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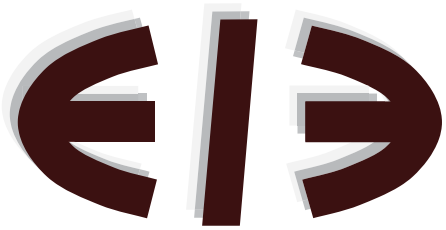

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Jacob M. Meyer*

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Abstract

Political institutions can influence the likelihood of banking crises through both direct and indirect causal pathways. They may influence domestic economic conditions, thereby *indirectly* impacting the likelihood of a banking crisis, or they may *directly* affect the likelihood of banking crises through confidence and expectations-related mechanisms. I apply econometric moderated multiple-mediation to estimate this combination of effects for veto player theory – a common framework for analyzing political institutional constraints – using a dynamic panel approach and a dataset of 111 developing economies and emerging markets from 1990-2012. I find more veto players indirectly *reduce* the likelihood of banking crises by reducing inflation and increasing GDP growth in the pre-crisis period. However, they also *increase* the likelihood of banking crises by increasing credit growth. When global risk is high, more veto players impede policy responses to changing conditions. This directly increases the likelihood of crises. When global risk is low, more veto players reduce policy volatility. This directly reduces the likelihood of crises. Rising global volatility has a larger effect on the likelihood of crises in relatively constrained political systems.

Keywords: Banking Crises, Political Institutions, Econometric Moderated Mediation, Veto Player Theory, Empirical International Finance

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Contents

1 Introduction

The influence of political institutions on financial crises can occur through direct or indirect pathways. Political institutions may *indirectly* affect the likelihood of financial crises by influencing macroeconomic and financial factors associated with financial stress and may *directly* affect the likelihood of banking crises by influencing market expectations and confidence. Existing empirical work on the political economy of banking crises primarily addresses the direct causal pathway. The indirect causal pathway has been discussed (*e.g.* Leblang and Satyanath 2006, Keefer 2001), but little of the existing empirical work in the literature explicitly estimates this causal pathway. A notable exception is Acemoglu et. al. 2003, though this paper doesn't explicitly analyze crises, and utilizes a different methodological approach.

The core contribution of this paper to the literature on banking crises is an empirical analysis disentangling the multifaceted role of political institutional constraints – using the framework of Veto Player Theory – that disaggregates the direct and indirect causal pathways on the likelihood of banking crises in emerging markets and LDCs. The broader contribution of this paper is the construction of an estimation process explicitly evaluating the many causal pathways through which political factors may influence the likelihood of of crises. This econometric analyses I present that consider these indirect effects may substantially differ from findings of estimations that consider only direct causal pathways, implying a potential avenue for future research in updating existing empirical work on the political economy of crises using the methodology outlined in this paper.

Banking crises are often caused in part by macroeconomic and financial vulnerabilities, such as excessive credit growth, inflation, weak economic growth, and/or a weak current account balance (Lo Duca and Peltonen 2013, Davis et. al 2011, Kauko 2014, Hagen and Ho 2007). Prior political economy work finds veto players influence some of the factors associated with banking crises (Treisman 2000, Tsebelis and Chang 2004, Henisz 2000). A wider literature more broadly shows institutions exert significant influence upon economic factors associated with financial crises (*e.g.* Acemoglu et. al. 2014 on democracy and economic growth, Besely and Persson 2009 on institutions and state capacity, and Rodrik 2000 on institutions and volatility). However, the existing literature offers little clarity regarding whether veto players influence macroeconomic factors in a manner that decreases, or increases, the likelihood of banking crises.

A variety of competing models propose varied potential links between veto players and economic conditions. The Commitment Approach to Veto Player Theory predicts more veto players will strengthen economic fundamentals – likely *reducing* the risk of banking crises (Mosher 1999). This contrasts with the Collective Action Approach, which predicts more veto players will generate an expansionary bias in economic policy that may be associated with financial and economic conditions characterized by *greater* vulnerability to crises (Treisman 2000). Still other work suggests more veto players do not influence the state of economic fundamentals, but merely reduce the volatility in these fundamentals (Tsebelis 2002), while *yet another* approach suggests an intermediate number of

these political institutional constraints offers the optimal balance of flexibility and policy continuity to facilitate macroeconomic stability (MacIntyre 2001). However, a question arises: how can we reconcile these findings, some of which appear to directly contradict each other?

As existing theories offer little clarity regarding the expected role of veto players on the likelihood of banking crises, I attempt to disentangle behavior potentially associated with these competing models by using an empirical approach designed to account for conditional effects through multiple causal pathways; econometric moderated multiple-mediation. I first evaluate the effect of veto players on the likelihood of banking crises through indirect causal pathways by linking the influence of veto players on economic fundamentals to the influence of these economic fundamentals on the likelihood of crises. I then also consider the direct causal pathway: how veto players influence the likelihood of financial crises through market confidence mechanisms that may catalyze (or curtail) the fire-sale/bank-run type behavior often associated with the onset of banking crises (the pathway analyzed in the extant literature on veto players and financial crises, such as McIntyre 2001, Keefer 1999, Amri and Kocher 2011, Jordana and Rosas 2014, Garriga 2016). Finally, I consider if any of these effects at either stage vary conditional upon a set of other institutional and economic factors. This process allows me to estimate each of the potential direct and indirect mechanisms, and serves as an aide in identifying the actual effect(s) of veto players on the likelihood of banking crises from among these competing models.

I test these models using a dataset of 111 emerging and developing countries from 1990 to 2012. A variety of factors (*e.g.*, flight-to-quality capital flows and economic structure) suggest results for emerging markets and developing economies may not be generalizable to industrial economies – and vice versa. Therefore, I restrict this analysis to emerging markets and developing economies. Prior work implies more veto players could either improve or weaken economic fundamentals. Using dynamic panel estimations, I find evidence to support the idea that more veto players tend to reduce inflation and increase economic growth by generating a credible commitment to far-sighted policy. A logit estimation shows this reduces the likelihood of crises. I also find evidence more veto players increase credit growth, increasing the likelihood of crises. I find some evidence that by impeding policy adjustment, more veto players "lock in" present conditions to reduce the probability of crises when fundamentals are strong, but increase the probability of crises if weak fundamentals necessitate policy adjustment. I also find the direct effects of these political constraints on the likelihood of crises are nonlinear, with an intermediate amount of veto players offering the optimal mix of stability and flexibility to minimize the risk of crises. Finally, I find this direct effect of veto players on the probability of crises is contingent upon global conditions. More veto players increase the likelihood of crises when global risk is high, but reduce the likelihood of crises when global risk is low. An intriguing corollary finding is increases in global risk have a larger effect on the likelihood of banking crises in relatively constrained political systems; as more flexible systems can more easily undertake policy adjustment after global shocks.

The paper is organized as follows. Section 2 discusses Veto Player Theory and the political

economy of banking crises, then links these topics. This framework motivates the econometric analysis; Section 3 then overviews the estimation process of this econometric moderated multiple-mediation. Section 4 conducts this analysis, estimating the effect of veto players on economic fundamentals important in the onset of crises, and the effect of veto players on the likelihood of crises after controlling for these fundamentals on the indirect causal pathway. Section 5 combines these individual estimations, and reports them as conditional mediated marginal effects. Section 6 discusses and concludes.

2 Political Institutions and Banking Crises

Political institutions may affect the probability of banking crises by influencing economic factors associated with their onset[1]. This is the *indirect* causal pathway. Political institutions may also affect the probability of crises by influencing market expectations of stability; or the lack thereof. This may catalyze – or curtail – the fire-sales/bank-runs that are associated with the onset of banking crises. This is the *direct* causal pathway. The need to evaluate this combination of causal pathways – each of which is potentially conditional upon other factors – motivates the use of econometric moderated mediation.

Veto Player Theory offers a framework for analyzing the role of political institutions on policy and macroeconomic behavior. Given the complexity of the competing models outlining the mechanisms through which veto players may influence the likelihood of banking crises, an analysis of the effects of veto players on banking crises is a worthy example to illustrate the broader merits of economic moderated mediation in research on the political economy of crises.

2.1 *Veto Player Theory* — A veto player is a governmental entity with the power to halt legislation – similar to what is colloquially discussed as"checks and balances" (Tsebelis 2002). With many veto players governments are rigid (or exhibit continuity in policy) and legislation is difficult to pass. When few veto players are present, governments can quickly shift policy. There are many applications of Veto Player Theory, spanning from the internal institutional functioning of governments to policy-specific (*e.g.,* budget deficits) to general economic outcomes like economic growth and inflation[2]. Four primary models relate veto players to economic and policy outcomes; the Inertia Model, the Collective Action Approach, the Commitment Approach, and the Curvilinear Model.

Inertia Model — Tsebelius's initial analysis outlines the effect of veto players on policy inertia (1995). When more actors have veto power, a broader consensus is required for policy change. With more potential actors able to halt legislation, the status quo is more difficult to change (Tsebelis 2002). Though veto players may have little effect on the levels of economic fundamentals

[1] See Breuer (2004) for an overview of the literature on the political economy of crises.
[2] For a detailed discussion of Veto Player Theory, see Ganghoff or Hallerberg (2003)(2010).

(*e.g.* inflation and growth) under this model, they "lock in" previous policy. Despite merely maintaining the status quo – rather than influencing levels of these economic fundamentals – more veto players may reduce the variance in economic fundamentals. For some factors (*e.g.,* inflation) a high variance itself may be considered a poor economic fundamental.

Collective Action Approach — This alternative approach hypothesizes institutional constraints generate an expansionary bias (Treisman 2000). When more actors have veto power, more log-rolling occurs in the process of passing legislation. Political actors typically have targeted constituencies, meaning more actors with veto power leads to more provisions benefiting favored constituencies. In aggregate this rent-seeking associated with more veto players increases aggregate demand and pushes policy away from public good provision towards private favors – generating an expansionary bias.

Commitment Approach — Other work suggests institutional constraints may instead generate a contractionary bias. Myopic political actors often fail to credibly commit to policy with long-term benefits but short-term costs (Mosher 1999). Introducing institutional constraints upon later policy options provide this credible commitment to long-sighted policy. An example is inflation. Without institutional constraints preventing excessively expansion policies in the short-run – at the cost of long-term stability – we should expect these excessively expansionary policy from myopic political actors. By constraining later "fixes" of inflationary policy, policymakers can introduce a credible commitment to maintaining stable prices.

Curvilinear Model — Countries with more veto players display resoluteness/stability in policy, while countries with low levels quickly and decisively shift policy (Cox and McCubbins 2007). If there are diminishing marginal benefits to both flexibility and stability, there exists an optimal "Goldilocks" point with enough veto players for the policy stability necessary to allow markets to develop stable expectations, but enough flexibility to generate market confidence in the ability of policymakers to respond to shocks (MacIntyre 2001). The relationship between veto players and effectiveness of response to crisis vulnerability then generates an upside down U-Shape. This optimal levels of veto players ought to shift towards decisiveness (less) when global volatility requires policy adjustment, and towards resoluteness (more) otherwise.

2.2 *Banking Crises* — A banking crisis usually occurs after a large-scale loss of confidence in the system leads to a bank-run type event, typically associated with bad investments being realized simultaneously across the financial system. This is often related to speculative bubbles and market (over)corrections (Diamond and Rajan 2005). Either can cause illiquidity or insolvency, leading to an asset value deflation weakening credit issuance and domestic balance sheets. This is driven by an economic or financial imbalance and/or an exogenous shock raising financial stress above a threshold that causes bank-run style panics[3]. While most analysis of banking crises centers on economic and/or financial factors, some recent work turns its attention to the "rules-of-the-game"

[3]For a detailed yet broad discussion of banking crises see Kauko (2014).

set by political factors (Breuer 2004). Most political economy analysis takes economic fundamentals as given while analyzing crises. However, in the pre-crisis period policy often has an important role generating (or avoiding) bubbles or vulnerabilities in economic fundamentals that leads to crises (*e.g.* rent-seeking policies that incentivize bad loans) (Broz 2013). My approach explicitly considers the influence of politics on these economic fundamentals in the analysis of veto players on the likelihood of crises. Given potentially substantial differences in the causes of banking crises in core vs. non-core economies, I restrict my analysis to developing and emerging markets. The specifications used in the empirical analysis are motivated by the following hypotheses about the relationships between veto players, economic fundamentals, and banking crises.

Inflation — Higher inflation is often associated with increased probability of crises (*e.g.* Demirgüc-Kunt and Detragiache 1999), usually through increasing nominal interest rates (generating liquidity shocks) or as a general indicator of economic mismanagement. Analysis of (typically low inflation) developed countries in the Global Financial Crisis does not find inflation to be an important factor in banking crises, but work considering developing and emerging markets does find inflation to be a predictor of banking crises (Angkinand and Willett 2011, Rose and Spiegel 2012, Lo Duca and Peltonen 2013).

Veto Player Theory offers several potentially conditional hypotheses relating veto players to inflation. The Collective Action Approach predicts more veto players will generate an *expansionary* bias, increasing inflation. The Commitment Approach predicts more veto players will generate a *contractionary* bias, reducing inflation. The Inertia Model predicts higher inflation will be more difficult to correct, and lower inflation more stable, with more veto players (and vice versa) (Treisman 2000). However these effects may be conditional upon other factors. For example, in political systems with an independent central bank setting monetary policy, these institutional constraints may have little effect on inflation through monetary policy oriented mechanisms – though they may still influence inflation through fiscal policy oriented mechanisms. This may suggest a larger effect of veto players on inflation in systems with less-independent central banks. It is also plausible these institutional factors may have different effects in democratic versus non-democratic systems.

This causal pathway linking veto players to the likelihood of banking crises through influencing economic fundamentals is known as the "indirect effect." The effect of veto players on the *level* of inflation is estimated in the "Imbalances" section (4.1). The "Adjustment" estimations investigate the effect of veto players on the inertia (*i.e.* volatility) of inflation – though this is relegated to Appendix B for concision and to focus on the core results of the analysis. Estimations including the effect of inflation on likelihood of banking crises are reported in the "Reactions" section (4.2). These effects are linked and used to evaluate the full indirect causal pathway in Section 5 – the "indirect effect" in econometric moderated mediation[4]. The potential conditionality of these effects

[4]The other component of the mediated marginal effect is the "direct effect." In the context of this analysis, this is the effect of veto players on the likelihood of a crisis working through confidence and expectations mechanisms – or the effect of veto players on the likelihood of a crisis while controlling explicitly for effects of these institutions on

is investigated in Appendix A.

Credit Growth — Excessive credit growth is a contributing factor to many financial crises (*e.g.* Schularick and Taylor 2012, Borio and Lowe 2002). Increases in credit issuance and asset values may strengthen balance sheets, further increasing asset values and credit issuance in a pro-cyclical manner, leading to profligate lending. As assets become overvalued and credit loosens further the system becomes less stable. A small shock reducing collateral values in this unstable setting may halt lending, then generate a credit crunch after the cycle reverses – amplifying the initial shock through financial channels (Kiyotaki and Moore 1997).

Little research explicitly links veto players and credit growth – though constrained political systems may facilitate larger and more systemically important financial systems (*e.g.* Haber et al 2007). Veto player models do yield some insight into potential links between political constraints and credit. Applying the Collective Action Approach seems to predicts more veto players will generate an *expansionary* bias, expanding credit. Applying the Commitment Approach seems to predicts more veto players will generate a *contractionary* bias, (relatively) contracting credit. Applying the Inertia Model predicts credit growth will be less (more) volatile (but not necessarily at ideal levels), with more (less) veto players. However, Rajan (2010) has argued that in relatively more constrained political systems, policymakers (less able to explicitly engage in redistribution to favored constituencies) may turn towards expanding credit in lieu of explicit redistribution. The findings of Ahlquist and Ansell (2017) suggest support for this hypothesis; for countries in which political constraints impede explicit fiscal redistribution, credit growth is shown to rise as lower-income groups turn instead towards credit to finance consumption. A finding that more constrained political systems are simultaneously associated with higher credit growth, but less expansionary policies in other dimensions, would suggest Rajan, and Ahlquist and Ansell, are correct. These competing hypotheses are evaluated in the same manner as described above for inflation.

Foreign Exchange Reserve Coverage — Poor foreign exchange reserve coverage exposes countries to financial sector stress from capital outflows (Kaminsky üc-Kunt and Detragiache 1998). A country with few foreign exchange reserves has little recourse other than monetary contractions (causing liquidity shocks) or exchange rate devaluations (increasing financial stress if debt is foreign currency denominated) – both of which can cause banking crises – if a capital outflow/reversal occurs. Further, markets are more likely to engage in these capital outflows/reversals if poor foreign exchange reserve coverage weakens market confidence in the country's currency. Through this combination of mechanisms, weaker foreign exchange reserve coverage should increase the likelihood of banking crises.

Foreign exchange reserve adequacy is typically evaluated relative to some monetary (*e.g.* M2), trade (*e.g.* months of imports), or debt (*e.g.* short-term debt) metric. Through the expansionary (contractionary) bias predicted by the Collective Action Approach (Commitment Approach), more veto players will weaken (strengthen) reserve coverage relative to these aggregates. Some

economic policies.

potential mechanisms for the weaker reserve ratio due to the expansionary bias (and vice versa for the contractionary bias) are inflation leading to appreciated real exchange rates (then reserve decumulation), increased absorption leading to current account deficits (then reserve decumulation), or increased credit growth and borrowing increasing the M2 or debt – the factors reserve coverage is typically evaluated relative to. The Inertia Model again predicts more veto players generate stability in reserves by stabilizing policy, but not affect typical levels of reserves. However, it is plausible that at extremely high levels of institutional constraints, the decreased latitude for policy adjustment may weaken confidence in the country's currency, leading to capital outflows that weaken coverage. As outlined with respect to inflation, these effects may also be conditional upon other institutional factors (*e.g.* central bank independence – if monetary policy is set by a central bank, it's plausible veto players will have a smaller effect on foreign exchange reserve coverage), motivating the conditional analysis reported in Appendix A. These competing hypotheses are also evaluated in the same manner as described above for inflation.

Exchange Rate Overvaluation — Domestic banking systems in emerging markets and LDCs often have substantial foreign currency liabilities ("currency mismatches"). When an exchange rate depreciation/devaluation occurs, the value of these liabilities (and the cost of servicing them) will increase (assuming imperfect hedging). When these devaluations/depreciations occur financial sector stress increases, potentially triggering banking crises (Duttagupta and Cashin 2011).

High levels of political constraint prevent policymakers from opportunistically devaluing exchange rates (nominally to protect investor's property rights) (Weymouth 2010). If periodic small depreciations/devaluations are appropriate to maintain external balance, over time this may lead to overvalued exchange rates – generating vulnerabilities culminating in the large depreciation that may trigger crises. If high levels of political constraint generate the expansionary bias expected under the Collective Action Approach, the following high inflation can also generate overvalued real exchange rates in countries with fixed exchange rate regimes. However, if more veto players prevent opportunistic depreciations/devaluations amidst transitory outflows/downward pressure, crises triggered by these depreciations/devaluations will be less likely. The expected effect of veto players on the likelihood of crises working through exchange rates is ambiguous, and likely highly conditional. These competing hypotheses are again evaluated in the same manner as described above for inflation.

