coded as 1 for those periods where the EMP index exceeds the country-specific mean by at least two standard deviations, and is coded 0 otherwise (Chiu and Willett 2009; Dreher and Walter 2010). More formally, this implies that \textit{currency crisis} is coded as 1 for country \( i \) at time \( t \) when

\[
EMP_{i,t} > \mu_{EMP} + 2\sigma_{EMP},
\]

where \( \mu_{EMP} \) and \( 2\sigma_{EMP} \) are the mean and standard deviation respectively of the EMP series for country \( i \).

Two alternative measures of the dependent variable are used in the outcome equation for robustness tests. For the first alternative measure (labeled as \textit{currency collapse}), I use a 3 standard deviation cut-off point to define currency crises in the dataset. This implies that \textit{currency collapse} is coded as 1 if the EMP measure for a particular country \( i \) at time \( t \) is greater than the following critical value

\[
EMP_{i,t} > \mu_{EMP} + 3\sigma_{EMP};
\]

it is coded as 0 otherwise. The second alternative measure of the dependent variable is Frankel and Rose’s (1996) \textit{currency crash} measure which is defined as a depreciation of the nominal exchange rate by at least 25 percent that also exceeds the previous year’s depreciation by at least 10 percent. \textit{Currency crash} is, therefore, coded as 1 when the aforementioned event occurs, and is coded as 0 otherwise.

We require a dichotomous measure for the incidence of an \textit{IMF} (stabilization) \textit{program}, which constitutes the dependent variable in the selection equation of the SAE bivariate probit model. Countries that turn to the Fund for financial help receive assistance from the IMF via seven main types of “stabilization” programs: Stand-by Arrangement, Extended Stand-by Arrangement, Extended Fund Facility, Currency Stabilization Facility, Standby Credit Facility, Structural Adjustment Fund, and Extended Structural Adjustment Fund. I thus code the dependent variable in the selection equation,
*IMF program* as 1 when the IMF assists democratic states under any of these seven types of programs, and 0 otherwise. Data for *IMF* are from Vreeland (2003, 2004) and IMF *Annual Reports* (various years).

### 3.1 Independent and Control Variables

Two independent variables are interacted to test the interactive effect posited in hypothesis 1: a dummy variable that operationalizes the incidence of an IMF structural adjustment program and a variable that operationalizes the degree to which parties in the national legislature of developing country democracies control the public budgetary resources that finance their own internal operation and provide for the perquisites of its own members. The dummy variable *IMF program* that operationalizes the incidence of an IMF stabilization program is described above. The second independent variable *democratic legislature control* is operationalized as a 0 to 2 ordinal variable which is fully defined as the following ordinal scale:

- **0**= The government (from the ruling party) in office has complete veto power – while other parties represented in the national legislature (the lower house) have no oversight or control over public budgetary resources that finance the electoral operations and activities of the parties as well as the salaries (plus other benefits) of the members of these parties in the legislature.
- **1**= Parties represented in the national legislature have control over public budgetary resources that only finance the wages and benefits of their party members but not their electoral operations and activities.
- **2**= Parties represented in the national legislature have complete (i.e. full) oversight and control over public budgetary resources that finance their electoral operations and activities and the salaries of their party members in the legislature.

The data sources employed to operationalize *democratic legislature control* is drawn from several primary and secondary sources. The secondary sources include Fish and Kroenig (2009), Yadav (2011), Regan *et*
The primary sources include Keesing’s Contemporary Archive, IFES Election Guide, International Institute for Democracy and Electoral Assistance (IDEA) database, and Facts on File (various years).

To test the interactive effect suggested in hypothesis 1, I first interact IMF program with legislative control. We then introduce IMF program x democratic legislature control in the outcome equation of the statistical model to test the hypothesis, and also control for the individual components of this interaction term. From hypothesis 1, I anticipate that IMF program x democratic legislature control will have a positive effect on currency crisis.

I next turn to discuss below the variables incorporated in the selection equation and then list the controls in the outcome equation. Three variables are included in the selection equation to account for our claim that developing states (including democracies) that experience serious financial and macroeconomic problems are more likely to participate in IMF stabilization programs. First, I include output loss measured as the magnitude of growth contraction relative to growth trend, which is calculated from the three-year average of the real GDP growth rate. Second, I include the dummy variable bank crisis which equals 1 if the country is experiencing a systemic banking crisis and is zero otherwise. This variable is drawn from Dell’Ariccia et al (2008) who operationalize systemic banking crises as situations where non-performing loans reach at least 10% of total financial assets and when emergency measures—such as bank holidays, deposit freezes, etc.—are taken to assist the banking system. Third, I include terms of trade shock measured for each country-year in the selection equation since it engenders macroeconomic imbalances that may encourage governments to self-select into IMF programs. I also incorporate several control variables in the selection equation that are identified in the existing literature on the determinants of IMF program participation. These controls include the dummy variable lag IMF.