Economic Growth/Development — In the build up to a crisis, rapid economic growth can generate excessive optimism that feeds back into asset values and credit growth, "kicking-off" the asset and credit bubbles associated with financial sector vulnerability (Jordá, Schularick, and Taylor 2011). At the onset of a crisis, a downturn in economic growth can increase non-performing loans or weaken economic optimism – potentially feeding back into reductions in asset values or contractions in credit through macro-financial linkages, stressing the financial sector (Davis and Karim 2008). Regarding levels of GDP per capita, Aizenman and Pasricha find low-come countries better weathered the global financial crisis, though Demirgüc-Kunt and Detragiache found poorer

countries are generally more likely to experience banking crises (2011)(2005). Theory and past work then offers little clarity on the relationship between economic growth and banking crises. The potential conditionality of this relationship is among those investigated in Appendix A.

The paper introducing the measure of veto players used in the econometric analysis of this paper found more veto players are associated with stronger economic growth – in line with the improved policy quality expected by the Commitment Approach (Heinzs 2000). The Collective Action Approach predicts more short-term expansions with falling veto players, but likely a reduced policy quality and increased accumulation of debt associated with lower long-term growth. The Inertia Approach again predicts more veto players increase stability in growth, and little else. These competing hypotheses are again evaluated in the same manner as described above for inflation.

The discussion above outlines the indirect mechanisms through which veto players may affect the likelihood of crises through influencing macroeconomic conditions. Veto players may also influence the way markets react to domestic or global economic conditions – affecting the likelihood of banking crises through influencing the probability markets react to any given event/conditions with the bank-runs/fire-sales that catalyze crises. This will be referred to as the "direct" effect of veto players on the probability of crises.

Political Institutions: Direct Effects — More veto players may reduce volatility in economic policies, increasing market confidence, which leads to the stable "bolted-down" type of investment that reduces the likelihood of banking crises. Policy changes that shift interest rates or collateral values may cause solvency or liquidity stress. This would lead to frequent policy shocks to asset/collateral values, which may increase the risk of banking crises. Political constraints that prevent these policy shocks may reduce the likelihood of crises. Further, at relatively low numbers of veto players, policymakers may not be able to generate market confidence in policy continuity. This may lead the preponderance of flighty short-term debt – which is also associated with an increased risk of banking crises. This implies more veto players should *reduce* the likelihood of banking crises, by offering both policy stability and market confidence associated with the expectation of stability.

More veto players may also reduce the ability of policymakers to react to changing conditions, deceasing market confidence, preventing the this stable "bolted-down" investment that reduces the likelihood of banking crises. During times of global volatility – or domestic financial vulnerability – quick policy responses are necessary to inspire investor confidence in the financial sector. These institutional constraints that impede quick policy responses may then increase the likelihood of crises amidst risky conditions, increasing the likelihood of banking crises. Further, at relatively high numbers of veto players, policymakers may not be able to generate market confidence they can respond to these risk conditions. This could also lead to the preponderance of the flighty short-term debt that is associated with an increased risk of banking crises. This implies more veto players should *increase* the likelihood of banking crises, by reducing policy flexibility and market confidence in policy responses to financial stress.

It may be the case both of these propositions are true, with some intermediate amount of veto players offering the optimal mix of this stability and flexibility that minimizes the risk of crises – as suggested by MacIntyre (2001). It could be that at either extreme of institutional constraints policymakers are unable to simultaneously generate market confidence in both policy continuity, and their ability to react to changing conditions. At an intermediate amount of veto players policymakers may be able to hit both of these targets – offer enough stability to generate market confidence in policy continuity, while also maintaining enough flexibility to respond to changing financial conditions. This would suggest it is at an intermediate amount of veto players we ought to observed the stable bolted-down investment and market confidence associated with financial stability and a reduced risk of banking crises. This would lead to a "U-shaped" relationship between the number of veto players and the likelihood of banking crises. Further, it may be the case that this optimal mix of flexibility shifts conditional upon global conditions. If global conditions are stable, this optimal mix may tilt towards preferring relatively more stability (*i.e.* more veto players), while this optimal mix may tilt towards relatively more flexibility (*i.e.* less veto players) amidst volatile global conditions that often require quick policy adjustment.

This generates an interesting non-linear dynamic. In times of increasing global risk the optimal amount of veto players is likely relatively low (to facilitate adjustment). In times of relative stability, the optimal amount of veto players is relatively likely high (to minimize policy shocks). This allows one to conceptualize this direct effect as a conditional non-linear U-shaped direct causal effect of veto players on the likelihood of banking crises, with the trough of the U shifting towards flexibility (few veto players) during risky global conditions, and rigidity (many veto players) during stable global conditions.

Effects of Global Volatility Conditional upon Political Institutions — Global risk and volatility leads to capital outflows (from emerging markets and LDCs, towards industrial economies), falling asset values, and market sell-offs, all of which increase financial stress and the likelihood of banking crises. The VIX[5] is a measure often used as a proxy for global risk and volatility (*e.g.* Gonzalez-Hermosillo Hesse 2011). When the VIX is rising, more volatile global conditions reduce market confidence, raising risk while reducing asset values. These times of global risk and falling asset values are associated with weakening balance sheets, capital outflows, and "fire-sales" of assets that generate stress in financial systems (Bruno and Shin 2015). As stress rises, quick action by policymakers (*e.g.* recapitalizing banks, economic stimulus packages) can restore market confidence and prevent the bank-runs or asset value crashes inciting crises. However, highly constrained political systems (many veto players) are less able to act quickly and unilaterally, impeding the implementation of these policy responses to incipient crises. After a global shock, markets may then be more likely to engage in the bank-runs/fire-sales that catalyze banking crises if high levels of institutional constraint weaken market confidence that these quick policy responses will occur. If this is the case, the effect of global volatility on crises may be conditional upon whether many veto

[5]The VIX is the Chicago Board Options Exchange volatility index, a measure of implied volatility of the S&P 500 options over the following thirty day period calculated using a weighted average of option prices.

players impede policy responses to the shock. When a country has more institutional constraints, increases global risk and volatility will have a larger effect on the likelihood of banking crises by causing a greater weakening of market confidence in the stability of the financial system. This will increase the likelihood of bank-runs and fire-sales after said shock, which increases the likelihood the shock becomes a crisis.

These mechanisms are tested in the "Reactions" section (4.2) then combined with the above indirect effects (the effects of veto players on economic fundamentals relevant to banking crises) for full marginal effects (Section 5.3). The following section outlines this process in detail.

3 Methodology

The prior section illustrates the multiple pathways through which political institutions influence the likelihood of crises; the indirect and direct causal pathways. The indirect causal pathway refers to veto players influencing the state of economic fundamentals affecting the likelihood of banking crises. The direct causal pathway refers to veto players influencing market expectations or policy shocks that catalyze crises. A research design evaluating both pathways is required to estimate the full effect of political institutions on the likelihood of crises. Econometric mediation satisfies this requirement. Econometric moderated mediation extends this approach to consider the potential conditionality of the causal linkages on these pathways. The multitude of potential causal linkages between veto players and banking crises outlined above suggests this is a worthy example with which to illustrate the merits of this methodology as a general tool for empirical work on the political economy of crises.

3.1 *Econometric Mediation* — Mediation first estimates the effect of an independent variable (veto players) on a mediator variable (denoted by dashed lines). I refer to this as the "imbalance" estimations[6]. The second estimation (indicated with solid lines) evaluates the effect of the mediator, the independent variable, and controls on the outcome variable. I refer to the second stage as the "reaction" estimation[7]. In a linear estimator the indirect effect (denoted by thin lines) is the coefficient (of the independent variable) from the first stage estimation multiplied by the coefficient of the mediator variable in the second stage estimation. Though this is a nonlinear estimator, the processes is substantively unchanged. The direct effect (denoted by **bold** lines) is merely the coefficient of the independent variable in the second stage estimation – which includes said controls and mediator variables.

When the effect of an independent variable on a dependent variable is mediated by more than one variable, the estimation process is called "multiple mediation." Veto players may have

[6]Referencing how veto players may influence the economic imbalances associated with crises.

[7]Referencing how market reactions to economic fundamentals and political factors may cause (or not) markets to react with the bank-runs/fire-sales that catalyze crises.

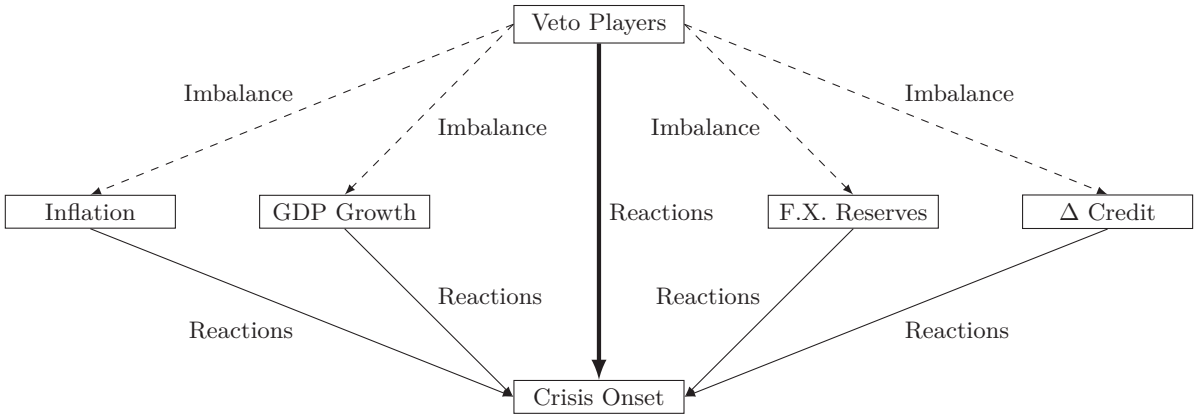


Figure 1: Mediated Estimation

a significant effect on multiple economic fundamentals that influence the likelihood of crises. I therefore do the imbalance estimations for all domestic economic variables discussed in the prior section (inflation, per capita GDP growth, foreign exchange reserve coverage, credit growth, and the real exchange rate[8]). Figure 1 gives a visual example of the multiple mediation our estimation process entails. As our second stage estimation uses a logit model, the marginal effects of veto players on the probability of crises is estimated using an application the product of coefficients approach shown to be consistent with logit models by MacKinnon et al (2007).

A statistically significant effect at each stage[9] is a necessary but not sufficient condition for mediation to occur. Therefore I calculate the mediated effects of veto players on the probability of crises for all variables meeting both conditions[10]. These estimates will be reported for the long and short-run[11]. The direct effect is the final path for veto players to influence the likelihood crises. This is the effect of the veto player variable on the probability of a banking crisis in an estimation controlling for the mediators, and potentially other variables – or the effect through causal pathways other than the mediator variables. Due to the use of a quadratic and interaction term, and the nonlinearity of the logit estimator used in the second stage estimation, results are evaluated using marginal effects at representative values of veto players and the change in the VIX. The marginal effect calculated using all pathways gives the full effect of veto players on the probability of banking crises[12].

A concern while using mediation analysis is the homogeneity assumption; it may be the case

[8]For reasons made clear in the following paragraph, I do not consider mediation with respect to the exchange rate. For the sake of parsimony, I do not include it in Figure 1.

[9]*E.g.* the estimations of the effect of veto players on inflation, and inflation on the probability of crisis, must each be significant for there to be mediated effect of veto players on the probability of crises by influencing inflation.

[10]In the sequentially first estimated Reactions regressions, the real exchange rate was not found to have a statistically significant influence on the likelihood of crises, and therefore there will be no attempt to calculate a mediated effect – though I do include the first stage of estimation of the variable for a complete 1st stage estimation of all economic fundamentals included in the second stage.

[11]Estimates generated and interpreted using a similar methodology to Acemoglu et al (2014)

[12]For a detailed discussion of multiple mediation and mediation using a logit model in the second stage, see (respectively) Peacher and Hayes and Breen et al (2008)(2013).

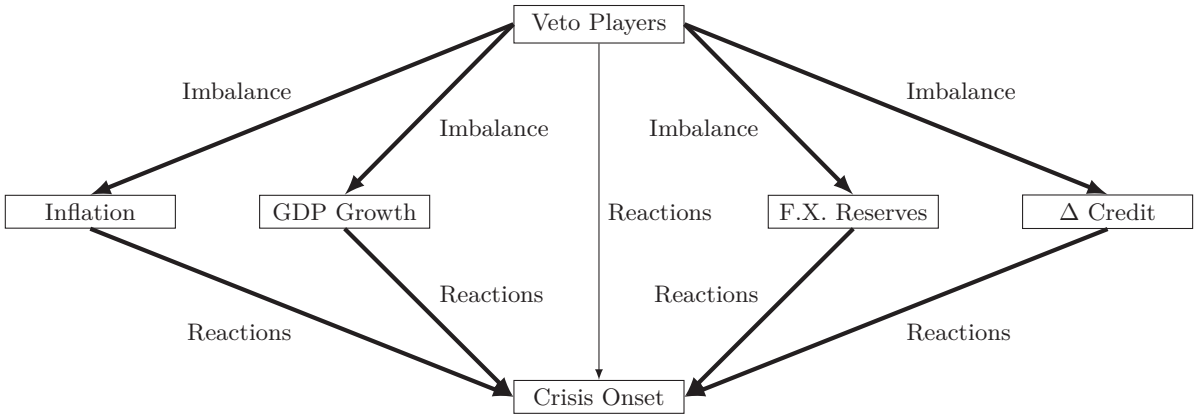


Figure 2: Moderated Mediated Estimation

that linkages between veto players and the mediator variables, or the mediator variables and banking crises, are conditional upon some other factor(s). If these observation level effects of the independent variable on the mediator, and the mediator on the dependent variable, are not independent the estimations will be biased by this (unobservable) covariance (Glynn 2011).

3.2 *Moderated Mediation* — if these individual level effects are not independent, the estimated indirect effect (in a linear function) is not the product of the coefficients ($\beta_x\beta_m$), but:

$$\beta_x\beta_m + \text{Cov}(\beta_{x,i}, \beta_{m,i}) \tag{1}$$

Where the second term indicates cross-stage covariance in individual effects. Though the estimator used for this mediation is nonlinear, the effect of this unobserved heterogeneity is broadly unchanged. This unobserved heterogeneity occurs in the indirect pathway (denoted by a **bold** highlight). To test for unobserved heterogeneity the effect at each stage of the indirect pathway[13] is allowed to vary conditional upon moderators (d) – variables potentially conditioning both the effect of veto players on the mediator and the mediator on the probability of crises. This is motivated by the discussion of the potential for causal linkages between veto players and economic fundamentals to be conditional upon other institutional factors (*e.g.* central bank independence), and/or the linkages between economic factors and banking crises to be conditional upon other factors, outlined in the prior section. This moderated mediation analysis is explicitly testing whether allowing these effects to vary conditional upon other institutional and economic factors changes the conclusions drawn from the mediated analysis. To achieve this, in the Imbalance regressions the moderator is interacted with the independent variable (veto players)[14]. In the Reactions regressions it is interacted with the mediators (Hayes 2013).

Statistically significantly different average mediated (indirect) marginal effects of veto players between estimations accounting for moderation and those not indicates this heterogeneity is

[13] *i.e.* the effect of the independent variable (mediator) on the mediator (dependent variable) is conditional upon another variable

[14] For a discussion of moderated mediation – AKA conditional indirect effects – see Preacher et al. (2007).

present, biasing the indirect effect (Preacher et al. 2007). Six moderators are tested: Financial Development, Central Bank Independence, Democracy, Exchange Rate Regime, Level of Economic Development, and Financial Liberalization. While no list of moderators can be exhaustive, I choose to focus primarily on institutional factors that may influence the relationship between veto players and the mediators and/or the mediators and the likelihood of crises. As I do not find significant evidence of moderation (*i.e.* allowing the relationship between veto players and the mediators, and the mediators and banking crisis, to vary conditional upon these other factors, does not substantively change the results of the analysis), these results are reported in Appendix A and I proceed under the assumption of cross-stage independence.

4 Estimation

The estimation reports and briefly discusses the estimations used for each of the multiple stages in the econometric analysis. A detailed discussion of the results of the mediation analysis follows in Section 5. Tables reporting the outputs of the estimations at each stage, and a description of the data used, are reported in Appendices C and E.[15]. Before the estimations are reported, I discuss the identification strategy required to make causal inferences using econometric mediation.

The first assumption is associated with identifying the causal effect of the mediator variables (the economic fundamentals) on the outcome variable (the likelihood of banking crises). The first of these is the sequential ignorability assumption associated with the link between the mediator variables and the outcome variable (the *indirect* effect). Domestic economic and institutional variables are lagged one year to avoid endogeneity associated with the effect of crises on the control variables[16]. This applies specifically to the mediator variables in the second stage estimations (*i.e.* the variables through which veto players *indirectly* influence the likelihood of banking crises)

The second assumption is associated with identifying the causal effect of the independent variable (veto players) on the likelihood of banking crises independent of its effect through the mediator variables (*i.e.* the *direct* effect). The veto player variable (an index from Heinzs 2005, ranging from 0 to 1) is not lagged, as it uses only data available on January 1st of the given year. This motivates the sequential ignorability assumption which is required for the causal identification of the direct effect (the effect of veto players on the likelihood of crises that does not work through the effect of veto players on the mediator variables) in econometric mediation, as it implies the veto player variable is predetermined at the time of the onset of the crisis. The global variables are also not lagged, and the regressions operate on the assumption that global risk and/or interest rate behavior are primarily driven by behavior in industrial economies.

The third assumption is associated with identifying the casual effect of the independent variable (veto players) on the mediator variables (the economic fundamentals). Contemporaneous

[15]The dataset and a Stata .do file including all regressions may be found in the supplementary material.

[16]This is a standard approach in the literature on financial crises.

observations of the veto player variable are used in these first stage estimations. This variable is constructed for the year's observation using only data available on January 1st of said year, thus reducing concerns of endogeneity. These estimations use a fixed effects dynamic panel model. This utilizes only the within-panel variation in political constraints across time to estimate how political constraints influence the behavior of the mediator variables (the economic fundamentals). This attempts to disentangle the causal effects of political constraints from other correlated factors. The causal effects of other underlying institutional factors (*e.g.*, the "inclusive versus extractive" framework discussed by Acemoglu et al 2014) are captured in the country-level fixed effects, as they are largely time invariant. Potential biases that could be introduced from time-variant non-institutional factors are addressed with the dynamic nature of the estimator, as the contemporaneous observation of the veto player variable is pre-determined at the date of the observation (due to its construction utilizing only information available the first day of the year of interest) – while any reverse causality between economic fundamentals and veto players operates with reasonably large lags. This motivates the sequential ignorability assumption required for the causal identification of the indirect effect of the mediated analysis.

Effects are discussed scaled to a one σ increase in veto players ($\sim$.3)[17].

4.1 *Imbalances* — These "imbalance" estimations evaluate the effect of the independent variable (veto players) on the mediators (m). I use dynamic panel data estimations to identify both the long and short-run effects of veto players on the mediator variables. Given that the direct effects likely operate in the short-run, while the effects of veto players through influencing fundamentals is likely a long-term effect, disentangling these dynamics is necessary to fully understand this topic. I first use fixed effects (country level – a) least squares to estimate the equations individually. I then estimate this system of equations jointly in a seemingly unrelated regression – a relatively efficient estimation process accounting for cross-equation correlation of the error term. My next set of estimations uses an Arellano-Bover/Blundell-Bond (System GMM)[18] estimator[19] to address the Nickel Bias associated with dynamic panel data estimations. The final estimate adds controls[20] to the individually estimated FELS models. I deliberately avoid controlling for variables potentially on the causal pathway linking veto players to the mediators in specifications I intend to use to calculate mediated marginal effects, and "bad controls" as discussed by Angrist and Pischke (2008)(such as those that may also be determined by veto players). An investigation of the potentially conditional nature of these effects is relegated to Appendix A, as the results do not suggest this is a significant concern.

[17] This sized change is rare within a country, indicating substantial political reforms or a move from single party rule to a large coalition. Cross-country differences of this size are more common, comparable to the difference between the US ($\sim$.4 typically) and the U.K. with a coalition government ($\sim$.7). The standard deviation of the difference between the value of the variable and the panel mean is $\sim$.18. The standard deviation of the panel means is $\sim$.25.

[18] For a full explanation of the estimator see Roodman (2009)

[19] Using Windmeijer's correction procedure for standard errors with the two-step SGMM estimator (2000). Both specifications pass all standard postestimation tests. Instrumentation discussed in Appendix D.

[20] Reported in Appendix E.

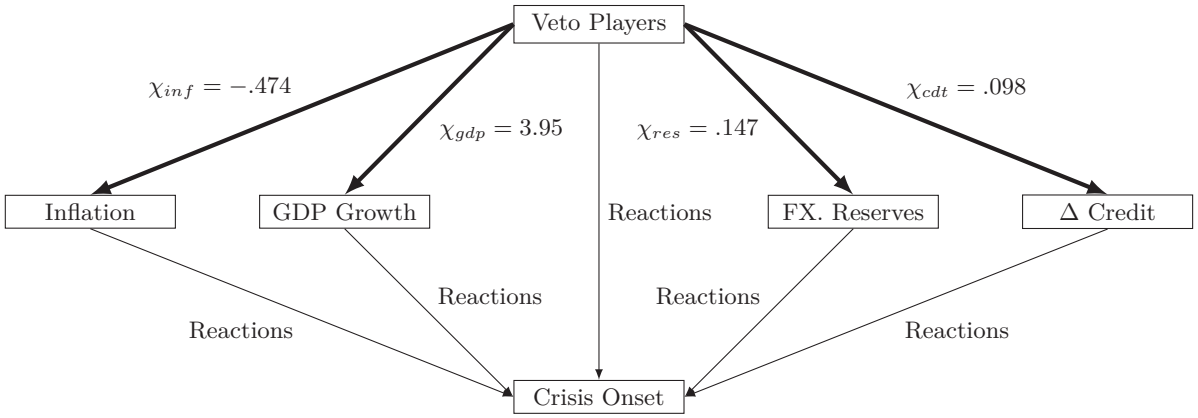


Figure 3: Imbalance Path Estimation

I calculate mediated effects using both the System GMM and Joint FELS first stage regressions. The System GMM estimator minimizes bias associated with the dynamic panel data approach, but is potentially susceptible to problems related to instrumentation. The Joint FELS estimation is affected by Nickell bias (though with large T panels this bias is likely relatively small), but is lower variance. The joint estimation of these models allows the Joint FELS estimations to include cross-equation information not utilized in the System GMM calculations – potentially related to omitted variables on the causal pathway for multiple mediators. By reporting and calculating mediated marginal effects using both sets of estimations, I attempt to avoid choosing a side in the "bias/variance" tradeoff between the two estimators while indicating the robustness of the results with the similarity of their coefficients and statistical significance.

The basic econometric model for each equation in the imbalance estimations[21] is:

$$m_{it} = \lambda_1 m_{it-1} + \chi v_{it} + a_i + \epsilon_{it} \tag{4}$$

This equation is estimated for each potential mediator (j) – inflation (logged), FX. reserve coverage (specified as a log of the ratio of FX. reserves to the M2), real exchange rate undervaluation (specified as the log of the ratio of the exchange rate relative to PPP with the US dollar, adjusted for Balassa-Samuelson), log difference of real credit issued to the private sector, and real GDP per capita growth[22]. I also calculate the long-run marginal effects of veto players by rescaling each coefficient by $\frac{1}{(1 - \lambda_1)}$. Figure 3 gives an illustration of the paths estimated (highlighted) and

[21] For the Imbalance stage of moderated mediation the basic model is:

$$m_{it} = \lambda_2 m_{it-1} + \phi_1 d_{it} \cdot v_{it} + \phi_2 d_{it} + \phi_3 v_{it} + a_i + \epsilon_{it} \tag{2}$$

Where d_{it} is the moderating variable. The remainder of the estimation remains fundamentally unchanged, but the marginal effect of veto players is no longer χ_j, but:

$$\frac{\partial m}{\partial v} = (\phi_3 + \phi_1 d_{it}) \tag{3}$$

Showing the marginal effect of veto players on the mediator is now conditional upon the moderator. These sets of estimations will take place with six moderators for each mediator. Estimation results are not reported, but the moderated mediated marginal effects are reported in the Appendix.

[22] A full data description can be found in Appendix C.

parameter estimates reported. Partial results are given in Table 1.

As outlined in Section 2, many veto players may constrain governments from short-term expansionary policy and allow commitment to far-sighted, high-quality policy. If so, more will reduce inflation, reserve vulnerability, and credit growth while increasing GDP growth.

Hypothesis 1 (Commitment Approach) *The veto player coefficients* χ_{inf} *and* χ_{cdt} *are statistically significant and negative.* χ_{gdp} *and* χ_{res} *are statistically significant and positive.*

Many veto players may also increase log-rolling, generating *expansionary* policy and an expansionary bias. If so, more veto players will have the opposite effect.

Hypothesis 2 (Collective Action Approach) *The veto player coefficients* χ_{inf} *and* χ_{cdt} *are statistically significant and positive.* χ_{gdp} *and* χ_{res} *are statistically significant and negative.*

The causal effect of veto players on the mediator variables likely works through varied policy oriented mechanism. To avoid controlling for factors on the causal pathway linking veto players to the mediators, and to follow the identification strategy described above estimates without controls are of interest. These will be used when calculating the mediated marginal effect. Estimations with controls are also evaluated however to ensure results don't substantively change. When controls are included I select those that are unlikely to be on the causal pathway between veto players and the mediators, or "outcome variables" (*i.e.* potentially causally determined by the veto player variable). The use of fixed effects in a dynamic panel framework attempts then aids in the identification of the effect of veto players on the mediator variables. This does so structuring the estimations to only capture how within-panel changes in political constraints across time influence the behavior of the mediator variables. This aids in identifying the causal effects related to political constraints independent of other correlated underlying (institutional or otherwise) factors that may also influence the dependent variables. I use the same set of controls for each estimations, adding the global interest rate (proxied by the U.S. three year treasury rate) when the dependent variable is an external variable (FX. reserves and the exchange rate).

The first control is the log of output – lagged one one year to avoid endogeneity. The veto player variable is correlated with output, making output important to control for to avoid any resulting bias. The second control is central bank independence, again included as its correlated with veto players and an important influence upon different economic fundamentals. The next control is the exchange rate regime – tallied as a one if the country has a fixed exchange rate. The final control in all specifications is trade as a portion of GDP. When controls are added the coefficient on veto players tends to fall in absolute value, but signs do not change among the relevant equations. Coefficients for the control variables are reported in Appendix E

A one standard deviation increase in the veto player variable is associated with reduction in inflation of ~8% with joint FELS and 15% with System GMM estimations[23]. For FX. re-

[23]Note this is in percent, not percentage points.

Table 1: Imbalances Partial Results

Dep. Var	Inflation	FX. Res	Ex. Rate	Δ Credit	Growth
			Individual FELS		
Lagged Dep. Var	.547***	.706***	.806***	.056	.006
	(0.0420)	(0.0361)	(0.0284)	(0.0400)	(0.0366)
Veto Players	-.155	.055	-.051	.045*	3.204**
	(0.1256)	(0.0666)	(0.0517)	(0.0329)	(1.3739)
			Joint FELS		
Lagged Dep. Var	.497***	.787***	.989***	.051	.082***
	(0.0395)	(0.0299)	(0.0149)	(0.0362)	(0.0253)
Veto Players	-.236*	.035	-.131*	.042*	1.900*
	(0.0904)	(0.0504)	(0.0769)	(0.0227)	(0.9959)
			System GMM		
Lagged Dep. Var	0.774***	0.884***	.720***	0.168***	0.181***
	(0.0588)	(0.0612)	(0.0598)	(0.0268)	(0.0639)
Veto Players	-0.474*	0.147	-1.540*	.098*	3.952**
	(0.2739)	(0.0989)	(0.8335)	(0.0543)	(1.986)
			FELS with controls		
Lagged Dep. Var	0.428***	0.698***	0.807***	0.0114	-0.0570
	(0.0541)	(0.0444)	(0.0224)	(0.0383)	(0.0883)
Veto Players	-0.0308	0.0112	0.0124	0.0354	1.155
	(0.142)	(0.0776)	(0.0492)	(0.0308)	(1.235)

Clustered/Windmeijer Corrected standard errors in parentheses

serve coverage this is approximately 1% and 5% (respectively). The exchange rate strengthens by approximately 4% in the joint FELS estimations – SGMM estimations are invalid based on post-estimation tests. Credit growth increases by 1.25% and 3% (respectively). Economic growth increases by .6 percentage points and 1.2 percentage points. With the exception of credit growth and the real exchange rate, all economic fundamentals are improved by an increase in veto players. This generally supports the Commitment Approach, as outlined above. In more constrained political systems policymakers are better able to commit to policy that offers long-term benefits, and avoid policies offering short-term expansionary benefits at the cost of long-term stability. Counterintuitively, credit growth appears though to *rise* in more constrained political systems, in line with the predictions of Rajan (2010). In these more constrained political systems, policymakers are prevented from engaging in short-term expansionary policies (such as raising social spending) and turn instead to increasing credit growth as a tool to boost consumption.

4.2 Reactions — I construct the control model using variables standard in the banking crisis literature[24] after which I add the veto player variable in a linear, quadratic, and interaction term – motivated by the discussion in Section 2.2. The quadratic term is included to evaluate whether the U-shaped model has explanatory power (*i.e* whether an intermediate amount of these institutional constraints offers the lowest risk of crises), while the interaction term is included to evaluate whether this effect of veto players on the likelihood of crises is conditional upon global risk. Figure 4 gives an illustration of the paths and parameters estimated. The relationship estimated in this

[24]Primarily Demirgüc-Kunt and Detragiache with additional explanatory variables added, then AIC/BIC tests performed after to remove unnecessary regressors (1999).

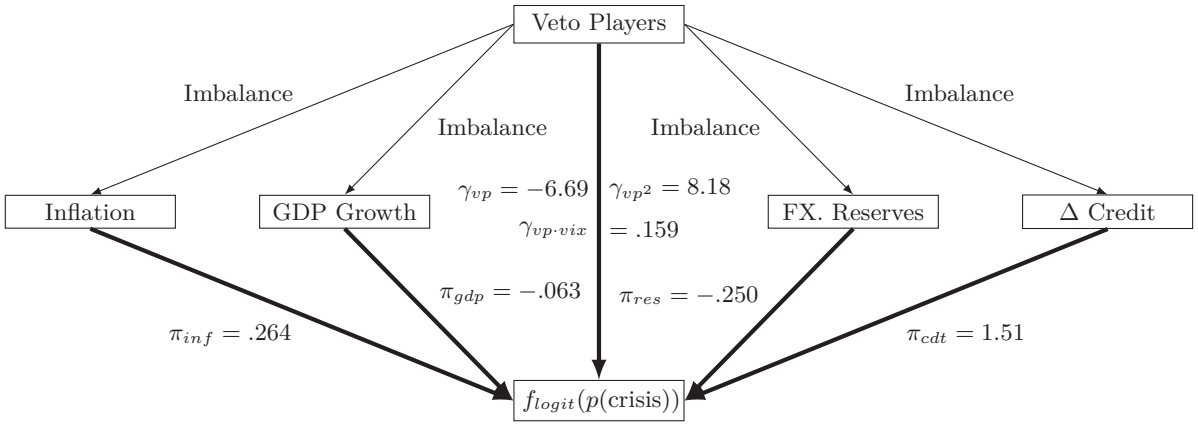


Figure 4: Reactions Estimation

stage is:

$$c = g(x_{\text{v}}\gamma + x_{\text{m}}\pi + x_{\text{c}}\beta + u) \tag{5}$$

With g a link function converting values of a selection of independent variables into crisis outcomes. x_{v} is a n x 3 matrix of veto player terms $[v_{\text{vp}},\ v_{\text{vp}}^2\ , v_{\text{vp}} \cdot x_{vix}]$, x_{m} is a n x 4 matrix of mediator variables $[m_{\text{inf}},\ m_{\text{gdp}}, m_{\text{res}}, m_{\text{cdt}}]$, and x_{c} is a matrix containing observations of control variables. This implies a latent variable $p(c)$, giving the probability of a crisis:

$$p(c) = p(c \mid x_{\text{v}},\ x_{\text{m}},\ x_{\text{c}}) \tag{6}$$

Estimated with a logit model[25]:

$$p(c) = f_{\text{logit}}^{-1}(x_{\text{v}}\gamma + x_{\text{m}}\pi + x_{\text{c}}\beta + u) \tag{7}$$

This fits the three vectors of parameters. γ is a 3 x 1 vector of veto player term coefficients (γ_j), π is a 4 x 1 vector of mediator term coefficients, and β is a k x 1 vector of control variable coefficients. The four mediators (m_j) are inflation, GDP growth, credit growth, and FX. reserve coverage[26]. The control interacted ($v_{\text{vp}} \cdot x_{\text{vix}}$) with veto players ($v_{\text{vp}}$) is the VIX ($x_{\text{vix}}$), an index of implied volatility proxying global risk – specified as a difference to measure changes in risk relative to that already priced in. The interaction term allows the marginal effect of veto players to vary conditional upon global conditions, and the marginal effect of global risk to vary conditional upon veto players. Marginal effects reported in Section 5 use the specification labeled ("FULL").

Hypothesis 3 (Inertia Model) *The veto player interaction term ($\gamma_{vp \cdot vix}$) will be statistically significant and positive*

If more veto players make it more difficult for policymakers to respond to exogenous shocks, these shocks will cause a relatively larger increase in the probability of a crisis. If shocks require

[25]Fixed Effects are not used in this model following the methodology of Demirgüc-Kunt and Detragiache, as all panels with no crisis observation will be omitted, producing a biased sample (1999).

[26]These variables are specified as outlined in prior sectors.

policy response impeded by veto players impede this, veto players' marginal effect will rise in the presence of a shock. I also include a quadratic term (v^2_{vp}) to test for a nonlinear effect. More veto players may introduce policy stability, generating market confidence. More veto players may also reduce market confidence policymakers will respond effectively to risky conditions. At low levels, the former effect may be larger. At high levels, the latter effect may be larger. Hypothesis 4 describes coefficients if this is the case.

Hypothesis 4 (Curvilinear Model) *The linear veto player term (γ_{vp}) will be statistically significant and negative. The quadratic term (γ_{vp^2}) will be statistically significant and positive*

If veto players do reduce the probability of crises when low (facilitating stable expectations) but increase the probability of crises when high (reducing market confidence in policy responses to shocks) – there may be an optimal "Goldilocks" amount of veto players balancing policy stability and flexibility. If Hypothesis 4 is also true, this optimal amount of veto players will shift towards less (flexibility) in times of volatility, and more (stability) in times of global tranquility.

Other variables (mediators x_{m} and controls x_{c}) in the full model are a mixture of economic and financial indicators. The selection of these controls is motivated by the discussion in Section 2.2. The observations are lagged to to avoid endogeneity while accounting for the "build-up" of fundamentals into a crisis, similar to the methodologies overviewed by Kauko (2014). This also facilitates the sequential ignorability element of the identification strategy discussed above. Selected results are reported in Table 2, while the full results are reported in Appendix E. Estimations contain a limited set of controls to avoid over-controlling and an unacceptable reduction of sample space due to missing observations – a concern exacerbated by mediation with a non-linear estimator. Prior work shows excessive credit growth can lead to banking crises, often through it's procyclical relationship with other financial and macroeconomic factors causing credit booms that lead to later busts. Table 2 supports this finding. An appreciated exchange rate can reduce the cost of foreign currency debt – however if an overvalued exchange rate weakens, the depreciation can cause financial stress sparking a crisis. I find little evidence of this effect[27].

If economic growth is weak, it may be difficult for private actors to service debts, leading to financial stress as NPLs rise and debt service paid to the financial system falls. Table 2 supports this conjecture. Factors such as the erosion of collateral values due to inflation, or monetary contractions that often follow high inflation may cause financial stress leading to banking crises. With a positive and statistically significant coefficient, the logit estimations support prior work analyzing this relationship between banking crises and inflation. Weak F.X. reserve coverage may cause a loss of market confidence, and the necessitate quicker adjustment to global pull factors, increasing a country's vulnerability to banking crises. Table 2 shows some support for this effect. The final economic fundamental is GDP per capita, accounting for the differences in crisis

[27]As this variable is not found to be statistically significant, it is reported as a control, rather than mediator, though imbalance estimations include it as a dependent variable.

Table 2: Banking Crisis: Reactions Partial Results

Variables	BASE	FULL	FIN.	REG.	MON.	POLS.
Veto Players		-6.689***	-7.285***	-8.229***	-6.499**	-7.134***
		(1.927)	(2.377)	(2.776)	(2.712)	(2.610)
Veto Players Sq.		8.180***	9.330***	10.94***	7.319**	8.803***
		(2.516)	(3.353)	(3.780)	(3.261)	(2.879)
Veto Players*ΔVIX		0.159*	0.00513	-0.0813	0.147*	0.148
		(0.0864)	(0.223)	(0.211)	(0.0857)	(0.0996)
Inflation	0.284***	0.264***	0.192	-0.0450	0.554***	0.347***
	(0.0949)	(0.0914)	(0.133)	(0.158)	(0.198)	(0.109)
Reserve Adequacy	-0.334**	-0.250*	-0.370**	-0.175	-0.136	-0.360**
	(0.141)	(0.142)	(0.188)	(0.255)	(0.246)	(0.165)
Credit Growth	1.657***	1.512***	1.563*	1.089	2.087**	1.403***
	(0.578)	(0.551)	(0.831)	(0.677)	(0.870)	(0.493)
Economic Growth	-0.0571**	-0.0625**	-0.0932*	-0.0354	-0.0901*	-0.0568*
	(0.0262)	(0.0266)	(0.0476)	(0.0467)	(0.0509)	(0.0296)
ΔVIX	0.0585***	-0.00573	0.173	0.199*	0.00298	0.0193
	(0.0227)	(0.0471)	(0.119)	(0.111)	(0.0426)	(0.0548)
Observations	1,412	1,412	758	693	827	1,163

Standard errors clustered by country

vulnerability related to level of development. The change in the VIX[28] has a positive coefficient, indicating increased global risk increases the likelihood of crises (potentially by causing systemic insolvency or illiquidity while increasing the costs of servicing debt). Coefficients not in γ or π are reported in Appendix E.

Once specifications add veto players – including a quadratic and interaction term (with the change in the VIX) – a U-Shaped relationship emerges. With few (many) veto players, more veto players lower (raise) the probability of crises. This is due to a negative linear and positive quadratic coefficient. Further, the positive coefficient of the interaction with the VIX indicates veto players reduce the probability of crises when conditions are stable (likely by reducing policy shocks), but increase the probability of crises when conditions are volatile (likely by reducing the ability of policymakers to respond to changing conditions).

I also estimate four alternative specifications for robustness – adding financial sector factors (FIN.), financial regulation (REG.), monetary factors (MON.), and political factors (POLS.), each adding two or three variables to the full model. These alternative estimations yield similar results. The exception is the financial and financial regulation specifications, though regressions dropping these additional variables over the same sample space yield similar results. This suggests the loss of significance of the interaction term is related to the reduced sample space[29] rather than omitted variable bias.