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27 Measured as trade-weighted average export prices divided by trade-weighted average import price.
program, log GDP per capita, current account (%GDP), log (foreign exchange) reserves and log inflation (Vreeland 2003, 2004; Bird et al 2004; Jensen 2004).\textsuperscript{28}

Several economic controls are also included in the outcome equation of the statistical model. First, I control for log gdp per capita as numerous scholars suggest that countries with higher GDP per capita are less vulnerable to currency crashes (Chiu and Willet 2009; Kaminsky et al 1998). The variable M2/reserves is included in the specification as rising ratios of M2 to reserves indicate a low coverage of central bank liabilities by hard currency which may increase the probability of a currency crisis (Kamin et al 2001). I include external debt (% GDP) in the outcome equation as higher indebtedness typically leads to a reversal in capital flows and hence increases the probability of a currency crisis (Kamin et al 2001). Researchers also find that the following economic variables influence the likelihood of a currency crisis: current account as a percent of GDP (labeled current account), the government budget balance as a percent of GDP (budget balance), domestic credit growth, capital acct openness (operationalized from Chinn and Ito’s capital account openness index), the lag of bank crisis, the rate of export growth (export growth), and real effective exchange rate (reer).\textsuperscript{29} The economic variables listed above are thus added to the outcome equation.\textsuperscript{30} I also include the dummy variable for countries with a de facto fixed exchange rate regime (labeled as fixed exchange rate) as some scholars hypothesize that the presence of a fixed exchange rate regime affects the probability of currency crises (e.g. Chiu and Willett 2009).\textsuperscript{31} The lag of the dependent

\textsuperscript{28} Data to operationalize output loss, terms of trade shock and the economic controls in the selection equation are drawn from the IMF (2009) and World Bank (2011). Veto players variable is coded from the checks measure in the World Bank’s (2010) Database of Political Institutions (hereafter DPI).

\textsuperscript{29} Extant studies that incorporate some or all of these economic controls in empirical models of currency crises include, for e.g., Kaminsky et al (1998); Kamin et al (2001); Leblang and Satyanath (2006); Chiu and Willett (2009); Dreher and Walter (2010).

\textsuperscript{30} Data for these controls are drawn from the IMF (2009) & World Bank (2011).

\textsuperscript{31} I employ Reinhart and Rogoff’s (2004) coarse 5-point scale of de facto exchange rate regimes, which has been updated till 2007 by Reinhart and Rogoff, to operationalize the fixed exchange rate dummy rom this 5-point scale, I discard observations that are classified as “freely falling” and those for which parallel market data are missing. I then classify the remaining observations as “fixed” (pegs and limited flexibility) or “floating” (managed float and free floating); the dummy variable fixed exchange rate is coded as 1 for observations that are classified as “fixed”.

22
variable \((\text{lag currency crisis})\) is added to the outcome equation since it is plausible that countries are more likely to suffer a currency crisis if their currency collapsed in the recent past (Dreher and Walter 2010).

In addition to the variables listed above, Leblang and Satyanath (2006: 255) find that the turnover of key governmental decision makers in democracies increases the likelihood of currency crises. We thus add turnover to the outcome equation which is operationalized from the STABS variable in the World Bank’s (2010) DPI. Scholars have also hypothesized that the presence of powerful (specifically market-concentrated) public sector banks in developing countries (this included developing democracies as well) influences the probability of currency crashes (Mukherjee and Bagozzi 2012). I thus included in the outcome equation a 0-1 Hirschman-Herfindahl index of the market concentration of public-sector banks in countries in the sample.\(^{32}\)

4. Results

Table 2 reports the selection equation results in which the dependent variable is the \(\text{IMF program}\) dummy. As indicated in the table, previous participation in IMF programs by developing democracies is the best predictor of current participation in IMF programs. One’s expectation that democratic states are more likely to participate in IMF programs when they experience serious financial and macroeconomic problems is also borne out by the results in the selection equation since bank crisis, terms of trade shock and output loss are each consistently positive and significant. Other factors with statistically significant effects include \(\log \text{GDP per capita, log inflation}\) and \(\log \text{reserves}\). The estimate of the spatial autoregressive error parameter in each selection equation is positive and statistically significant,

\[ \sum_{i=1}^{n} s_i^2 \text{ where } s_i \text{ is the share of each state-owned bank's financial assets in the total financial assets of the banking sector per year for each country. The financial assets of state-owned banks in this case refers to their cash assets, government securities and equity investments but not deposits since bank deposits are liabilities. Hence, the Hirschman-Herfindahl index is the sum of the squared market shares in terms of financial assets of public sector banks in the banking sector. The variable concentration ranges from } 1/n \text{ (its lowest value) and 1 (maximum value).} \]

\(^{32}\) Following existing studies (see e.g. Bikker 2004), the Hirschman-Herfindahl index of market concentration of public-sector banks, which is labeled as \textit{public bank concentration}, is defined for each country-year (after dropping the parameter \(t\) for time for notational convenience) as \( \sum_{i=1}^{n} s_i^2 \) where \( s_i \) is the share of each state-owned bank’s financial assets in the total financial assets of the banking sector per year for each country. The financial assets of state-owned banks in this case refers to their cash assets, government securities and equity investments but not deposits since bank deposits are liabilities. Hence, the Hirschman-Herfindahl index is the sum of the squared market shares in terms of financial assets of public sector banks in the banking sector. The variable concentration ranges from \(1/n\) (its lowest value) and 1 (maximum value).
indicating that researchers need to econometrically account for spatial dependence in the data when evaluating the determinants of IMF program participation among developing country democracies.