[28]The VIX is the Chicago Board Options Exchange volatility index, a measure of implied volatility of the S & P500 options over the following thirty day period calculated using a weighted average of option prices – often used as a proxy for global risk and volatility.

[29]These variables run until 2005, suggesting the change is driven by the omission of the Global Financial Crisis.

5 Mediated Results

The next section of this analysis combines the findings of different stages of the estimations in the prior section to fully evaluate the marginal effects of veto players on the likelihood of banking crises through these multiple causal pathways. The first subsection will evaluate the direct effect of veto players on the likelihood of banking crises. This is the marginal effect of veto players on the estimated likelihood of a banking crisis estimated while controlling for economic fundamentals and global conditions. The second subsection will evaluate the indirect effect of veto players on the likelihood of banking crises. This is the marginal effect of veto players on the likelihood of crisis through influencing economic fundamentals associated with the onset of crises. The third subsection will combine these two effects for estimates of the full effect of veto players on the likelihood of crises. The appendix reports the effect of a shock to economic growth on the likelihood of crises in later periods given the conditional autoregressive effect of economic growth (also reported in the appendix).

5.1 Direct Marginal Effects — Evaluating the marginal effect of a variable included in three terms (linear, quadratic, and interaction) requires calculating marginal effects at representative values. The path and estimated parameters are illustrated in Figure 5. All marginal effects are calculated using the output of the "FULL" model from the Reactions regression. The direct average marginal effect at representative values while controlling for the mediator variables (using the methodology of Archarya et al (2016)) is:

$$\frac{\partial \overline{p(c)}}{\partial v} = \frac{1}{n}\sum_{i=1}^{n} \hat{p}_i(1-\hat{p}_i)\cdot(z_d) \tag{8}$$

With $\hat{p}_i$ from Equation 11 calculated using representative values for x_{v}, and observed values for x_{m} and x_{c}. z_d is calculated as:

$$z_d = (j_d \cdot \hat{\gamma}) \tag{9}$$

With $\hat{\gamma}$ the coefficient vector from Equation 11 using the "full" model from Section 3.3, and:

$$j_d = [1,\ 2v,\ x_{\mathrm{vix}}] \tag{10}$$

A gradient of the variables in the interior of the inverse logit function from equation 11 with respect to v at representative values. z multiplied by $\hat{p}_i(1-\hat{p}_i)$ (the derivative of the logistic function) gives the marginal effect of veto players at representative values (of veto players and the VIX) given the observed value for the terms in x_{c} and x_{m}. Averaging this term across the sample gives the average marginal effect at the representative value (hereafter AMERV), the best estimation of the marginal effect throughout the observed data. For a more in-depth explanation of the calculation of full, direct, and indirect marginal effects, see Breen et al (2013). The process to calculate marginal effects for the VIX is substantively similar.

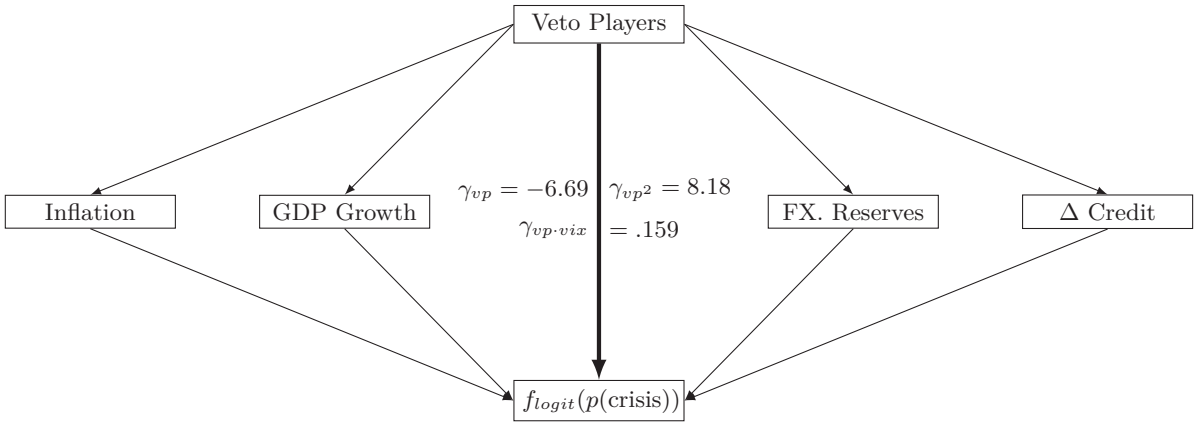


Figure 5: Direct Marginal Effects

The marginal effect of veto players on the probability of crises conditional upon the the VIX is shown in Figure 5.1, with veto players on the Y axis and the change in the VIX on the X axis[30]. Both sets of marginal effects are scaled to show the effect of a one standard deviation increase in the variable in question. The mean and standard deviation of veto players is approximately .35 and .3. The VIX has a mean of approximately 20 and ranges from 12 to 32. The mean and standard deviation of Δ VIX is 0 and 5, with a rising VIX indicating rising risk and volatility.

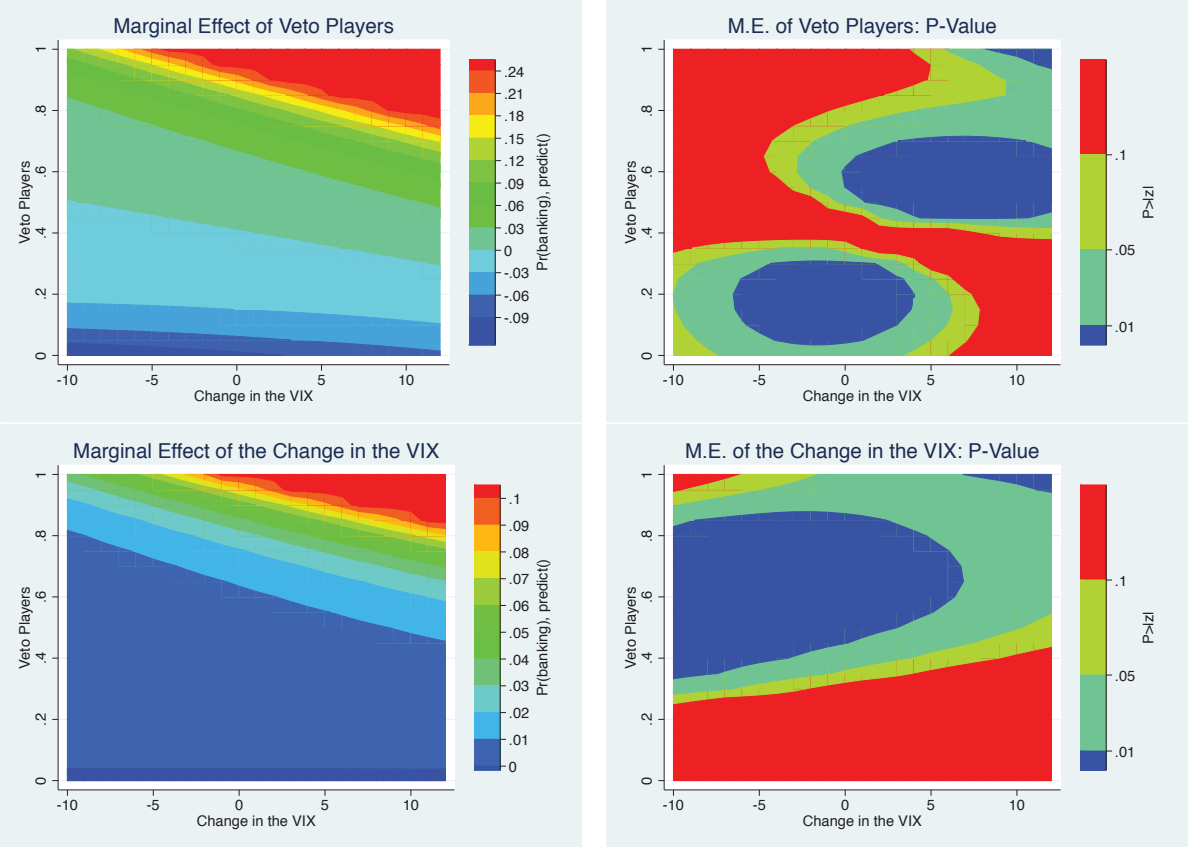
The marginal effect at any combination of veto players and change in the VIX is indicated by the color at the respective point – given by the scale on the right side of the image – after calculating these marginal effects at combinations of the two variables and generating a contour plot. The marginal effects are displayed in the left image, while the the statistical significance of these marginal effects[31] are in the right image. The level of significance is also indicated by the color as shown in the scale on the right portion of the image.

More veto players increase the probability of crises when the VIX is rising with many veto players (high on the Y axis) and reduce the probability of crises when the VIX is falling with few veto players. When the global economy is volatile more veto players reduce market confidence in policymakers' ability to react to changing conditions. When the global economy is stable more veto players reduce political/policy shocks, allowing the expectations of stability to generate confidence. As the amount of veto players rises the marginal effect rises. With few veto players, more increase confidence and therefore stability. With many veto players, more reduce market confidence in policymakers' ability to carry out economic adjustment, reducing stability. This supports the U-shaped hypothesis. When the marginal effects are large (in absolute value) they tend to be statistically significant – with many veto players and a rising VIX, or few and a falling VIX.

Also interesting is the marginal effect of the change in the VIX on the probability of crises conditional upon veto players. These marginal effects are again rescaled to one standard deviation,

[30] The plots span approximately the range of both variables.
[31] Standard errors are calculated using the delta method.

Figure 6: Marginal Effects of Veto Players and the VIX



rather than one unit, increase in the differenced VIX. Interpreting this effect is somewhat complex: The marginal effect of a one standard deviation change in the VIX (~5) at a value of five would be analogous to changing from an increase of five to an increase of ten, for example. With few veto players (left side of Figure 11) the marginal effect is approximately 0. As the amount of veto players rises (moving right on the graph) the marginal effect rises, indicating a rising VIX only increases the probability of crises with relatively many veto players, and the effect is larger as the amount of veto players rises further. This effect is larger when the change in the VIX is larger. The difference in the VIX *falling* 4 points vs 5 points is small, while the difference in the VIX *rising* 4 points vs 5 points is large. This relationship is only statistically significant (Figure 12) when veto players are greater than ~.35, or approximately the mean.

These results are quite intriguing. They indicate that global volatility has little effect on the probability of crises when a political system is relatively unconstrained, and can respond to the shock. However, when there are many of constraints – impeding policy adjustment to global shocks – these shocks to global volatility/risk have a larger effect on the probability of crises. Markets are more concerned with global volatility when political institutions make policy adjustment less likely.

5.2 Mediated Marginal Effects — The calculation of mediated AMERV is substantively similar to the direct effects in Section 5.1. Figure 7 shows the paths of this estimation and the parameter

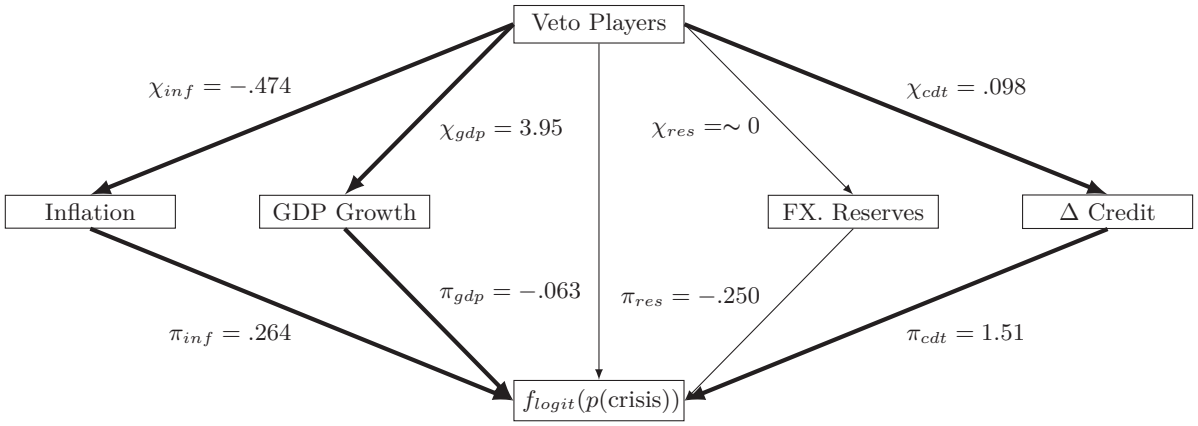


Figure 7: Mediated Marginal Effects

estimates used. The marginal effects are again calculated at representative values of the VIX and veto players. A statistically significant effect of the independent variable on the mediator, and the mediator on the dependent variable, are necessary but not sufficient conditions for mediation. As such, I only calculate mediated effects for variables meeting both conditions (inflation, credit growth, and real GDP per capita growth). The mediated AMERV is also calculated using:

$$\frac{\partial \overline{p(c)}}{\partial v} = \frac{1}{n}\sum_{i=1}^{n} \hat{p}_i(1-\hat{p}_i)\cdot(z_m) \tag{11}$$

With $\hat{p}_i$ from Equation 11 calculated using representative values for x_{v}, and observed values for x_m and x_{c}, and the coefficient vectors from the "full" model in Section 3.3. The difference between the calculation of the direct and mediated marginal effects is that z_m is now:

$$z_m = (j_m \cdot \hat{\pi}) \tag{12}$$

Where $\hat{\pi}$ is the coefficient vector of the *mediator* variables from Equation 11. The gradient of the mediator variables with respect to veto players of the interior of the logistic function is:

$$j_m = [\hat{\chi}_{\text{inf}},\ \hat{\chi}_{\text{gdp}},\ \hat{\chi}_{\text{cdt}}] \tag{13}$$

Where $\hat{\chi}_j$ is the estimated first stage coefficient[32] of the veto player variable from Equation 2 for each mediator. Rescaling each element of j_m by $\frac{1}{(1\ -\ \hat{\lambda}_{1j})}$ and recalculating z gives the long-run marginal effects. The standard error of this term is calculated using the delta method[33]. Table 4 shows a one standard deviation increase in veto players reduces the probability of crises indirectly by approximately .04 to .5 percentage points in the short-run, and from .2 to 2.5 percentage

[32] Figure 7 shows the System GMM estimations, while mediated marginal effects are also calculated using the joint FELS coefficients.

[33]

$$\sigma^2_{ME} = \bigtriangledown f(l)\cdot\Omega\cdot\bigtriangledown f(l)' \tag{14}$$

Where the elements are the gradient are calculated as:

$$\bigtriangledown f(l) = \left[\frac{1}{n}\sum_{i=1}^{n}(\frac{\partial^2 f}{\partial\gamma_j\ \partial z})_i, ..., \frac{1}{n}\sum_{i=1}^{n}(\frac{\partial^2 f}{\partial\pi_j\ \partial z})_i\ + \frac{1}{n}\sum_{i=1}^{n}(\frac{\partial f}{\partial\pi_j})_i, ..., \frac{1}{n}\sum_{i=1}^{n}(\frac{\partial^2 f}{\partial\beta_j\ \partial z})_i, ..., \frac{1}{n}\sum_{i=1}^{n}(\frac{\partial f}{\partial\chi_j})_i, ...\right] \tag{15}$$

points in the long-run[34]. The indirect effect is statistically significant (indicated by **bold** font) at all estimated representative values. These changes are economically significant compared to the unconditional the probability of crises of about 3 percent.

Table 3: Mediated Marginal Effects in Percentage Points

	Short-Run			Long-Term		
	System GMM Estimations					
Variable	Inflation	Δ Credit	Growth	Inflation	Δ Credit	Growth
Average Mediated Marginal Effect	-.093%	.163%	-.240%	-.464%	.193%	-.285%
	-.0032	.0057*	-.0083*	-.0160***	.0067**	-.0099*
	(.0021)	(.0031)	(.0050)	(.0057)	(.0034)	(.0055)
Representative Values	-.391%	.683%	-1.001%	-1.938%	.807%	-1.190%
	-.0135	.0236	-.0347	-.0672**	.0280*	-.0412*
	(.0091)	(.0144)	(.0222)	(.0277)	(.0159)	(.0247)
Combined Mediated Effect		-.169%			-.556%	
		-.0059			-.0193***	
		(.0056)			(.0073)	
	Joint FELS Estimations					
Variable	Inflation	Δ Credit	Growth	Inflation	Δ Credit	Growth
Average Mediated Marginal Effect	-.057%	.062%	-.132%	-.113%	.064%	-.144%
	-.0020	.0021	-.0045*	-.0039**	.0022	-.0050*
	(.0013)	(.0014)	(.0027)	(.0017)	(.0014)	(.0029)
Representative Values	-.237%	.258%	-.552%	-.473%	.268%	-.601%
	-.0082	.0090	-.0191	-.0164**	.0093	-.0208
	(.0055)	(.0061)	(.0123)	(.0079)	(.0062)	(.0129)
Combined Mediated Effect		-.127%			-.193%	
		-.0044			-.0067**	
		(.0032)			(.0033)	
Unconditional probability of crises = 3%						

The first set of estimations ("Average Mediated Marginal Effects") calculates the mediated effect of each variable across all observations, then reports the average of this value. The 1st row is rescaled to show the marginal effect of a one standard deviation higher amount of veto players individually for each mediator on the probability of a crisis in percentage points. The second set of estimations ("Representative Value") performs this calculation for when the change in the VIX is equal to 12, and the veto player variable is equal to .8 – conditions with substantial vulnerability to a crisis. The final estimation ("Combined Mediated Effect") calculates the (average) mediated effect of veto players working through all three mediators.

A vector of partial derivatives with respect to each model parameter comprised of cross-partial derivatives:

$$\frac{1}{n}\sum_{i=1}^{n}(\frac{\partial^2 f}{\partial\beta_w\ \partial z})_i = \frac{1}{n}\sum_{i=1}^{n}\left[\left[(\hat{p}_{it}(1-\hat{p}_i)(1-\hat{p}_i)) - ((1-\hat{p}_i)\hat{p}_i\hat{p}_i)\right]\cdot z\cdot w_i\right] \tag{16}$$

With respect to each model parameter, and the derivative of each coefficient in π:

$$\frac{1}{n}\sum_{i=1}^{n}(\frac{\partial f}{\partial\pi_j})_i = \frac{1}{n}\sum_{i=1}^{n}\left[\hat{p}_i(1-\hat{p}_i)\cdot e_i\right] \tag{17}$$

where β_w is the coefficient on variable w, and e_j is the element of vector J_{m} corresponding with variable j at representative values of v and x. Ω is the logit model cluster-robust variance-covariance matrix, extended by adding 1st stage variances of veto player terms on the diagonal, and covariances off between first stage coefficients across equations for the join estimations. Elements of J_m are rescaled by $\frac{1}{(1-\lambda_{1j})}$ when estimating long-run marginal effects.

[34] A full table also reporting the unscaled marginal effects and standard errors is in Appendix C.

5.3 Full Marginal Effects — The full marginal effects are the combination of the mediated and the direct marginal effects. Figure 8 illustrates the paths and parameter estimates used in this calculation. While the general results can inferred from Sections 5.1 and 5.2, this allows point estimates, standard errors, and statistical significance of the effect. The full AMERV calculation is similar to Sections 5.1 and 5.2:

$$\frac{\partial \overline{p(c)}}{\partial v} = \frac{1}{n}\sum_{i=1}^{n} \hat{p}_i(1-\hat{p}_i)\cdot(z_f) \tag{18}$$

Where:

$$z_f = (j_f \cdot \Theta) \tag{19}$$

However, the construction of z_f is slightly more complicated. j_f is now a full vector of partial derivatives of the interior of the logistic function with respect to veto player terms after accounting for mediation, requiring stacking j_d and j_{m} into:

$$j_f = [1,\ 2v,\ x_{\mathrm{vix}},\ \hat{\chi}_{\mathrm{inf}},\ \hat{\chi}_{\mathrm{gdp}},\ \hat{\chi}_{\mathrm{cdt}}] \tag{20}$$

For which mediator elements are rescaled by $\frac{1}{(1\ -\ \hat{\lambda}_{1j})}$ for the long-run effects of mediated terms. Θ is constructed by stacking the two coefficient vectors (for the veto player and mediator terms) from the Reactions regression. This gives the full vector of coefficients:

$$\Theta' = [\hat{\gamma}_{\mathrm{vp}},\ \hat{\gamma}_{\mathrm{vp}^2},\ \hat{\gamma}_{\mathrm{vp\cdot vix}},\ \hat{\pi}_{\mathrm{inf}},\ \hat{\pi}_{\mathrm{gdp}},\ \hat{\pi}_{\mathrm{cdt}}] \tag{21}$$

Table 4 shows the point estimate and statistical significance of these full marginal effects[35]. As can be inferred from the results reported in the prior sections, this table shows that when veto players are relatively low, and the VIX is falling, more veto players will *reduce* the probability of crises. With many veto players and a rising VIX, more veto players will *increase* the probability of crises. The results are statistically significant (indicated by **bold**) at these two combinations, but are not with few veto players and a rising VIX, or many veto players and a falling VIX. These general results hold for both the short and long term estimations. These results follow from Section 5.1, adding the additional effect of stronger fundamentals reducing the probability of crises from Section 5.2: An unconstrained political system (few veto players) introduces policy volatility, increasing risk when markets are stable (falling VIX). This effect is negated by the benefits offered by quick policy response amidst turbulent markets (rising VIX), leading the marginal effect of more veto players with few veto players to be negative when markets are stable, but insignificant when markets are volatile. At all representative values more veto players reduce inflation and increase real GDP per capita growth, reducing the probability of crises. This effect is partially negated by more veto players increasing credit growth, which increases the likelihood of crises.

The marginal effect of a one standard deviation increase in veto players in the short-run ranges from a reduction in the probability of crises of approximately ten percentage points when veto players are at zero and the VIX is falling eight, to an increase in the probability of crises of twenty

[35] This section reports the SGMM results. The joint FELS results are substantively similar, and can be found in Appendix E.

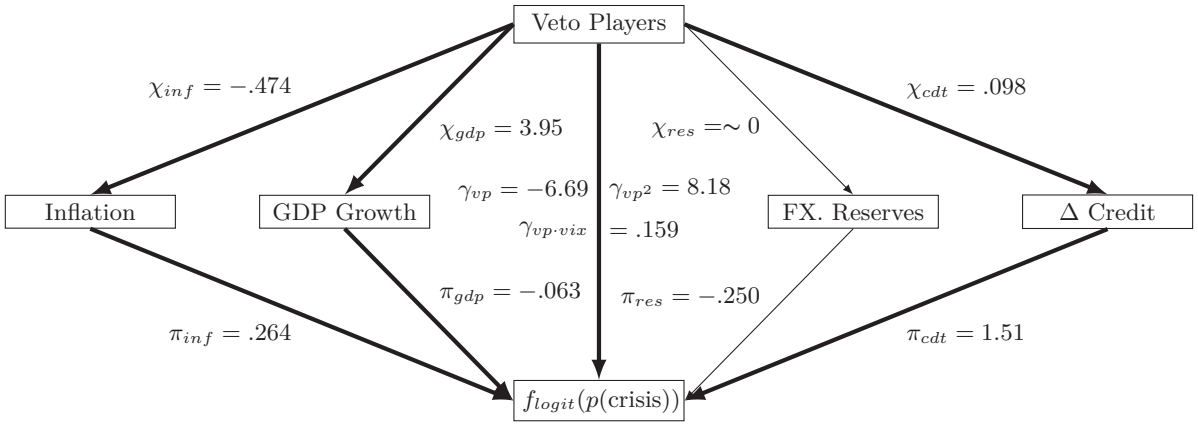


Figure 8: Full Marginal Effects

four and a half percentage points with veto players at .8 and the VIX rising by twelve. Unscaled marginal effects and delta method standard errors[36] are reported in Appendix E.

Table 4: Full Marginal Effects in Percentage Points

Short-Run					
Veto Players =	0	.2	.4	.6	.8
ΔVIX = 12	-6.6%	-1.2%	1.2%	**6.8%**	**30.9%**
= 8	-7.5%	-1.6%	.6%	**4.3%**	**20.6%**
= 4	**-8.5%**	**-1.9%**	.2%	**2.7%**	**13.0%**
= 0	**-9.6%**	**-2.1%**	-.1%	**1.6%**	**7.9%**
= −4	**-10.7%**	**-2.2%**	-.4%	.9%	4.6%
= −8	**-11.8%**	**-2.3%**	0.7%	.5%	2.6%
Long-Term					
ΔVIX = 12	-7.1%	-1.6%	.9%	**6.2%**	**29.3%**
= 8	-8.1%	**-1.9%**	.3%	**3.9%**	**19.4%**
= 4	**-9.2%**	**-2.1%**	-.1%	**2.3%**	**12.2%**
= 0	**-10.2%**	**-2.3%**	-.3%	**1.4%**	7.3%
= −4	**-11.3%**	**-2.4%**	-.5%	.7%	4.3%
= −8	**-12.5%**	**-2.5%**	-.5%	.3%	2.4%

σ_{vp} change in Veto Players on the probability of crises

*This table reports the marginal effect of one standard deviation more veto players on the probability of a crisis in percentage points at representative values of the change in the VIX and veto players. Marginal effects that are statistically different than zero are reported in **bold**. A table reporting unscaled marginal effects and their standard errors can be found in Appendix E.*

[36]The calculation of this standard error is substantively similar to the calculation of the standard error of the mediated marginal effect. The only difference in the process of calculating the standard error is in the gradient:

$$\bigtriangledown f(l) = \left[\frac{1}{n}\sum_{i=1}^{n}(\frac{\partial^2 f}{\partial \gamma_j\ \partial z})_i + \frac{1}{n}\sum_{i=1}^{n}(\frac{\partial f}{\partial \gamma_j})_i, ..., \frac{1}{n}\sum_{i=1}^{n}(\frac{\partial^2 f}{\partial \pi_j\ \partial z})_i\ + \frac{1}{n}\sum_{i=1}^{n}(\frac{\partial f}{\partial \pi_j})_i, ..., \frac{1}{n}\sum_{i=1}^{n}(\frac{\partial^2 f}{\partial \beta_j\ \partial z})_i, ..., \frac{1}{n}\sum_{i=1}^{n}(\frac{\partial f}{\partial \chi_j})_i, ...\right] \quad (22)$$

Which now includes the terms $\frac{1}{n}\sum_{i=1}^{n}(\frac{\partial f}{\partial \gamma_j})_i$, accounting for the direct effect of the γ_j coefficients.

6 Discussion & Conclusions

The results of Section 5 suggest that veto players influence the likelihood of crises through a complex combination of pathways. This analysis shows that a variety of different veto player models have explanatory power. This analysis further highlights the merit of econometric mediation as a tool to conduct quantitative work on the political economy of crises in the presence of such complex combinations of causal linkages. Through indirect causal pathways, more veto players *reduce* the likelihood of crises by reducing inflation and increasing economic growth (the Commitment Approach). More veto players also *increase* the likelihood of of crisis through indirect causal mechanisms by increasing credit growth; a causal pathway proposed by Rajan (2010).

Considering direct causal pathways, an intermediate number of institutional constraints offers the optimal mix of flexibility and policy stability to minimize the likelihood of crises ("U-Shaped" Model). This optimal point moves towards flexility (fewer veto players) amidst volatile global conditions, and towards stability (more veto players) amidst stable global conditions (Inertia Model). The only veto player model the econometric analysis does not find empirical support for is the Collective Action Approach. Given this analysis is restricted to developing economies and emerging markets, one should be cautious attempting to generalize these results and apply them to industrial economies.

6.1 *Indirect Effects* — The above econometric analysis finds more veto players reduce inflation and increase economic growth. In more constrained political systems, policymakers can credibly commit to far-sighted economic policies – removing the ability (and therefore the temptation) to engage in short-term expansionary policies which may be destabilizing in the long-term (*e.g.* excessively expansionary fiscal and/or monetary policy). These political institutional constraints then offer an institutional structure that facilitates stable economic conditions. By contributing to stable economic conditions, veto players indirectly *reduce* the likelihood of banking crises. By finding more veto players strengthen economic fundamentals, the empirical analysis supports the Commitment Approach to Veto Player Theory.

More veto players are also found to increase credit growth. In more constrained political systems, policymakers are relatively constrained from engaging in expansionary policies. As such, policymakers instead turn towards pushing credit growth as a mechanism through which to increase consumption among lower-income constituents. More of these institutional constraints increase credit growth, indirectly *increasing* the likelihood of banking crises. By finding more veto players increase credit growth, this econometric analysis supports the link between credit growth and institutional constraints proposed by Rajan. This effect serves to negate a portion – but not all – of the indirect effect veto players have in reducing the likelihood of banking crises by increasing economic growth and reducing inflation.

A one standard deviation increase in veto players was found to reduce the probability of crises by approximately .13 to .17 percentage points in the short-run and .19 to 56 percentage points in the long-run through this combination of indirect causal mechanisms. These marginal effects are much larger in "edge" conditions where crises are relatively more likely (the representative values of the VIX are high). These effects are not unsubstantial relative to the unconditional probability of banking crises of approximately 3%.

It is plausible these indirect effects of institutional constraints on the likelihood of crises are conditional upon other political, institutional, or economic factors. Six moderators test for unobserved heterogeneity in these indirect effects; this is reported in Appendix A. These moderators are financial development, financial liberalization, democracy, central bank independence, left wing government, and economic development. While the effect of veto players on the mediator is found to be conditional upon some of these factors for some of mediators, and the effect of the mediators on banking crises is found to be conditional upon some of these factors, no moderated mediated effect is found to be significantly different from the mediated effect. Further, all moderators except democracy are found to increase the mediated effect. These results indicate any unobserved heterogeneity likely leads this estimated effect to be smaller than the real indirect effect of veto players on the likelihood of crises.

The empirical analysis also finds more veto players reduce volatility in economic growth; this is reported B. By raising the marginal effect of the prior observation of economic growth on the present observation, veto players increase inertia in economic fundamentals through this "adjustment" effect. When fundamentals or shocks necessitate policy adjustment, this inertia may increase the likelihood of a crisis. With strong fundamentals, this inertia can "lock in" low-risk conditions and reduce the likelihood of a crisis. The overall effect of veto players on the likelihood of crises through increasing inertia in economic growth is contingent upon initial conditions, but this estimation supports the Inertia Model of veto players.

6.2 Conditional Direct Effects: Veto Players — With few veto players, more of these institutional constraints directly *reduce* the probability of banking crises. With many veto players, more of these institutional constraints *increase* the probability of banking crises. Often banking crises are result of a shift in asset/collateral values generating solvency issues, or bank-run type events generating liquidity shocks. On the former extreme (few veto players) quickly shifting policy may generate political shocks to asset values, raising the probability of a crisis. On the latter extreme, countries with excessively rigid political systems may fail to assure markets they can overcome the collective action problems required to protect a stressed banking sector – raising the probability of banking crises as this leads markets to engage in bank-run/fire sale type behavior at lower thresholds of vulnerability. This creates a U-shaped relationship between veto players and the likelihood of banking crises through this direct causal mechanism; this supports the U-shaped model.

These direct effects of veto players on the likelihood of banking crises are also conditional upon

shocks to the global financial system (proxied by changes in the VIX). More veto players reduce the probability of crises in *stable* conditions (a falling VIX) by increasing policy stability – minimizing policy shocks that may shift collateral values and stress the banking system. More veto players increase the probability a crises in *volatile* conditions (a rising VIX) by impeding policy responses that may be necessary to protect a stressed banking sector after these shocks. This weakens market confidence in financial stability, leading to an increased likelihood of bank-runs/fire-sales associated with global volatility when there are more of these institutional constraints. This is an application of the Inertia Model.

It is possible to synthesize these two direct causal mechanisms. The optimal number of veto players in the U-shaped model (that which offers the best mix of stability and flexibility to generate market confidence) can be thought of as shifting towards fewer veto players (flexibility) in relatively volatile global conditions, and shifting towards more veto players (stability) in relatively tranquil global conditions. This allows one to conceptualize the direct effects of the Inertia and U-Shaped models as one single conditional non-linear direct causal effect of veto players on the likelihood of banking crises.

6.3 Conditional Effects: VIX — The econometric analysis also reveals the effect of global shocks (proxied by changes in the VIX) on the probability of banking crises is conditional upon the number of veto players. Increased risk and volatility reduce market confidence in the stability of a country's financial system. This potentially sparks the bank-runs/fire-sales that catalyze crises. If markets expect effective policy responses to this risk and volatility, confidence in the system may be maintained, potentially avoiding these bank-runs and fire-sales – and therefore the crisis. The presence of a political system that *can* react quickly to changing conditions (*i.e.* one with few veto players) can help maintain this market confidence – mitigating the effect of this global volatility on the likelihood of banking crises. The presence of a political system that *cannot* react quickly to changing conditions (one with many veto players) can quickly lead to a loss of market confidence in the country's financial stability as global risk rises. When markets have little faith policymakers can quickly react to protect a stressed financial system, they will tend to engage in the sell-offs/fire-sales that spark crises. The presence of relatively many veto players then *magnifies* the effect of global volatility on the likelihood of banking crises. Global shocks have a larger effect on the likelihood of banking crises if markets believe institutional constraints may impede policy responses to these global shocks.

6.4 Future Work — Conceivably, a variety of other political economy factors may influence the likelihood of financial crises through similarly diverse causal mechanisms. Central bank independence, for example, may reduce the likelihood of currency crises *indirectly* through reducing inflation, while also reducing it *directly* by inspiring market confidence, which lessens the risk of speculative attacks. A standard econometric analysis attempting to estimate the effect of central bank independence on the likelihood of currency crises – if it controls for inflation – would mask

the indirect causal pathway. However, choosing not to control for inflation leaves the analysis open to significant omitted variable bias. This mediated approach allows for an analysis of both causal pathways without increasing the risk of omitted variable bias. This same general argument could be made for a variety of political economy factors and the influence of these factors upon a variety of types of financial crises. Given the results of the econometric analysis of this paper suggested estimations accounting for mediated effects may substantially differ from estimations that do not, this suggests a broad agenda for future empirical work on the political economy of crises in updating the extant literature with this more robust methodological approach.

6.5 Conclusions — The econometric analysis reveals a complex combination of links between veto players and the likelihood of banking crises. Through indirect causal mechanisms, the econometric analysis finds support for the Commitment Approach, the Inertia Approach, and Rajan's (2010) proposal that policymakers push credit growth as a tool to boost consumption when institutional constraints impede explicit redistribution. As proposed by the Commitment Approach, more veto players tends to reduce inflation and increase economic growth, indirectly *reducing* the likelihood of banking crises. However, (as proposed by Rajan) when these political constraints reduce the ability of policymakers to increase consumption levels through social spending, policymakers often instead turn to increasing credit growth as a tool to boost consumption. This indirectly *increases* the likelihood of banking crises. The results of the econometric analysis do not yield support for the Collective Action Approach – that more institutional constraints generate an expansionary bias in economic policies.

The results suggest the Inertia Approach and the "U-Shaped" model both have merit in explaining the effect of veto players on the likelihood of banking crises through direct causal mechanisms. By reducing policy volatility, more veto players *reduce* the likelihood of banking crises amidst stable global conditions – likely by reducing the likelihood of policy shocks. However, amidst volatile global conditions that often require decisive policy actions to maintain market confidence, these institutional constraints *increase* the likelihood of crises. This displays the conditional behavior of the inertial model that relates veto players to banking crises. The final veto player model supported by this empirical analysis is the "U-shaped" model. With very few veto players, policymakers may not be able to generate confidence in policy stability. However, with very many veto players, policymakers may be too constrained to react to changing economic conditions, again failing to generate market confidence at this other extreme. In this context, an intermediate number of veto players offers the optional mix of flexibility and stability to inspire market confidence, thereby minimizing the likelihood of banking crises – leading to a u-shaped relationship between the number of veto players and the likelihood of a banking crisis. It is possible to synthesize this combination of effects, and conceptualize the Inertia Model as modifying the U-Shaped model – shifting the trough of the "U" towards fewer veto players when global volatility is high, and towards more veto players when global volatility is low.

Disentangling this complex web of causal relationships is achievable through the use of econo-

metric moderated multiple-mediation. Using this method, the econometric analysis uncovered causal effects along pathways that could not be estimated in a standard regression framework. The results of this analysis suggests estimations accounting for these indirect causal pathways may be substantially different than those estimated in a standard regression framework. This suggests productive avenues for future research in applying this methodology to past studies in the literature on the political economy of financial crises.

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Appendices

A Moderated Mediated Marginal Effects

Valid estimates of mediation require independence in observation level individual stage effects. This condition is tested with interaction terms between veto players and the moderator in the

Imbalance regressions, and the mediator and moderator in the Reactions regression (Preacher et al 2007). I will utilize two methods to test for moderation in order to test whether the assumption of cross stage independence is appropriate. The 1st second evaluates moderation effects at individual stages – with a statistically significant coefficient on the interaction term at both stages required for a moderation effect (Fairchild and McKinnon 2009). The second method (outlined in Preacher et al 2007) evaluates whether there are differences between the entirety of the mediated effect when controlling for moderation. The former analyzes each mediator and stage separately to evaluate if there is a moderated effect – but has been shown to still be a powerful test of moderation. The latter explicitly searches for moderation in the entirety of the mediated effect, but may struggle to identify moderation in specific variables due to imprecise coefficients for other variables/stages. I consider both.

A moderation effect suggests unobserved heterogeneity, indicating the assumption of cross stage independence is inappropriate. For these tests, fixed effects least squares is used in the Imbalance regressions to avoid instrumentation issues related to the use of the System GMM. As the relevant metric is relative mediated marginal effects with and without moderation – or the presence of a statistically significant interaction term at either stage – rather than the raw value of the mediated effect, Nickell bias is a less important concern. Figure **??** gives an illustration of the estimated paths. Pathways where mediation is tested are highlighted and in **bold**[37]. These estimations take place for six moderators, so parameter values are not reported. Once a moderator variable is included in the Reactions regressions the specification[38] becomes:

$$p(\text{crisis}) = f(x_{\text{v}}\gamma + x_d\psi + x_{\text{c}}\beta + u) \tag{23}$$

With $x_{\text{v}} = [v_{\text{vp}},\ v_{\text{vp}}^2\ , v_{\text{vp}} \cdot x_{\Delta\text{VIX}}]$ a vector of veto player terms, $x_d = [m_{\text{inf}},\ m_{\text{inf}} \cdot d,\ m_{\text{gdp}},\ m_{\text{gdp}} \cdot d,\ m_{\text{cdt}},\ m_{\text{cdt}} \cdot d]$ the terms involved in moderated mediation, and x_{c} the control variables. d is the moderator variable. The coefficients are γ (the veto player coefficients), ψ (the moderated mediator coefficients), and β (the control coefficients).