<<Insert Table 2 about here>>

Model 1 in table 3 presents the estimates from the outcome equation of the SAE bivariate probit model in which the dependent variable is currency crisis. The selection equation results of this model (reported in table 2) were discussed above. The estimate of the interaction term $\text{IMF program} \times \text{democratic legislature control}$ in model 1 is positive and highly significant at the 1% level. This statistically corroborates the prediction in hypothesis 1. With respect to the individual components of $\text{IMF program} \times \text{democratic legislature control}$, one finds that the estimate of the individual IMF program dummy and the individual democratic legislature control measure is statistically insignificant. Hence it is indeed the interaction of the two independent variables—rather than each variable individually—that increases the likelihood of a currency crisis.

<<Insert table 3 about here>>

To gain a better sense of how $\text{IMF program} \times \text{democratic legislature control}$ affects the probability of currency crisis, I next derive and analyze the marginal effect of this interaction term. Specifically, I use the estimates from model 1, and parametric bootstraps,\(^{33}\) to compute the marginal effect of (a 0-to-1 change in) IMF program on the probability of currency crisis for three “types” of developing democratic countries in the sample coded along the 0 to 2 ordinal democratic legislature control variable that was described in detail earlier. The resultant first differences in expected values are reported—via boxplots of their distributions—in figure 3. As discussed below, this figure shows that the effect of IMF program participation on a developing country democracy’s likelihood of experiencing a financial crisis differs markedly depending on a democratic country’s legislative rules that determines the extent to which

\(^{33}\)For our bootstraps, \(m=1000\). All control variables were held to their means or modes.
legislative parties have access to and can control public finance sources for use in elections and for paying wages of party members.

<<Insert figure 3 about here>>

Indeed, for IMF-assisted democratic developing in which \textit{democratic legislature control} is equal to 0 and 1, figure 3 indicates that the effect of an IMF program on the probability of currency crisis is expected to be slightly negative, and significant. By contrast, and in support for hypothesis 1, we find that IMF programs significantly (in the statistical sense) increase the probability of currency crisis in IMF-assisted democracies in which \textit{democratic legislature control} is equal to 2. Relative to our findings for Fund-supported democracies in which the legislative parties have either no access and control or relatively less access and control over public financing resources, I find that the presence of IMF programs in developing democracies where legislative parties have complete oversight and control of public finance resources for their electoral activities and other benefit increases the net yearly likelihood of currency crisis by nearly 9%. Given the rarity and severe consequences of currency crises, 9% is indeed a non-negligible amount. This latter marginal effect is statistically significant at least at the 95% confidence level, and is also more than double in size to the IMF program-effects found for IMF-supported developing democracies where \textit{democratic legislature control} variable is equal to 0. Thus there exists strong statistical \textit{and} substantive support for hypothesis 1.

I also check whether our main results hold when directed dyad trade-flow shares of country \(j\) in country \(i\)’s total is used, instead of using the inverse distance between all states \(i\) and \(j\), for operationalizing the cell entries in the spatial weights matrix of the SAE bivariate probit model. Results from the outcome equation of this model are reported in model 2 (table 3). The estimate of \textit{IMF program} \(x\) \textit{democratic legislature control} variable remains positive and highly significant in this model.

I further checked whether the results reported above hold when a broader IMF program dummy (labeled as \textit{IMF}) is employed that is coded as 1 when developing democracies participate in any of the
seven types of IMF programs listed earlier and two additional types of IMF programs—Supplemental Reserve Facility and Contingent Funding Facility—that tend to include structural policy reform conditions discussed earlier. Model 3 in table 3 presents the estimated effect of $\text{IMF} \times \text{democratic legislature control}$, the individual components of this interaction term, and the control variables in the outcome equation of the SAE bivariate probit model in which we use the inverse distance between all states $i$ and $j$ for operationalizing the cell entries in the spatial weights matrix. $\text{IMF} \times \text{democratic legislature control}$ is positive and highly significant in model 3. The estimate of $\text{IMF} \times \text{democratic legislature control}$ on currency crisis remains positive and highly significant in the outcome equation of the SAE bivariate probit model in which I employ directed dyad trade-flow shares of country $j$ in country $i$'s total to operationalize the cell entries in the spatial weights matrix of the model.

The results for the remaining control variables are mixed in the outcome equation. For example, current account, external debt, M2/reserves, export growth, budget balance and (domestic) credit growth are each statistically insignificant in the outcome equation. However, $\log \text{GDP per capita}$ and fixed exchange rate are in the predicted direction and are each statistically significant. The positive estimate of bank crisis, turnover and private bank concentration is consistently significant in each outcome equation. The spatial autoregressive error coefficient is positive and statistically significant in the outcome equation which means that statistically accounting for spatial dependence is necessary when evaluating the impact of covariates on the probability of currency crises. Further, the statistical significance of $\rho_i$ in the outcome equation suggests that it is appropriate to econometrically account for the nonrandom participation of democratic developing states in IMF programs when testing hypothesis 1.

5. Robustness tests and diagnostic checks

For robustness tests, I first assess whether my main results hold when two alternative measures of “currency crisis” described earlier are each used as the dependent variable. Model 5 in table 4 reports
the results from the outcome equation where the dependent variable is currency crash, while model 6 presents the outcome equation estimates where currency collapse is the dependent variable.\textsuperscript{34} IMF program x democratic legislature control variable is equal to 1 is positive and highly significant in models 5 and 6.

Second, I add the following controls to the outcome equation where currency crisis is the dependent variable as some studies suggest that these variables affect the probability of currency crashes in developing countries which includes democratic regimes: real GDP growth and reserves/short-term debt.\textsuperscript{35} Furthermore, I introduce in the selection equation three other controls that proxy for the economic interests of G-5 countries in IMF lending cases since some studies suggest that pressure exerted by these countries (when their interests are involved) on the IMF may induce the Fund to assist countries (Copelovitch 2010; Steinwand and Stone 2008). These three controls include the exposure of G-5 commercial banks to each borrowing country’s market,\textsuperscript{36} G-5 foreign aid commitments,\textsuperscript{37} and voting affinity within the UN General assembly between G-5 nations and borrowing countries.\textsuperscript{38}

Model 7 in table 4 reports the estimates from the outcome equation of the SAE bivariate probit model that includes the additional controls mentioned above, while the augmented selection equation results of this model with the three controls that proxy for the economic interests of G-5 countries is shown in column E (table 2). The estimate of IMF program x democratic legislature control remains positive and highly significant in model 7. However, the additional controls – real GDP growth, reserves/short-term debt and personalist regime – are each statistically insignificant in model 7. The coefficients of the three

\textsuperscript{34} The selection equation results obtain from the SAE bivariate probit model when the specification in model 5(6) constitutes the outcome equation is presented in column C(D), table 2.

\textsuperscript{35} Frankel and Rose (1996); Kamin et al (2001).

\textsuperscript{36} Operationalized as the log sum of G-5 commercial bank exposure, in millions of dollars, weighted by the relative voting power of the US, UK, Japan, Germany and France in the EB (see Copelovitch 2010). Data are from Bank for International Settlements (2010) and Barth et al (2006).

\textsuperscript{37} Data are from OECD (2008).

\textsuperscript{38} Copelovitch (2010).
controls that account for the economic interests of G-5 countries in IMF lending cases are each significant in the selection equation in column E.

In model 8, I present the estimates from the outcome equation of the SAE bivariate probit model which is estimated with random effects and which includes the additional controls listed above; the selection equation results of this model is shown in column F (table 2). \( \text{IMF program} \times \text{democratic legislature control} \) remains positive and significant at the 1% level in this model. I also find, but do not report to save space, that the estimate of \( \text{IMF program} \times \text{democratic legislature control} \) is positive and highly significant in the outcome equation (i) with the additional controls after including country-specific fixed effects in the specification and (ii) of the spatial autoregressive lag (SAL) bivariate probit model (in other words, the bivariate probit model with spatial lag dependence). Finally, I estimated additional SAE bivariate probit models after adding the following controls in the outcome equation: a variable that measures at time \( t \) the cumulative number of currency crises (or crashes) that have occurred in develop-country democracy \( i \), output loss, terms of trade shocks, and US real interest rate. I incorporated additional controls in the selection equation including budget balance, the lag of democratic legislature control, and debt service as a percent of GDP. I do not report the results obtained after including these additional controls because of space constraints, but our key results were unchanged.

Diagnostic tests reveal that none of our empirical models suffer from severe multicollinearity or serial correlation, and that the residuals are normally distributed.\textsuperscript{39} I also implement Hurlin and Venet’s (2003) granger causality test for panel data to check for endogeneity between the dependent variable, currency crisis, and each of the two independent variables in our empirical analysis: IMF program and democratic legislature control. F-statistics from the Hurlin and Venet (2003) tests reveals that there is no endogeneity problem between currency crisis and the two independent variables mentioned above. I

\textsuperscript{39}The relevant VIF values indicate that multicollinearity is not a problem. The Breusch-Godfrey LM test fails to reject the null of no serial correlation, the Jarque-Bera test shows that the residuals are distributed normally, and diagnostic tests establish the validity of the exclusion restrictions parameters in the estimated models.
further addressed the possibility of endogeneity by testing hypothesis 1 via Rivers and Vuong’s (1988) two-stage conditional maximum likelihood (2SCML) approach. The 2SCML approach corrects for potential endogeneity in this case and allows researchers to obtain reliable standard errors as well as consistent estimates. Results from the 2SCML model that include all the variables in the outcome equation listed earlier (not reported to save space) confirm that the interaction term $IMF_{program} \times democratic\ legislature\ control$ has a positive and significant impact on currency crisis.  