The moderated mediated marginal effect is calculated as:

$$\frac{\partial\overline{p(c)}}{\partial v} = \frac{1}{n}\sum_{i=1}^{n}\hat{p}_i(1-\hat{p}_i)\cdot(z_o) \tag{24}$$

With:

$$z_o = (j_o \cdot \hat{\psi}) \tag{25}$$

The calculation of j_o is more complex than the equivalent vector in prior sections. This gradient on the interior of the logistic function for an average moderated mediated marginal effect is:

$$\begin{aligned} j_o = [&\hat{\phi}_{3,\text{inf}} + \hat{\phi}_{1,\text{inf}} \cdot d_i,\ (\hat{\phi}_{3,\text{inf}} + \hat{\phi}_{1,\text{inf}} \cdot d_i) \cdot d_i, \\ &\hat{\phi}_{3,\text{gdp}} + \hat{\phi}_{1,\text{gdp}} \cdot d_i,\ (\hat{\phi}_{3,\text{gdp}} + \hat{\phi}_{1,\text{gdp}} \cdot d_i) \cdot d_i, \\ &\hat{\phi}_{3,\text{cdt}} + \hat{\phi}_{1,\text{cdt}} \cdot d_i,\ (\hat{\phi}_{3,\text{cdt}} + \hat{\phi}_{1,\text{cdt}} \cdot d_i) \cdot d_i] \end{aligned} \tag{26}$$

[37] F.X. Reserves is not included as I did not find that it mediated the effect of Veto Players in prior estimations.
[38] For parsimony notation is simplified from the more rigorous explanation in Section 3.3.

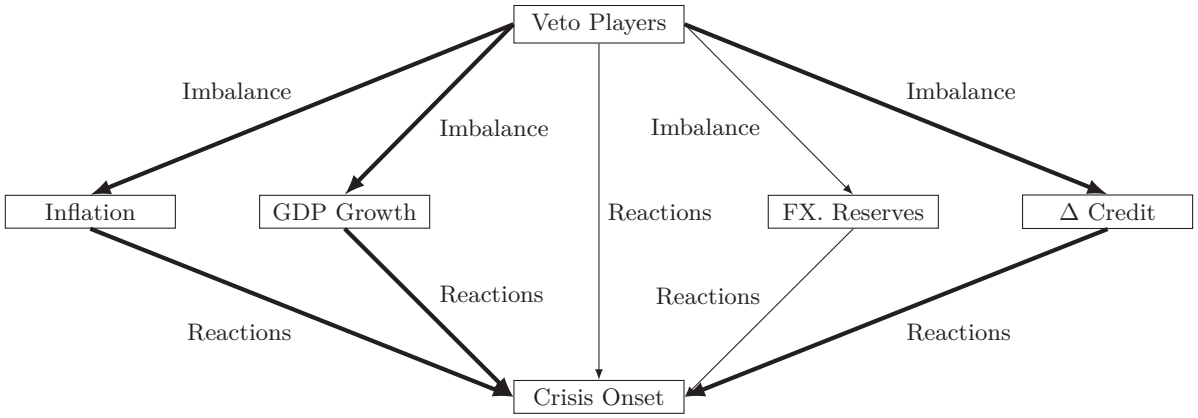


Figure 9: Moderated Mediated Marginal Effects

While the calculation of the direct effects would be the same as in Section 4.1, the indirect effect marginal effect of v on the interior of the logit function is now j_o, using the estimated values of $\hat{\phi}_{3j}$, $\hat{\phi}_{1j}$, and the observed value of d, from Equation 3 in the imbalance section. This gives the marginal effect of an increase in veto players on the mediator in the first stage estimation. This term alone is in the element of the gradient multiplied by the coefficient of the linear terms of the mediators, and is multiplied by the value of the moderator d again in the term multiplied by the coefficient of the interaction terms. This gives the marginal effect of an increase in veto players (conditional on the moderator) for each mediator variable, with the marginal effect of *that* term on this function conditional on the moderator (Figure 16[39]). If the moderated mediated marginal effect is statistically different than the mediated marginal effect while controlling for the moderator variable in both stages, d moderates the mediated effect[40].

Using first the method of Fairchild and McKinnon (2009) to test for moderation, I simply test whether the interaction term between veto players and the potential moderator in the 1st stage, and the mediator and the potential moderator in the second stage, are both statistically significant. Table 7 reports this estimation for six potential moderators[41]. The first two rows for each moderator will indicate if the interaction term at that stage increases or decreases in absolute value the effect of veto players or the mediator at that stage. If the coefficient cannot be distinguished from zero the effect is listed "N/A". The final row for moderator will indicate whether or not moderation has occurred during this test, and if so, whether this moderation (that is present as unobserved heterogeneity in the estimated mediated effects) indicates the real effect mediated effect is larger or smaller than the estimated mediated effect[42]. The direction of this

[39] path ending in another pathway indicate the variable conditions the marginal effects of another – *i.e.* the variable the path ending on another path originates is interacted with the variable

[40] The standard error of this marginal effect is calculated similar to in Sections 5.2 and 5.3, though using delta method variances of the 1st stage estimation in the diagonal elements of the variance covariance matrix.

[41] Full data descriptions in Appendix C.

[42] For example: For economic growth and the financial development moderator, the negative sign on the 1st stage interaction term indicates the marginal effect of veto players on economic growth is smaller in less financially developed economies. The positive coefficient in the second stage indicates the marginal effect of the mediator (growth) in reducing the likelihood of crises is smaller more financially developed economies. This indicates the effect

effect is indicated by $|\Delta| < 0$, or $|\Delta| > 0$. If the two stages have the same (opposite) signs this indicates the real mediated effect will be larger (smaller) for that variable than was estimated in the body of the paper once the moderator is accounted for.

Table 5: Testing for Moderation: Individual Stages and Mediators

Moderator	Stage	Inflation	Δ Credit Growth	GDP Growth
Financial Development	1st	N/A	N/A	$\|\Delta\| < 0$
	2nd	$\|\Delta\| > 0$	N/A	$\|\Delta\| < 0$
	Moderation:	No	No	Increase
Central Bank Independence	1st	N/A	N/A	N/A
	2nd	N/A	N/A	N/A
	Moderation:	No	No	No
Democracy	1st	N/A	$\|\Delta\| < 0$	N/A
	2nd	N/A	$\|\Delta\| > 0$	$\|\Delta\| > 0$
	Moderation:	No	Decrease	N/A
Fixed Exchange Rate	1st	N/A	N/A	N/A
	2nd	N/A	N/A	N/A
	Moderation:	No	No	No
Left Wing Gov.	1st	N/A	N/A	$\|\Delta\| > 0$
	2nd	N/A	N/A	N/A
	Moderation:	No	No	No
Financial Liberalization	1st	N/A	N/A	$\|\Delta\| < 0$
	2nd	N/A	N/A	N/A
	Moderation:	No	No	No

The first row for each variable indicates whether the moderator increases or decreases (in absolute value) the effect of the veto players on the mediator variable. The second row indicates whether the moderator increases or deceases the effect of the mediator on the likelihood of a crisis. If the effect of the moderator on the marginal effect of term it's interacted with is not statistically different than zero the effect is listed as N/A. For moderator to occur there has to be a statistically significant effect of the moderator on the marginal effect of the independent variable in the first stage, and the mediator in the second stage. The final row indicates if moderation has occurred, and if so, whether this indicates the real mediated effect is larger, or smaller, than the estimated mediated effect.

Using the method outlined by Preacher et al (2007), I test to see if there is a statistically significant difference between the mediated effect and the mediated effect with moderation. This is reported in Table 8. The first column shows the mediated effect with moderation. The second shows the mediated effect without moderation. The third reports if these values are statistically different. Fourth is the ratio of the values, a multiplier of estimated mediated effects that can be applied to mediated effects from prior sections. "N/A" indicates the mediated effect is not significant.

A ratio of moderated mediated to mediated marginal effects > 1 indicates moderation increases (in absolute value) the mediated effect (and vice versa). This method of testing for moderation is conceptually similar to the method reported above – except the mediated effect of the combination

of the 1st stage will be relatively small (large) when the effect of the 2nd stage is relatively small (large), meaning (due to the multiplicative effect of mediation) the aggregate effect of mediation will rise once this is accounted for.

Table 6: Average Moderated Mediated Marginal Effects

Moderator	Moderated	Mediated	Difference	Ratio
Financial Development	-.0031	-.0059	No	.51
	(.2963)	(.0049)		
Central Bank Independence	-.0007	-.0053	No	.13
	(.0508)	(.0050)		
Democracy	.0087	-.0043	No	-2.02
	(.0968)	(.0042)		
Fixed Exchange Rate	.0043	-.0048	No	-.89
	(.0461)	(.0052)		
Left Wing Gov.	-.0033	-.0058	No	.56
	(.0708)	(.0044)		
Financial Liberalization	.0202	.0071	No	2.87
	(.3702)	(.0056)		

Delta method standard errors in parentheses

of all mediators is calculated and without moderation (but while controlling for the moderator variable) and if the two are statistically different, I infer there is moderation.

Though the point estimates of the mediated effect are different when controlling for moderation, for no moderates is there a statistically significant different between the mediated and the moderated mediated effect. Using this method outlined by Preacher et al (2007), I don't infer there is cross stage heterogeneity. Using the method outlined by Fairchild and McKinnon (2009), two of six potential moderators are found to moderate one each of the three mediator variables. Based on these results, I decide to conduct my analysis under the assumption of cross-stage independence.

B Adjustment Effects

B.1 *Adjustment Estimation* — More veto players make policy change more difficult. When economic policy is static, economic conditions exhibit less variation over time. A shock (or conversely, strong economic fundamentals) in a period will have a larger effect on the following periods when more veto players increase policy inertia. If a shock or vulnerability in economic fundamentals affects the likelihood of a crisis, a shock or state of economic conditions in a given period will have a larger effect on the probability of a crisis in the following periods with more veto players "locking in" these conditions.

I take multifaceted approach to estimating this relationship. In my first set of estimations I regress the panel standard deviation of each mediator variable on the panel mean of veto players. This estimates the effect of an increase in the panel mean of veto players on the standard deviation of the panel. The results of this estimation are shown in Table 7. Countries with higher average amounts of veto players do have a lower panel standard deviation for all variables, indicating inertia in these economic fundamentals is rising in political constraints. This effect is statistically

Table 7: Between Effects: Veto Players and σ_m

Standard Deviation of:	Infl.	FX. Res	Ex. Rate	Δ Credit	Growth
Veto Players	-0.0404	-0.682***	-0.532	-0.0404	-3.697***
	(0.204)	(0.163)	(0.938)	(0.0517)	(1.175)
Constant	1.021***	0.832***	1.848***	0.206***	5.211***
	(0.0797)	(0.0623)	(0.364)	(0.0202)	(0.457)
Number of Countries	112	110	113	112	110

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

significant for economic growth and foreign exchange reserve coverage. These results show some support for the Inertia Approach.

However, due to dynamic factors (*i.e.* many individual observations of the independent variable used in the this calculation are observed after components used in the calculation of the dependent variable) a more robust estimation is necessary. I do this with a FELS joint dynamic panel data estimation[43] that allows the autoregressive coefficient to vary conditional upon the amount of veto players. The veto player variable (v) is interacted with the lagged dependent variable (m_{it-1}) to estimate inertia in each mediator conditional on veto players. The regressions are specified:

$$m_{it} = +\lambda_3 m_{it-1} + \alpha_1 m_{it-1} v_{it} + \alpha_2 v_{it} + a_i + \epsilon_{it} \tag{27}$$

A larger marginal effect of the prior observation of the mediator on the current observation indicates a current state more dependent on prior states (*i.e.* greater inertia). The marginal effect of the lagged dependent variable is now:

$$\frac{\partial m_{it}}{\partial m_{it-1}} = (\lambda_3 + \alpha_1 v_{it}) \tag{28}$$

Based on the Inertia Model, there should be more policy inertia with more veto players. Formally:

Hypothesis 5 (Inertia Model) *The veto player interaction term (α_{1j}) will be statistically significant and positive*

A value of $\alpha_1 > 0$ indicates the marginal effect of m_{it-1} on m_{it} (*i.e.* inertia) is larger with more veto players, as $(\lambda_3 + \alpha_1 v)$ is increasing in v. This positive coefficient shows greater inertia in the mediator variable with more veto players. The null and the research hypotheses are:

$$H_0 : \alpha_1 \leq 0 \tag{29}$$

$$H_1 : \alpha_1 > 0 \tag{30}$$

When the null is rejected there is evidence inertia in economic fundamentals is increasing in the number of veto players. If the empirical analysis supports this hypothesis the interpretation will be

[43] I choose to report the joint estimation without dealing with the Nickell-Bias as the System GMM estimations with this interaction term are extremely sensitive to specification.

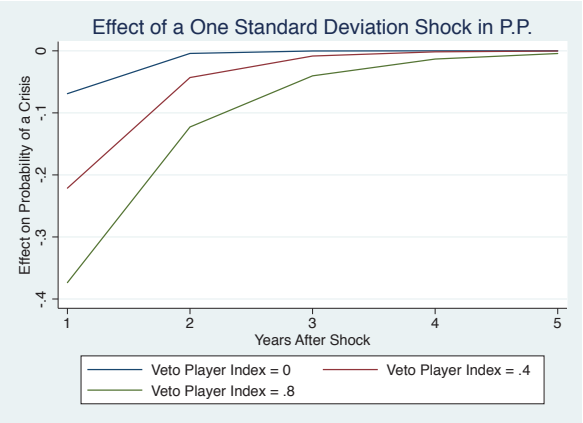
Table 8: Adjustment: Conditional Autoregressive Effect

Variable	Infl.	FX. Res	Ex. Rate	Δ Credit	Growth
Lagged Dependent Variable	.498***	.790***	.985***	.033	.061***
	(0.042)	(0.034)	(0.016)	(0.037)	(0.022)
Lagged D.V.*V.P	.013	-.020	.046	.037	.335*
	(0.182)	(0.114)	(0.031)	(0.153)	(0.181)
Veto Players	-.230*	.051	-.171*	.044**	2.359**
	(0.127)	(0.049)	(0.090)	(0.023)	(0.959)

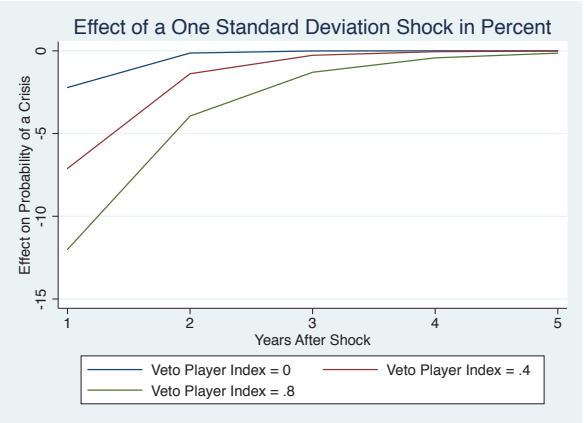
Standard errors in parentheses

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

Figure 10: One σ Shock to GDP Growth on the Probability of Banking Crises



Percentage Points



Percent

highly conditional. If vulnerabilities in economic fundamentals necessitate adjustment, more veto players will increase the likelihood of crises. If economic fundamentals are strong, more inertia will "lock-in" these conditions, reducing the likelihood of crises.

Selected results are shown in Table 8. For three mediator variables (inflation, foreign exchange reserve coverage, and credit growth) there does not appear to be any significant change in the autoregressive coefficient conditional upon the amount of veto players. This does not support the inertia model. However, we do find some evidence for exchange rates and economic growth. The interaction term between the lagged dependent variable and the veto player variable for the exchange rate is positive and narrowly misses statistical significance at the 10% level. For economic growth, this term is statistically significant and fairly large economically. Moving from the 25th percentile of the veto player variable (0) to the 80th percentile (.68), the autoregressive coefficient will rise from .056 to .31, a policy-relevant increase in inertia.

B.2 Adjustment Marginal Effects — This section evaluates veto players' impact on the probability of crises by conditioning inertia in the mediators. Adjustment effects condition each individual mediated effect in subsequent periods after a shock (using the marginal effect of the

previous observation from Equation 6). Increases in each mediator affect the probability of crises, and higher levels of veto players increase the inertia in each mediator. For this adjustment effect to take place requires a statistically significant coefficient for the interaction between the lagged dependent variable and veto players in the adjustment estimations, and a statistically significant effect of the mediator on the likelihood of crises in the reactions estimations. Economic growth is the only mediator meeting both conditions. The AMERV of a one unit positive shock to economic growth is calculated as:

$$\frac{\partial \overline{p(c)_{t+k}}}{\partial m_{j,t}} = \frac{1}{n}\Big[\sum_{i=1}^{n} \hat{p}_i(1-\hat{p}_i)\cdot(\hat{\pi}_j\cdot(\hat{\lambda}_{3j}+\hat{\alpha}_{1j}v)^{k-1})\Big] \tag{31}$$

With $(\hat{\lambda}_{3j}+\hat{\alpha}_{1j}v)$ the marginal effect on the probability of crises $p(c)$[44] of the prior observation of the mediator, k the number of lags, and π the mediator coefficient in the Reactions regression. Selecting a representative value of v and a number of lags ($k \geq 1$), Equation 27 will yield the change in the probability of crises from a one unit shock in the mediator variable. Figure 9 reports this effect (in both percentage points, and percent – relative to the unconditional probability of a banking crisis) of a one standard deviation shock to growth at representative time periods, and values of veto players at approximately the mean and one standard deviation above/below. With more veto players future mediator values are more dependent upon present values. If a country is exhibiting weakness in these fundamentals, the higher constraints will increase the probability of crises. If a country is in a strong position with respect to the fundamentals, more veto players reduce the probability of crises by maintaining these strong fundamentals year to year. With more veto players increasing this inertia, a shock impacting fundamentals in the present period has a relatively larger effect later.

C Data Description/Sources

Panels run from 1990 to 2012, and include all developing economies and emerging markets in the IMF's systemic crisis database – though they are unbalanced due to missing observations. Summary statistics for the observations used in each specification are reported in the relevant table. For the crisis regressions, the summary statistics of the variables used are reported in Table 9. I report the number of observations, the mean, the standard deviation, and the 10th and 90th percentiles for each variable.

The crisis variable is the banking crisis indicator from the IMF's systemic crisis database, coded by Laevan and Valencia as a 1 in the year the crisis begins if two conditions are met: Significant signs of distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations), and significant policy intervention measures in response to significant losses in the banking system (2012). Observations one and two years after the onset of a crisis are dropped from the dataset. The data used in the full specification of the probability

[44] Subscripts were previously omitted from this term as the logit estimator ignores the panel structure of the data.

model regressions contains 59 crisis instances. The variable of interest (Veto Players) is political constraints (POLCON – V) from Heinzs (2006). It is coded based on data available on January 1st of the given year, with higher values corresponding with more institutional or partisan constraints (after adjusting for similarity of policy preference) – hence the choice to not include it as a lagged term.

The three variables tested through mediation analysis are inflation, a three year rolling average of growth, and credit growth. The first of these, inflation from the World Bank, and is specified as a log (World Bank 2016). The next of these is a three year rolling average of real GDP per capita growth, generated from the Penn World Tables (Summers and Heston 2016). The final mediator, generated from the World Bank's WDI, is real credit growth, specified as log-difference in real credit to the private sector as a percentage of GDP. All are lagged to avoid endogeneity, and account for fundamentals building into a crisis.