6. Conclusion

In this paper, I developed a simple formal model to explain when IMF reforms are more likely to be associated with currency crises in developing country democracies. The main insights from this model derived from this model are two fold. The first is that the occurrence of the most devastating form of financial crises – namely, currency crashes – that (sadly) occur with alarming regularity in developing country democracies primarily when they participate in IMF programs is intrinsically associated with legislative rules in these countries. The second insight, which follows from the previous claim, is that the association between IMF programs and currency crisis in developing country democracies crucially depends on the extent to which legislative rules allows parties in the national legislature to control the resources that finance their own electoral operation and provide for the perquisites of its own (party) members. There are a number of potential explanations for this relationship. One plausible causal story, which is proposed above, contends that IMF programs oblige democratic governments to implement structural reforms that can harm the economic interests of key players in the legislature. In response, legislative parties issue political challenges to the IMF-assisted government and such challenges are credible when legislative parties have greater control over public finances that fund their electoral operations. IMF-supported incumbents attempt to co-opt these parties

40 Results available from the authors by request.
with rents. This undermines the Fund’s influence, and subsequently, the government’s ability to implement its IMF-reform obligations. Recognizing this, currency speculators will initiate a speculative attack against the program-participating country’s currency, leading to a currency crisis. After controlling for contagion effects and the nonrandom selection of democratic developing countries in IMF agreements, one finds robust statistical support for my main hypothesis.

The findings presented here contribute to the extant literature in four main ways. First, this paper builds upon existing theories of the interactive effects of international institutions and domestic politics on international economic policymaking (Simmons and Martin 1998; Rosendorff and Milner 2001). While this area of research is now fairly mature, few to our knowledge have examined how international institutions interact with legislative rules, institutions and politics stemming from such rules to influence international economic and financial outcomes. The theory and findings presented earlier take us one step closer to this goal. Second, and related to this broader vein of research, the role played by domestic politics in IMF-program compliance is beginning to receive a great deal of scholarly attention (Vreeland 2005; Nooruddin and Simmons 2006; Dreher and Walter 2010). As above, this study helps to deepen the micro-foundational theories underlying this burgeoning area of scholarship by elucidating the political economic dynamics that may arise between IMF programs and legislative institutions in democratic developing states.

Third, studies on the efficacy (or lack thereof) of legislative rules and institutions in developing country democracies generally suggest that greater institutional leverage and control over resources by legislative has net positive effects on electoral accountability and economic outcomes like growth (e.g. Fish and Kroenig 2009; Yadav 2011). This paper certainly does not challenge this perspective. But at least in the context of financial crises in democracies, this study show (i) that legislative rules and institutions also matter for international financial outcomes in the developing world, and (ii) that these institutions may in fact interact with international institutions to increase the likelihood of currency crises.
Indeed, legislative rules that empower the budgetary control and responsibilities of parties in national legislatures in developing democracies do not always guarantee positive economic outcomes for these states. Finally, prior scholarship on the effects of IMF programs neglects the possibility that country participation in IMF programs displays geographic clustering. I present and use a novel statistical estimator, the spatial autoregressive error bivariate probit model, to account for these spatial effects as well as selection bias and the influence of spatial dependence on currency crises.

Two key policy lessons emerge from this study. The first is that the IMF should seek to better understand the institutional constraints – stemming from the legislature – faced by incumbents in developing country democracies when developing and designing reform conditions in programs offered to these states. For some time, the IMF has acknowledged that it must tailor IMF program conditions to the institutional constraints faced by democratically elected leaders in developing states (IMF 1999a, 2005). However, some critics have charged that despite such “acknowledgments”, the Fund nevertheless ignores the institutional constraints that democratic incumbents in the developing world face when implementing IMF-sponsored reforms (Collier 1999; Santiso 2000). The evidence presented above clearly suggests that the claim put forth by these critics is not far-fetched and that the domestic political constraints (particularly those stemming from legislative rules) faced by democratic governments may make it more challenging for these regimes to implement reforms in IMF programs. Second, the findings presented here also indicate that democratic governments in the developing world may agree to Fund conditions even when they lack the domestic support to comply with such conditions. Herein, I found that democratic incumbents may overcommit to Fund conditions when they believe that they can overcome domestic opposition by transferring rent to domestic actors (who oppose IMF reforms) which in turn hinders the abilities of these democracies to repay the Fund. Hence, less loan fungibility and better Fund monitoring-mechanisms may help to prevent democratic incumbents from gambling with IMF loans in this costly manner.
Notwithstanding the lessons offered by our analysis, more work needs to be done to fully understand the causal processes discussed above. Further research should extend the model presented here to better capture the complex bargaining dynamics that likely arise between the IMF and developing country democracies. Doing so may lead to substantive insights into the interactions between international financial institutions and democratic governments’ across the developing world, and may help to explain how these interactions ultimately affect international financial markets. Second, currency crises are but one potential outcome that could arise in response to tensions among elites in developing democracies over IMF program conditions. An interesting extension of our model and findings would therefore be to examine how IMF programs and legislative institutions in developing country democracies may interact to influence a variety of other, potentially related political and economic outcomes such as domestic repression, financial liberalization, and divestment of state-owned enterprises. One hopes to extend this project along these lines in future research.
Appendix

Proof of Lemma 1: I first solve for $l^*$, $e^*$ and $r^*$, and then derive the necessary and sufficient condition with respect to $\theta$ (for the likelihood of a speculative attack) that is formally characterized in Lemma 1. Recall that $dr/de > 0$ and $dr/dl < 0$. I adopt without loss of generality the following functional form for $r = \frac{e}{e+l}$ which allows me to retain the assumption: $dr/de > 0$ and $dr/dl < 0$. Rewriting the Fund’s constrained maximization problem after substituting $r = \frac{e}{e+l}$ in (1) leads to

\[ u^{imf} = \max_l \left( 1 \frac{e}{e+l} \right) m - l \text{ when } \theta_a \geq \bar{\theta} \]  

subject to $l \geq 0$ and $l \leq \left( \frac{e}{e+l} \right) m$

Rewriting the government’s constrained optimization problem after substituting $r = \frac{e}{e+l}$ in (2) leads to

\[ u^a = \max_e \beta \left( 1 \frac{e}{e+l} \right) m - l + (1 - \beta) (w + p(e) \frac{e}{e+l} m - \theta_a - c(e)) \]

subject to $\bar{\theta} \leq \theta_a \leq \frac{e}{e+l} m$

The first order condition (f.o.c) of (A.1) with respect to $l$ is

\[ \frac{du^{imf}}{dl} = - \frac{e(e+2l-m)+m^2}{(m+e)^2} \]  

(A.3)

Solving for $l$ from (A.3) and checking the second order condition (s.o.c), we get the Fund’s reaction function $l(e, m) = \sqrt{em} - e$. Without loss of generality, let $c(e) = e$ in (A.2). The f.o.c of (A.2) Solving for $e$ from the f.o.c of (A.2) and checking the second order condition, we get the government’s reaction function, $e(l, m) = \sqrt{lm(1-\beta/p)} - l$. Solving the expressions $l(e, m)$ and $e(l, m)$ simultaneously leads to the Nash equilibrium pair of $l^* = \frac{(p-\beta)^2}{(2p-\beta)^2} pm$ and $e^* = \frac{(p-\beta)}{(p-\beta)[1+(p-\beta)]}$ when $\theta_a \geq \bar{\theta}$. In equilibrium $r^* = \frac{e^*}{e^*+l^*}$ since $r = \frac{e}{e+l}$. Substituting $e^*$ and $l^*$ in $r^*$ leads after collecting terms to $r^* = \frac{(p-\beta)}{(p-\beta)[1+(p-\beta)]}$ Since $t(e) = te$, the expected payoff of a speculator when other speculators (i) attack (that is, $u(k_i, k_{-i})$) and (ii) do not attack (that is, $u(k_i, d_{-i})$) is respectively defined from (3) and (4) as follows:

\[ u(k_i, k_{-i}) = \int_{-\infty}^{1} (b - te)\psi(\theta)d\theta - \int_{1}^{\infty} te\psi(\theta)d\theta \]  

(A.4)

\[ u(k_i, d_{-i}) = \int_{-\infty}^{0} (b - te)\psi(\theta)d\theta - \int_{0}^{\infty} te\psi(\theta)d\theta \]  

(A.5)

We can rewrite speculator $i$’s expected payoff in (A.4) when other speculators attack as $u(k_i, k_{-i}) = b\phi(\sqrt{\alpha}(1-\theta)) - te$ which is equal to
\begin{equation}
    u(k_i, k_{-i}) = b \phi(\sqrt{\alpha (1 - \theta)}) - te
\end{equation}

Speculator $i$'s expected payoff when other speculators don't attack can be rewritten from (A.5) as

\begin{equation}
    u(k_i, d_{-i}) = b \phi(-\sqrt{\alpha \theta}) - te
\end{equation}

where $\phi$ is the cumulative distribution function of a standard normal distribution. Rearranging (A.6) yields the condition for the likelihood with which speculative $i$ will attack $a$'s currency when other speculators attack in equilibrium: $\theta = (1 - \frac{1}{\phi(\frac{e^*}{b})/\sqrt{\alpha}})$. Rearranging (A.7) yields the condition for the likelihood with which speculative $i$ will attack $a$'s currency in equilibrium when other speculators do not attack: $\theta = (\frac{1}{\phi(\frac{e^*}{b})/\sqrt{\alpha}} - 1 - \frac{1}{\phi(\frac{e^*}{b})/\sqrt{\alpha}})$ as claimed QED.

**Proof of Proposition 1**: Differentiating $r^*$ with respect to $p$ yields $\frac{dr^*}{dp} = \frac{(p-\beta)(3p-\beta)}{(p-\beta)(p-\beta)^2}$. Note that $dr^*/dp > 0 \forall p > \beta$ which holds as $\beta \in [0,1]$ and $p > 1$. In equilibrium, the government repays $(1 - r^*)m$ to the Fund. Substituting the Nash solution for $r^*$ in $(1 - r^*)m$ and differentiating with respect to $p$ yields $-m\left(\frac{3p-\beta}{(p-\beta)(p-\beta)^2}\right) < 0 \forall p > \beta$.