The primary measure accounting for shocks is the VIX, a measure of international financial market risk and volatility. The VIX is included as a differenced term (labeled VIX) instead of as a regular term since the operative mechanism is likely to be the increased risk's negative effect on asset values (and therefore balance sheets), rather than the higher risk's effect on the likelihood of speculative attacks as in Currency Crises. As changes in the VIX are a proxy for a global shock, this is the measurement indicating the effect of international shocks on generating stress in the banking sector.

Control variables representing economic fundamentals are next on the list. The first control variable is is the (logged) ratio of F.X. reserves to the M2, labeled "Reserve R.", from the World Bank's World Development Indicators (2016). Logged Real GDP Per Capita is generated from the Penn World Tables, to account for the effect of levels of development on the probability of crises (Summers and Heston 2016). A measure of exchange rate undervaluation from Rodrik is generated by estimating the deviation from purchasing power parity after accounting for Balassa-Samuelson of a country's real effective exchange rate, also constructed using data from the Penn World Tables (2016). All are lagged.

The variables included in alternative specifications are the following. For the political specification political risk from the International Country Risk Guide and Democracy (Dem) generated from the Polity IV project (coded as a 1 if the Polity variable is larger than a 4) are added to the base model (2016)(2010). The monetary policy specification includes C.B. Independence, a measure of Central Bank Independence from Garriga, and the logged change in the real interest rate from the WDI. (2016). For the financial alternative specification the log of Credit as a portion of GDP, and an index of Financial Development from Svirydzenka at the IMF, and an index of financial liberalization are added in the financial specification (2016)(Abiad 2008). The final alternative specification includes regulatory variables used in the construction of of the financial liberalization variable.

For the Imbalance and Adjustment sections, summary statistics are listed in Table **??**. Veto Pkayers, logged real GDP per capita, the financial liberalization variable, the real effective exchange rate undervaluation, the log of inflation, credit growth, GDP per capita growth, and the F.X. reserve to M2 ratio are all under the same label and are the same variable – only with more observations now that this table is the full dataset rather than just what was used in the Banking Crisis regressions (some may be included as a level rather than a difference). Due to missing observations for certain variables, panels are unbalanced.

New variables included are M2 Growth, also from the World Bank, is measured as a the percent change in the M2 from the previous year (2016). A variable measuring openness, Trade as a percentage of GDP is also from the World Bank and is tallied as imports plus exports divided by GDP. The next variables added is manufacturing value added, also from the World Bank and tallied as a percentage of GDP. To measure inflationary pressure due to fiscal deficits, a measure of fiscal deficits as a portion of the M2 is included from the World Bank as well. Lastly, a term from Reinhart and Rogoff's exchange rate regime dataset was generated to create a dummy variable equalling a one if a country has a Fixed Exchange Rate (HFix)(2016).

D Instrumentation

With the exception of the exchange rate undervaluation measure, both the full set and each individual instrument pass all standard postestimation tests indicating exogeneity and 1st order (but not second) serial correlation. The two step estimation process, robust standard errors, and orthogonal transformation are used. All GMM instruments are collapsed.

Inflation – Lags 2-5 of logged inflation is specified as GMM instruments. Lags 2-3 Growth in the M2 and the logged real interest rate are specified as collapsed GMM instruments. The change in the ratio of claims on the central government to the M2, manufacturing value added, and logged Real GDP Per Capita are specified as standard instrumental variables. First lags did not pass tests of exogeneity. Total instrument count is 12, with a standard regression testing instrument strength showing an R squared of .09, with all but four of the individually instruments statistically significant.

Reserve R. – The dependent variable and political constraints are specified as GMM instruments for lags 1 – 6 with the instrument matrix collapsed, M2 Growth is specified as a GMM instrument in the first and second lag also with the instrument matrix collapsed. Polcon is specified as a GMM instrument in lags 1 – 5. The differenced logged Real Interest Rate is specified as a standard instrument. Total instrument count is 16.

Credit Growth – The dependent variable is specified as GMM instrument using lags 2 through 6. M2 growth is specified as a GMM instrument using lags 2 through 4. The lag of logged GDP per capita is specified as a standard instrument.

Economic Growth – The dependent variable is specified as a a GMM limit using lags 2 through 6. The lag of logged GDP per capita is specified as a standard instrument.

Exchange Rate Undervaluation – The dependent variable is specified as a GMM instrument using lags 2 through 8. I was unable to construct a lag structure passing exogeneity tests.

E Tables

Table 9: Summary Statistics: Crisis Regressions

VARIABLES	N	mean	σ	10th pct.	90th pct.
Banking	1,412	0.0347	0.183	49 Crises	
Veto Players	1,412	0.390	0.281	0	0.753
Δ VIX	1,412	0.770	5.181	-5.310	5.920
ln(FX. Reserves/M2)	1,412	-1.175	0.847	-2.103	-0.234
ln(Inflation)	1,412	1.968	1.289	0.569	3.460
Δ Credit	1,412	0.0320	0.219	-0.164	0.245
ln(Output Per Capita)	1,412	8.338	0.988	6.967	9.473
Ex. Rate Undervaluation	1,412	1.577	3.145	-2.013	5.965
Δ Output (3RA)	1,412	2.710	5.321	-1.831	7.400
Financial Liberalization	772	0.622	0.195	0.369	0.869
ln(Credit/GDP)	1,412	3.009	0.911	1.835	4.132
Financial Development	1,398	0.206	0.137	0.0711	0.397
C.B. Independence	1,316	0.538	0.201	0.268	0.802
ln(Interest Rate)	873	-0.0774	0.799	-0.899	0.726
Political Risk	1,170	61.90	11.13	47	75
Democracy	1,373	0.599	0.490	0	1
Countries	104				

All variables except Banking Crisis, Veto Players, and the VIX lagged

Table 10: Summary Statistics: Imbalances and Adjustment

VARIABLES	N	mean	σ	10th pct.	90th pct.
Veto Players	2,417	0.360	0.288	0	0.751
M2 Growth	2,273	44.11	310.5	3.363	45.34
Trade/GDP	2,339	79.17	43.37	35.86	131.0
Manufact. V.A.	2,129	15.11	7.459	5.976	24.66
Deficit/M2	2,252	12.41	139.2	-11.68	21.14
US 3 Year Rate	2,417	4.591	1.904	1.930	6.680
ln(Inflation)	2,169	2.069	1.384	0.627	3.533
Dummy: Fixed Rate	1,983	0.349	0.477	0	1
Growth (3 year R.A.)	1,814	2.102	5.817	-2.820	7.199
C.B. Independence	2,214	0.548	0.193	0.295	0.801
ln(Real GDP per Capita)	2,417	8.357	1.040	6.958	9.599
ln(Real Ex. Rate)	2,417	1.749	3.409	-2.113	6.151
ln(F.X. Reserves/M2)	2,225	-1.168	0.927	-2.097	-0.210
Δ ln(Real Int. Rate)	1,314	-0.0384	0.903	-0.908	0.851
Real Credit Growth	2,157	0.0270	0.221	-0.162	0.234
Countries	111	111	111	111	111

Table 11: Imbalances: FELS with Controls

VARIABLES	Inflation	FX. Res	EX. Rate	Δ Credit	Growth
Lagged Dep. Var	0.428***	0.698***	0.807***	0.0114	-0.0570
	(0.0541)	(0.0444)	(0.0224)	(0.0383)	(0.0883)
Veto Players	-0.0308	0.0112	0.0124	0.0354	1.155
	(0.142)	(0.0776)	(0.0492)	(0.0308)	(1.235)
Lagged Output	-0.257**	0.170	-0.189***	0.0503*	-1.569
	(0.105)	(0.103)	(0.0350)	(0.0257)	(1.992)
C.B. Independence	-0.625*	-0.116	-0.108	-0.0990	0.940
	(0.321)	(0.103)	(0.0822)	(0.0715)	(2.197)
Fixed Ex. Rate	0.0197	-0.00158	0.0536*	-0.0127	-0.0704
	(0.101)	(0.0386)	(0.0322)	(0.0211)	(0.528)
Trade/GDP	-0.000352	0.000884	-0.000247	0.000798***	0.0863***
	(0.00185)	(0.000969)	(0.000366)	(0.000197)	(0.0303)
Global Interest Rate		0.00491	0.00745		
		(0.0105)	(0.00587)		
Constant	3.624***	-1.782**	2.005***	-0.403*	8.497
	(0.814)	(0.878)	(0.322)	(0.208)	(15.34)
Observations	1,548	1,650	1,739	1,659	1,219
R-squared	0.275	0.561	0.857	0.013	0.186
Number of Country	103	101	104	103	100

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12: Veto Players and the Standard Deviation of Fundamentals

Standard Deviation of	Infl.	FX. Res	Ex. Rate	Δ Credit	Growth
Veto Players	-0.0404	-0.682***	-0.532	-0.0404	-3.697***
	(0.204)	(0.163)	(0.938)	(0.0517)	(1.175)
Constant	1.021***	0.832***	1.848***	0.206***	5.211***
	(0.0797)	(0.0623)	(0.364)	(0.0202)	(0.457)
Observations	3,958	3,937	3,979	3,958	3,915
R-squared	0.000	0.140	0.003	0.006	0.084
Number of Countries	112	110	113	112	110

Standard errors in parentheses

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

Table 13: Adjustment: Conditional Autoregressive Effect

Standard Deviation of:	Infl.	FX. Res	Ex. Rate	Δ Credit	Growth
Lagged Dependent Variable	.498***	.788***	.983***	.048	.056*
	(0.042)	(0.034)	(0.017)	(0.038)	(0.029)
Lagged D.V.*V.P	-.020	-.017	.053	.024	.373*
	(0.192)	(0.120)	(0.034)	(0.156)	(0.200)
Veto Players	-.227*	-.038	-.193**	.036*	1.827*
	(0.126)	(0.050)	(0.089)	(0.020)	(0.976)
Number of Countries	112	110	113	112	110

Standard errors in clustered by country

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

Table 14: Banking Crisis: Reactions

Variables	BASE	FULL	FIN.	FIN. REG.	MON.	POLS.
Veto Players		6.689***	-7.285***	-8.229***	-6.499**	-7.134***
		(1.927)	(2.377)	(2.776)	(2.712)	(2.610)
Veto Players Sq.		8.180***	9.330***	10.94***	7.319**	8.803***
		(2.516)	(3.353)	(3.780)	(3.261)	(2.879)
Veto Players*ΔVIX		0.159*	0.00513	-0.0813	0.147*	0.148
		(0.0864)	(0.223)	(0.211)	(0.0857)	(0.0996)
Inflation	0.284***	0.264***	0.192	-0.0450	0.554***	0.347***
	(0.0949)	(0.0914)	(0.133)	(0.158)	(0.198)	(0.109)
Reserve Adequacy	0.334**	0.250*	0.370**	0.175	0.136	0.360**
	(0.141)	(0.142)	(0.188)	(0.255)	(0.246)	(0.165)
Credit Growth	1.657***	1.512***	1.563*	1.089	2.087**	1.403***
	(0.578)	(0.551)	(0.831)	(0.677)	(0.870)	(0.493)
ΔVIX	0.0585***	-0.00573	0.173	0.199*	0.00298	0.0193
	(0.0227)	(0.0471)	(0.119)	(0.111)	(0.0426)	(0.0548)
Real Ex. Rate Und.	-0.0347	-0.0347	0.0287	0.0394	0.0605	-0.0344
	(0.0748)	(0.0662)	(0.0626)	(0.0524)	(0.0562)	(0.0778)
GDP Per Capita	0.166	0.165	0.372	0.460	0.618***	0.0229
	(0.181)	(0.153)	(0.236)	(0.353)	(0.219)	(0.182)
Economic Growth	-0.0571**	-0.0625**	-0.0932*	-0.0354	-0.0901*	-0.0568*
	(0.0262)	(0.0266)	(0.0476)	(0.0467)	(0.0509)	(0.0296)
Credit/GDP			0.532*			
			(0.274)			
Fin. Development			-2.048*			
			(1.175)			
Financial Liberalization			-1.730*			
			(0.945)			
Banking Supervision				-1.189***		
				(0.367)		
Credit Controls				-0.381		
				(0.248)		
Interest Rate Controls				-0.0625		
				(0.159)		
C.B. Independence					-1.037	
					(0.921)	
Real Interest Rate					0.417*	
					(0.218)	
Political Risk						0.0294
						(0.0222)
Democracy						-0.241
						(0.553)
Constant	-5.800***	-5.068***	-6.904***	-5.064	-8.690***	-5.917***
	(1.800)	(1.504)	(2.389)	(3.123)	(2.131)	(1.892)
Observations	1,412	1,412	758	693	827	1,163

Standard errors clustered by Country
*** p<0.01, ** p<0.05, * p<0.1

Table 15: Mediated Marginal Effects in Percentage Points

	Short-Run			Long-Term		
	System GMM Estimations					
Variable	Inflation	Δ Credit	Growth	Inflation	Δ Credit	Growth
Average Mediated Marginal Effect	-.093%	.163%	-.240%	-.464%	.193%	-.285%
	-.0032	.0057*	-.0083*	-.0160***	.0067**	-.0099*
	(.0021)	(.0031)	(.0050)	(.0057)	(.0034)	(.0055)
Representative Values	-.391%	.683%	-1.001%	-1.938%	.807%	-1.190%
	-.0135	.0236	-.0347	-.0672**	.0280*	-.0412*
	(.0091)	(.0144)	(.0222)	(.0277)	(.0159)	(.0247)
Combined Mediated Effect		-.169%			-.556%	
		-.0059			-.0193***	
		(.0056)			(.0073)	
	Joint FELS Estimations					
Variable	Inflation	Δ Credit	Growth	Inflation	Δ Credit	Growth
Average Mediated Marginal Effect	-.057%	.062%	-.132%	-.113%	.064%	-.144%
	-.0020	.0021	-.0045*	-.0039**	.0022	-.0050*
	(.0013)	(.0014)	(.0027)	(.0017)	(.0014)	(.0029)
Representative Values	-.237%	.258%	-.552%	-.473%	.268%	-.601%
	-.0082	.0090	-.0191	-.0164**	.0093	-.0208
	(.0055)	(.0061)	(.0123)	(.0079)	(.0062)	(.0129)
Combined Mediated Effect		-.127%			-.193%	
		-.0044			-.0067**	
		(.0032)			(.0033)	
Unconditional probability of crises = 3%						

The first set of estimations ("Average Mediated Marginal Effects") calculates the mediated effect of each variable across all observations, then reports the average of this value. The 1st row is rescaled to show the marginal effect of a one standard deviation higher amount of veto players individually for each mediator on the probability of a crisis in percentage points. The second set of estimations ("Representative Value") performs this calculation for when the change in the VIX is equal to 12, and the veto player variable is equal to .8 – conditions with substantial vulnerability to a crisis. The final estimation ("Combined Mediated Effect") calculates the mediated effect of veto players working through all three mediators.

Table 16: Full Marginal Effects in Percentage Points

Short-Term					
Veto Players =	0	.2	.4	.6	.8
ΔVIX = 12	-.2278	- -.0446	.0421	.2360***	1.072**
	(.2050)	(.0466)	(.0260)	(.0838)	(.5155)
	-6.6%	-1.2%	1.2%	**6.8%**	**30.9%**
= 8	-.2620	-.0557	.0203	-.1505***	.7140**
	(.1794)	(.0345)	(.0150)	(.0451)	(.3486)
	-7.5%	-1.6%	.6%	**4.3%**	**20.6%**
= 4	-.2973*	-.0724***	.0053	.0928***	.4511*
	(.1543)	(.0208)	(.0090)	(.0280)	(.2345)
	-8.5%	**-1.9%**	.2%	**2.7%**	**13.0%**
= 0	-.3340**	-.0711***	-.0047	.0550**	.2733*
	(.1423)	(.0178)	(.0078)	(.0222)	(.1635)
	-9.6%	**-2.1%**	-.1%	**1.6%**	**7.9%**
= −4	-.3719**	-.0759***	-.0146	.0308	.1601
	(.1610)	(.0231)	(.0093)	(.0192)	(.1166)
	-10.7%	**-2.2%**	-.4%	.9%	4.6%
= −8	-.4112*	-.0792**	-.0145	.0159	.0910
	(.2153)	(.0344)	(.0113)	(.0163)	(.0826)
	-11.8%	**-2.3%**	0.7%	.5%	2.6%
Long-Term					
ΔVIX = 12	-.2472	-.0557	.0308	.2155***	1.016**
	(.2142)	(.0496)	(.0259)	(.0819)	(.5065)
	-7.1%	-1.6%	.9%	**6.2%**	**29.3%**
= 8	-.2817	-.0658*	.0112	.1354***	.6736**
	(.1858)	(.0363)	(.01557)	(.0454)	(.3430)
	-8.1%	**-1.9%**	.3%	**3.9%**	**19.4%**
= 4	-.3175**	-.0737***	-.0021	.0818***	.4232*
	(.1582)	(.0243)	(.0100)	(.0289)	(.2307)
	-9.2%	**-2.1%**	-.1%	**2.3%**	**12.2%**
= 0	-.3546**	-.0795***	-.0106	.0471**	.2547
	(.1447)	(.0185)	(.0090)	(.0228)	(.1602)
	-10.2%	**-2.3%**	-.3%	**1.4%**	7.3%
= −4	-.3929**	-.0835***	-.0157	.0252	.1480
	(.1643)	(.0244)	(.0104)	(.0194)	(.1134)
	-11.3%	**-2.4%**	-.5%	.7%	4.3%
= −8	-.4327*	-.0861**	-.0185	.0119	.0833
	(.2214)	(.0364)	(.0123)	(.0161)	(.0796)
	-12.5%	**-2.5%**	-.5%	.3%	2.4%

σ_{vp} change in Veto Players on the probability of crises
Unconditional the probability of crises = 3%
p<0.01, p<0.05, p<0.1

This table reports the unscaled marginal effect of veto players veto players on the probability of a crisis at representative values of the change in the VIX and veto players. Standard errors are reported in parentheses. Marginal Effects in percentage points scaled to a one standard deviation increase in veto players are reported in the 3rd row that are statistically different than zero are reported in ***bold****.*

Table 17: Testing for Moderation: Individual Stages and Mediators

Moderator	Stage	Inflation	Δ Credit Growth	GDP Growth
Financial Development	1st	N/A	N/A	$\lvert\Delta\rvert < 0$
	2nd	$\lvert\Delta\rvert > 0$	N/A	$\lvert\Delta\rvert < 0$
	Moderation:	No	No	Increase
Central Bank Independence	1st	N/A	N/A	N/A
	2nd	N/A	N/A	N/A
	Moderation:	No	No	No
Democracy	1st	N/A	$\lvert\Delta\rvert < 0$	N/A
	2nd	N/A	$\lvert\Delta\rvert > 0$	$\lvert\Delta\rvert > 0$
	Moderation:	No	Decrease	N/A
Fixed Exchange Rate	1st	N/A	N/A	N/A
	2nd	N/A	N/A	N/A
	Moderation:	No	No	No
Left Wing Gov.	1st	N/A	N/A	$\lvert\Delta\rvert > 0$
	2nd	N/A	N/A	N/A
	Moderation:	No	No	No
Financial Liberalization	1st	N/A	N/A	$\lvert\Delta\rvert < 0$
	2nd	N/A	N/A	N/A
	Moderation:	No	No	No

The first row for each variable indicates whether the moderator increases or decreases (in absolute value) the effect of the veto players on the mediator variable. The second row indicates whether the moderator increases or deceases the effect of the mediator on the likelihood of a crisis. If the effect of the moderator on the marginal effect of term it's interacted with is not statistically different than zero the effect is listed as N/A. For moderator to occur there has to be a statistically significant effect of the moderator on the marginal effect of the independent variable in the first stage, and the mediator in the second stage. The final row indicates if moderator has occurred, and if so, whether this indicates the real mediated effect is larger, or smaller, than the estimated mediated effect.