**Proof of Claim 1**: The Fund's reaction function from Lemma 1 is $l(e, m) = \sqrt{em} - e$. Note that $\frac{\partial l(e,m)}{\partial e} = \frac{m}{2\sqrt{em}} - 1$. One can easily check from this expression that when $m$ decreases, then $\frac{\partial l(e,m)}{\partial e}$ strictly decreases $\forall e \in \mathbb{R}_+$ (i.e. irrespective of the government's effort) and $\forall m \in \mathbb{R}_+$. In fact, in the limit when $\lim m \to 0$, then $\frac{\partial l(e,m)}{\partial e} < 0$. QED.

**Proof of Proposition 2**: Differentiating $e^*$ from Lemma 1 with respect to $p$ leads (after collecting terms) to

\begin{equation}
    \frac{de^*}{dp} = \frac{(2p-\beta)[(2p-\beta)-4(p-\beta)]}{[(2p-\beta)^2]^2}
\end{equation}

$\frac{de^*}{dp} < 0 \forall p > \beta$ which holds as $\beta \in [0,1]$ and $p > 1$. We now show that $u(k_i, k_{-i}) > 0$ and $u(k_i, d_{-i}) > 0$ if $\frac{de^*}{dp} < 0$ as initiating a speculative attack becomes a strictly dominant strategy for each speculator when $u(k_i, k_{-i}) > 0$ and $u(k_i, d_{-i}) > 0$. Suppose that in the limit, $\lim e^* \to 0$ when $\frac{de^*}{dp} < 0$. Then $\lim_{e^* \to 0} \theta \to -\infty$ from $\theta = (\frac{1}{\phi(\frac{e^*}{b})/\sqrt{\alpha}})$ (derived from $\frac{d}{d\theta} u(k_i, d_{-i})$) in Lemma 1.

Likewise, for $\lim_{e^* \to 0} \theta \to 1 - \infty$ from $\theta = (1 - \frac{1}{\phi(\frac{e^*}{b})/\sqrt{\alpha}})$ (derived from $\frac{d}{d\theta} u(k_i, k_{-i})$) in Lemma 1.
Thus $\theta \in (-\infty, 1 - \infty)$. From (A.6) and (A.7) respectively in Lemma 1 $u(k_i, k_{-i}) > 0$ (for $\lim \epsilon^* \rightarrow 0 \theta \rightarrow 1 - \infty$) and $u(k_i, d_{-i}) > 0$ (for $\lim \epsilon^* \rightarrow 0 \theta \rightarrow -\infty$) when $\frac{d\epsilon^*}{dp} < 0$; this means that the likelihood with which speculators attack the government’s currency (and thus the probability of a currency crisis) increases for $\frac{d\epsilon^*}{dp} < 0$. QED

**Proof of Claim 2:** More uncertainty about $\theta$ implies higher $\alpha$ for speculators. We need to show that more uncertainty about $\theta$ implies that $\frac{d}{d\alpha} u(k_i, k_{-i}) > 0$ and $\frac{d}{d\alpha} u(k_i, d_{-i}) > 0$. Differentiating $u(k_i, k_{-i})$ in (A.6) with respect to $\alpha$ yields: $\frac{d}{d\alpha} u(k_i, k_{-i}) = (1 - \theta) \frac{b}{2\sqrt{\alpha}} \phi\left(\sqrt{\alpha}(1 - \theta)\right)$. Since $\theta = (1 - \frac{1}{\phi(\frac{te^*}{b})\sqrt{\alpha}})$ from $\frac{d}{d\alpha} u(k_i, k_{-i})$, it implies that $0 < \theta < 1$ in this case. $\frac{d}{d\alpha} u(k_i, k_{-i}) > 0$ when $\theta < 1$ which is true as $0 < \theta < 1$ in equilibrium. Because $\theta = (-\frac{1}{\phi(\frac{te^*}{b})\sqrt{\alpha}})$ from $\frac{d}{d\theta} u(k_i, d_{-i})$,

it follows that $\theta < 0$, $\frac{d}{d\alpha} u(k_i, d_{-i}) > 0$ if $\theta < 0$ which holds as $\theta < 0$ in equilibrium. Since $\frac{d}{d\alpha} u(k_i, k_{-i}) > 0$ and $\frac{d}{d\alpha} u(k_i, d_{-i}) > 0$, attacking the country’s currency becomes a strictly dominant strategy when uncertainty about $\theta$ increases which in turn increases the likelihood of a currency crisis. QED

**Estimation of SAE Bivariate Probit Model:** The log-likelihood function of the SE bivariate probit selection model is, according to Wang, Iglesias and Wooldridge (2009: 11), defined (after dropping the parameter $t$ for time for notational convenience) as

$$L = \sum_{i=1}^{N} \left[ y_{it}y_{it2} \log \Pr(y_{it} = 1, y_{it2} = 1 \mid X_i) + y_{it}(1 - y_{it2}) \log \Pr(y_{it} = 1, y_{it2} = 0 \mid X_i) \right. $$

$$+ (1 - y_{it})y_{it2} \log \Pr(y_{it} = 0, y_{it2} = 1 \mid X_i) + (1 - y_{it})(1 - y_{it2}) \log \Pr(y_{it} = 0, y_{it2} = 0 \mid X_i) \right]$$

(A.10)

Each constituent term in the log-likelihood in (A.10) -- $\Pr(y_{it} = 1, y_{it2} = 1 \mid X_i)$, $\Pr(y_{it} = 0, y_{it2} = 1 \mid X_i)$, $\Pr(y_{it} = 1, y_{it2} = 0 \mid X_i)$ and $\Pr(y_{it} = 0, y_{it2} = 0 \mid X_i)$ -- is derived by Wang et al (2009: 9-11) in equations 25-40 of their paper. They show that $\Pr(y_{it} = 1, y_{it2} = 1 \mid X_i) = \int_{-\infty}^{\infty} \Phi\left(\frac{X_i\beta_i + \delta_i}{\sqrt{\text{Var}(\epsilon_{i1})}}\right) \phi\left(\frac{\epsilon_{i2}}{\sqrt{\text{Var}(\epsilon_{i2})}}\right) d\epsilon_{i2}$ where $\text{Var}(\epsilon_{i1}) = \text{Var}(\epsilon_{i2}) - \delta_i^2 \text{Var}(\epsilon_{i2}) = \text{Var}(\epsilon_{i1})(1 - \rho_i^2) = \frac{1}{1 + \lambda^2 w_o^2}$ because $(\epsilon_{i1}, \epsilon_{i2})$ has a joint normal distribution and
where \( \delta_{ij} = \frac{Cov(\varepsilon_i, \varepsilon_j)}{\sqrt{Var(\varepsilon_i)} \sqrt{Var(\varepsilon_j)}} = \frac{2\lambda w_{ij}}{(1 + \lambda w_{ij}^2)} = \rho_{ij} \). Note that \( \rho_{ij} \) is the covariance between the two error terms and \( w_{ij} \) the elements in the spatial weights matrix. Since \( y_i \) is a binary variable, it follows that

\[
Pr(y_i = 0, y_j = 1 \mid X_i) = 1 - Pr(y_i = 1, y_j = 1 \mid X_i) .
\]

This implies that

\[
Pr(y_i = 0, y_j = 1 \mid X_i) = \Phi(-\frac{X_i \beta + \delta_{ij} \varepsilon_j}{\sqrt{Var(\varepsilon_i)}}) - \int_{-\infty}^{x_{ij} \beta} \Phi(-\frac{X_i \beta + \delta_{ij} \varepsilon_j}{\sqrt{Var(\varepsilon_i)}}) \phi(-\frac{\varepsilon_j}{\sqrt{Var(\varepsilon_j)}}) d\varepsilon_j (A.11)
\]

Thus \( Pr(y_i = 1, y_j = 0 \mid X_i) = \Phi(\frac{X_i \beta}{\sqrt{Var(\varepsilon_i)}}) \int_{-\infty}^{x_{ij} \beta} \Phi(-\frac{X_i \beta + \delta_{ij} \varepsilon_j}{\sqrt{Var(\varepsilon_i)}}) \phi(-\frac{\varepsilon_j}{\sqrt{Var(\varepsilon_j)}}) d\varepsilon_j \). I estimate the log likelihood function in (A.10) via full-information maximum likelihood by using the spatial econometrics toolbox in MATLAB. Similar results are obtained if the log likelihood in (A.10) is estimated via partial maximum likelihood estimation (PMLE).
Table 1: Democratic Developing Country sample, 1980-2008

<table>
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<th>Country</th>
<th>Period</th>
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<th>Period</th>
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<td>1984-2008</td>
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Notes: The time period in the columns indicate the years in which each country is observed as a democracy according to the Cheibub et al (2010) criteria for a democratic regime.
### Table 2: Selection equation results

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<tr>
<th></th>
<th>Column A</th>
<th>Column B</th>
<th>Column C</th>
<th>Column D</th>
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**Notes:** ***, **, *: 1%, 5% and 10% levels of significance. The specification in column F includes random effects.
Table 3: Outcome equation results: Dependent variable – currency crisis

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Notes: ***, **, *: 1%, 5% and 10% levels of significance. Numbers in parentheses are heteroskedastic-robust standard errors.
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**Notes:** ***, **, *: 1%, 5% and 10% levels of significance. Numbers in parentheses are heteroskedastic-robust standard errors. Model 8 incorporates random effects.
Figure 1: US $/Turkish Lira weekly exchange rate, 2000-01

Figure 2: US $/Pakistani Rupee exchange rate, August 1995- June 1996

Notes: Data used to derive figures 1 and 2 is from Global Financial Data, http://www.globalfinancialdata.com/index.htm
Figure 3: Marginal effect of IMF program on currency crisis, for each level of democratic legislature control.
References


Keeling’s Contemporary Archive. Various years. London: Keeling’s Ltd


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