Table 18: Average Moderated Mediated Marginal Effects

Moderator	Moderated	Mediated	Difference	Ratio
Financial Development	-.0031	-.0059	No	.51
	(.2963)	(.0049)		
Central Bank Independence	-.0007	-.0053	No	.13
	(.0508)	(.0050)		
Democracy	.0087	-.0043	No	-2.02
	(.0968)	(.0042)		
Fixed Exchange Rate	.0043	-.0048	No	-.89
	(.0461)	(.0052)		
Left Wing Gov.	-.0033	-.0058	No	.56
	(.0708)	(.0044)		
Financial Liberalization	.0202	.0071	No	2.87
	(.3702)	(.0056)		

Delta method standard errors in parentheses

F Figures

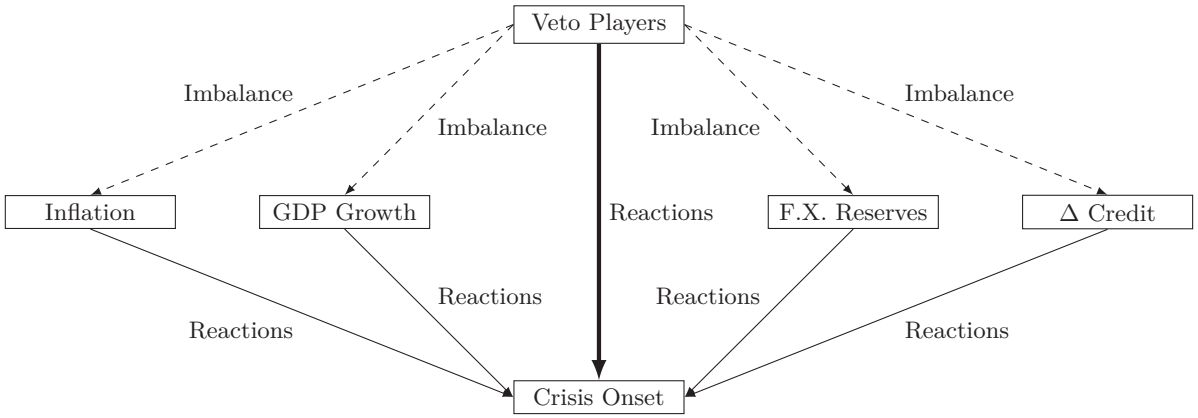


Figure 11: Mediated Estimation

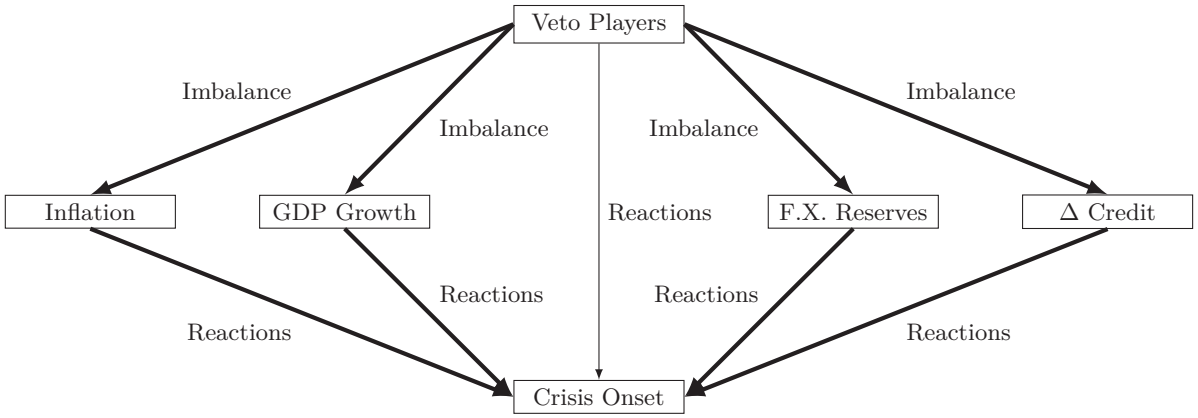


Figure 12: Moderated Mediated Estimation

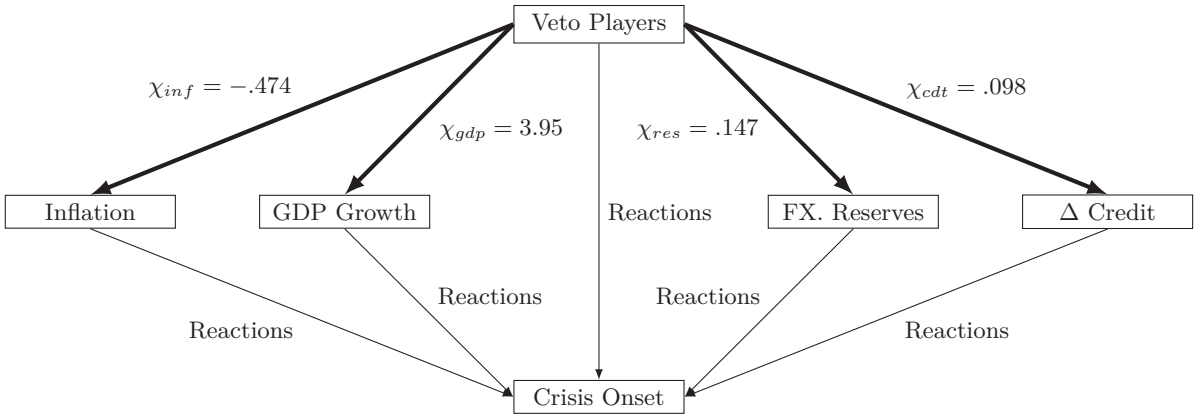


Figure 13: Imbalance Path Estimation

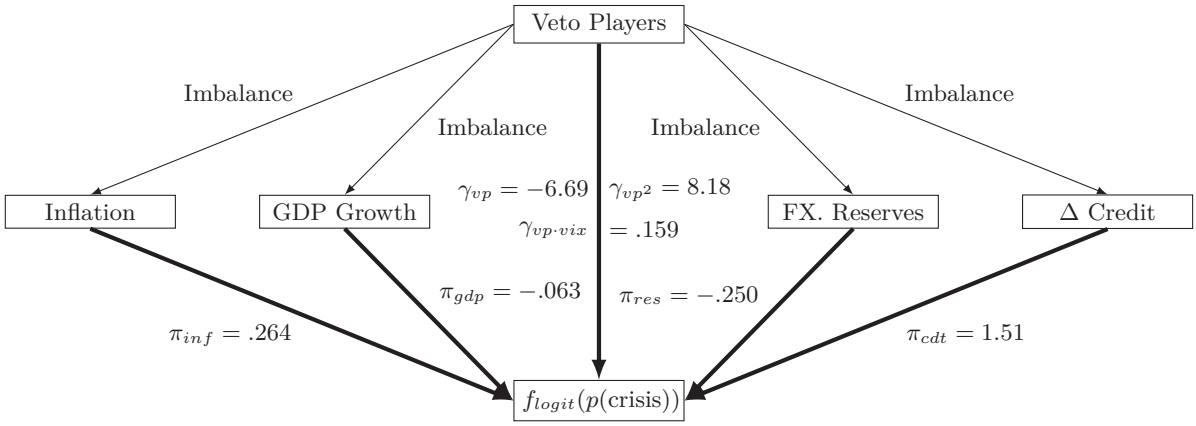


Figure 14: Reactions Estimation

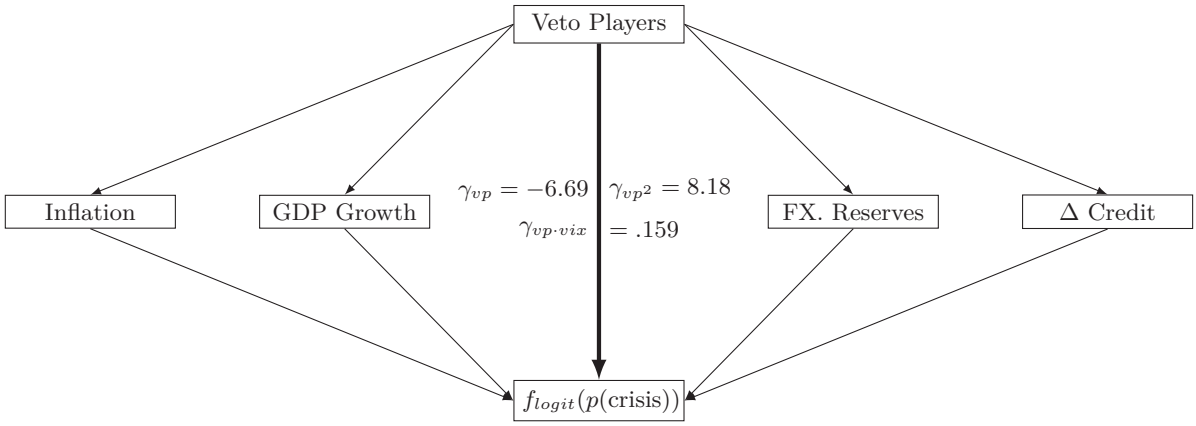


Figure 15: Direct Marginal Effects

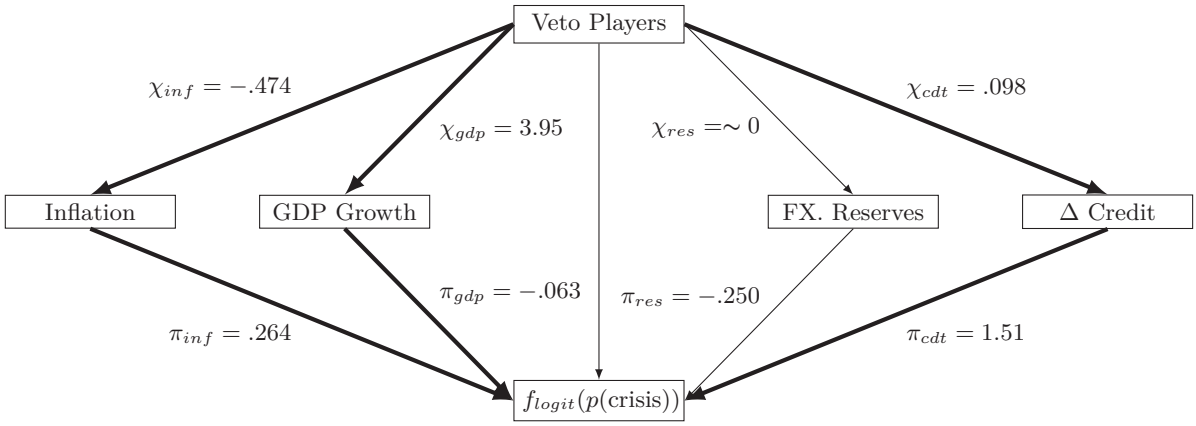


Figure 16: Mediated Marginal Effects

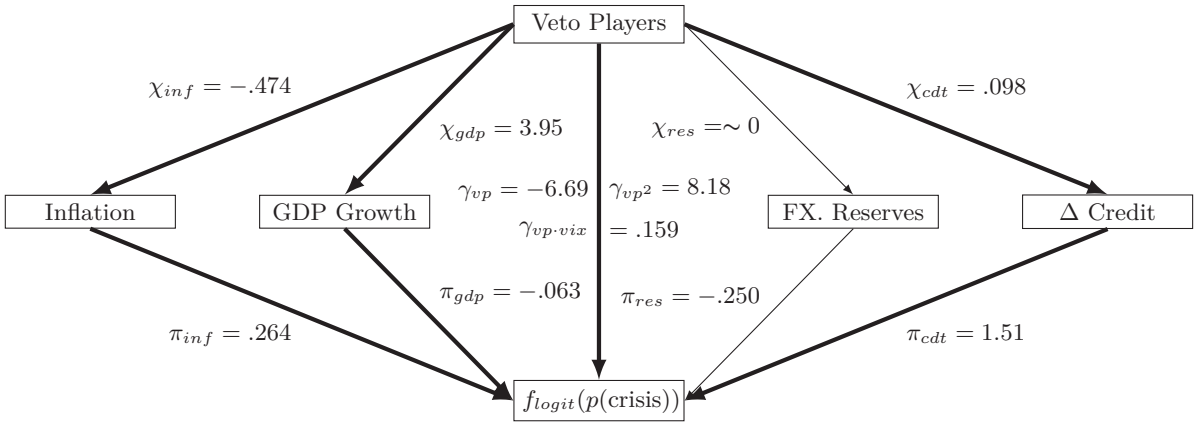


Figure 17: Full Marginal Effects

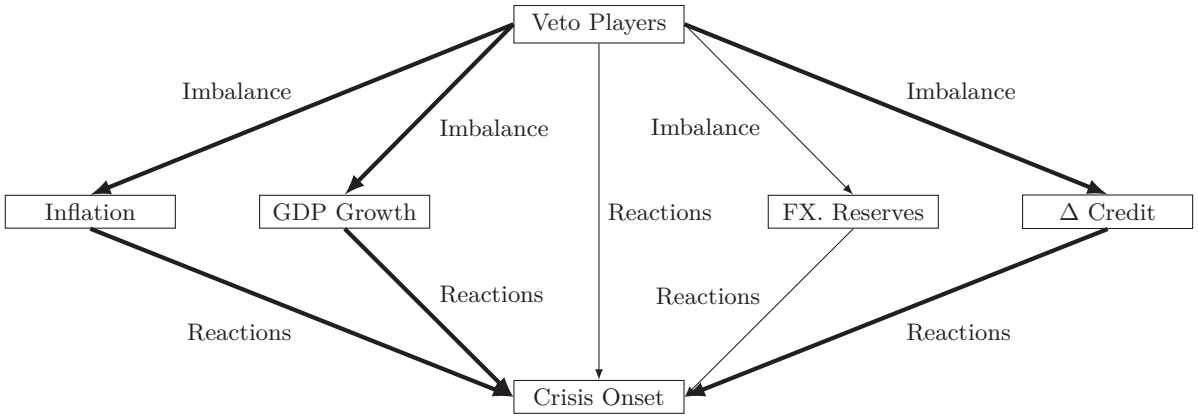


Figure 18: Moderated Mediated Marginal Effects

Figure 19: Marginal Effects of Veto Players and the VIX

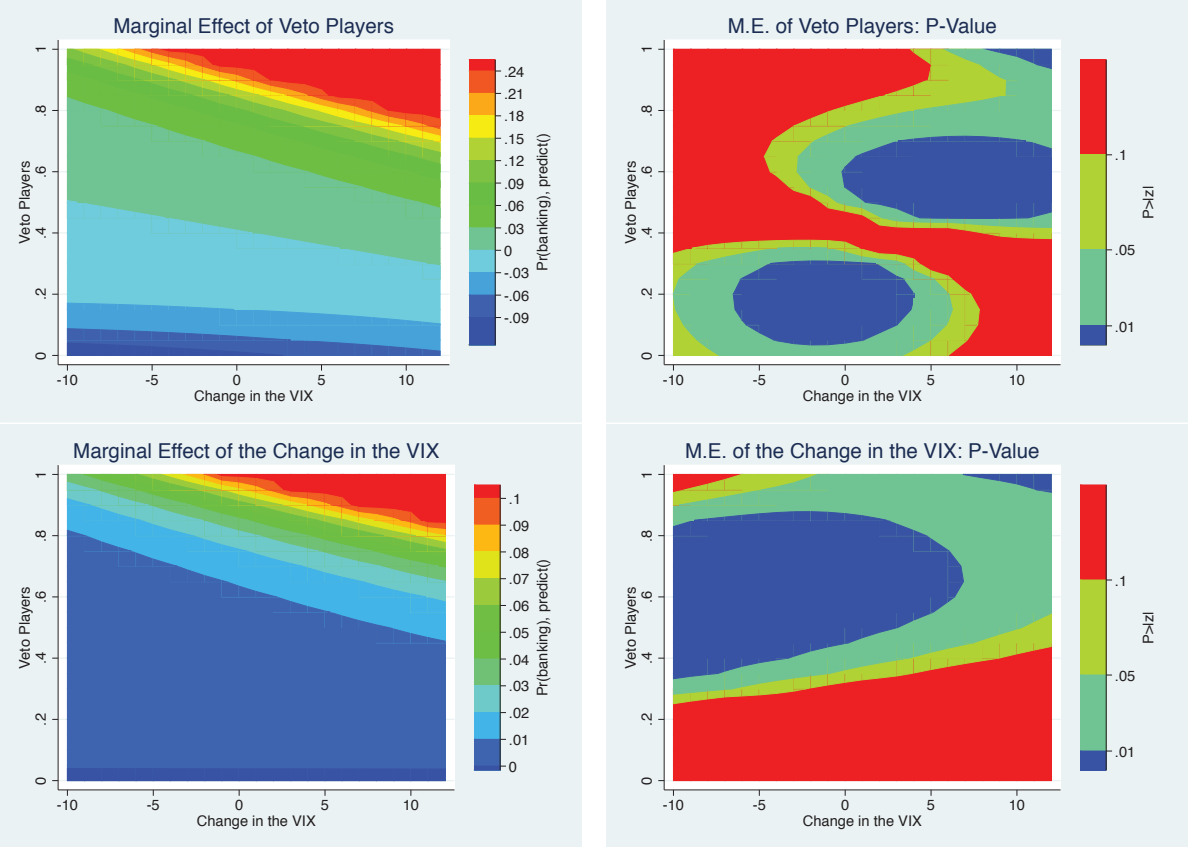
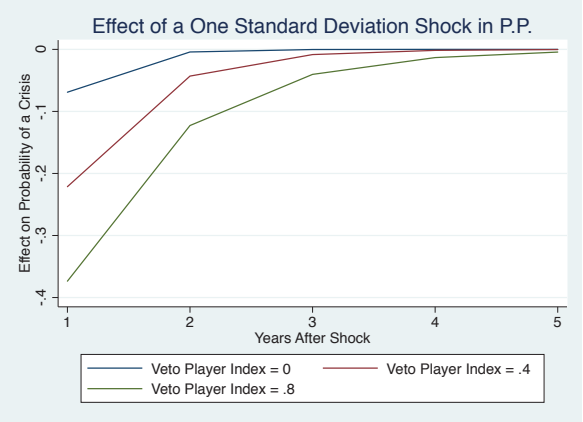
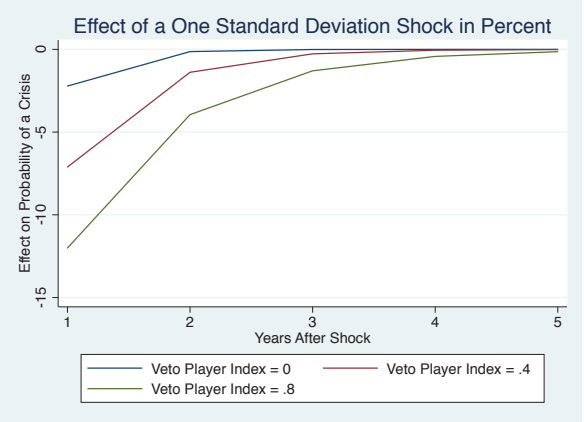


Figure 20: One σ Shock to GDP Growth on the Probability of Banking Crises



Percentage Points



Percent