Financial instability, political crises and contagion

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1 Introduction

Political distortions are allegedly a salient trait of most emerging markets in Asia and Latin America. They arise when policymakers have objectives divergent from those of the average citizen. This discrepancy mainly springs from three sources: reputation concerns, pro-business agendas, and crony capitalism. We follow along the first line. Policymakers may be excessively concerned about their reputation. For instance, they may be prone to service the sovereign debt or to bail-out collapsing banks beyond what is socially optimal, because default would raise questions about their governing abilities.

Financial crises and political instability are interrelated. Bank runs feed political instability, as citizens are tempted to overthrow a government and overrule a bailout decision if they believe it is not economically justified. Political distortions give rise to political uncertainty, as citizens have incentives to dismiss a government after a bailout announcement. Higher political uncertainty increases both financial and political instabilities as it enlarges the set of parameters for which rational-expectations agents will find bank runs and the dismissal of the government optimal. This paper is meant to shed light on those relations.

The existing literature on the effects of political distortions on financial crises is scarce. The present paper builds on a paper by Chang (2004) about sovereign debt service with a political dimension. In that ongoing work, Chang features a divergence between the objectives of policymakers and the average citizen, and the latter can dismiss the former and cancel their decisions to service the debt. The resulting equilibria may comprise both default and political crises, which is reminiscent of the fate of Argentina in late 2001. Our paper uses that model of strategic interaction between policymakers and citizens in a framework of bank bailouts instead of debt service.

A related paper is a model of contagious banking crises of Giannetti (2003). She shows how collapses may materialize and spread if international lenders have incomplete information about the quality of projects funded

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by banks. Lack of transparency results in unproductive projects being financed, and thus in banks accumulating losses. Therefore, the failure of a truly insolvent bank may propagate to healthy banks, i.e., temporarily illiquid but otherwise solvent banks, as the latter may wind up collapsing due to a uniform rise in interest rates, as lenders are unable to distinguish between illiquid and insolvent banks. Her model is fundamentally a model of uncertainty on investment opportunities of a country. In particular, the bank-firms relationship is in the forefront. In contrast, we feature no such aggregate uncertainty and bank crises originate in the liabilities side of the balance sheet, i.e., because of self-fulfilling depositors' runs and lenders' expectations. What is more, we give policymakers a central place in that they can save collapsing banks.

We must also contrast our contribution with papers that put government guarantees at the root of financial excess. The resulting moral hazard translates into excessive external borrowing and over-investment, as in Corsetti, Pesenti and Roubini (1999) or Irwin and Vines (2003), or into un-hedged exposure to exchange-rate risk, as in Burnside, Eichenbaum and Rebelo (2004). Those authors are focused on featuring over-investment or other excessive risk exposure, and therefore those traits must be outcomes of their models. On the other hand, we are more interested in the strategic interaction between policymakers and the public. As a result, we are not compelled to display endogenous investment and can therefore somehow disregard the production side of the economy. To be concrete, we will take bank investment and borrowing as exogenous.

We will also show in this paper how a crisis in a country may spread to other countries, due to the revision by the public of the policymakers' incentives to rescue collapsing banks. In this respect, our paper relates to Drazen (2000), which features political contagion in a model of speculative attacks on currencies meant to provide a complementary explanation for the spread of the crises of the European Exchange Rate Mechanism in 1992-93. The possibility of contagious crises is based on incomplete information regarding the governments' intentions about maintaining their currency within the system. A successful attack on a country leads speculators to reappraise the commitment of policymakers in other countries of the "club" to keep their exchange rate pegged.

To the best of our knowledge, no paper studies the political economy of banking crises and bailouts, and this contribution is intended to fill part of this gap. This paper studies banking liquidity crises under the assumption that there exists a non-perfectly credible lender of last resort. Even if the government finds it optimal to intervene, citizens may not agree with the bailout decision and overthrow the government. The main results can be synthesized as follows. First, the possibility of a political crisis in equilibrium is increasing the more likely there are political distortions. Second, political uncertainty increases financial instability as it enlarges the set of parameters for which expectations of financial and political crises indeed make opti-

mal a bank run and the dismissal of the government. Third, political crises may stem from foreign lenders' loss of confidence. Fourth, if country types are correlated there may be contagion: In particular, contagion happens if after a first banking crisis in a country, the citizens of other similar countries update their beliefs on the type of their government. Doing so, they may reinforce their beliefs that the government is self-interested and bank bailouts are not socially optimal.

In Section 2, we set up the framework in two steps. A financial stage features foreign lenders who assess their chances of being repaid before enabling banks to rollover their maturing debt. Banks are indeed subject to self-fulfilling depositors' runs due to a maturity mismatch between their liabilities and their assets. In this respect, lenders and depositors must determine the likelihood of bank bailouts by policymakers. This entails that they are able to anticipate the outcomes of a political game between the government and citizens. That political stage displays a non-cooperative Bayesian game with an informational advantage of the government over the representative agent regarding the social costs of bank liquidation. Policymakers may be self-interested in their bailout policies and citizens have the power to dismiss them and overrule their proposal to intervene if they believe that bailouts are not socially optimal.

In Section 3, we stress the relations between financial instability and political instability. We first determine the Perfect Bayesian Equilibria (PBE) of the political game between the government and citizens, and then derive the rational-expectations equilibria of the model by taking account of the behaviors of depositors and foreign lenders.

We first concentrate on the political stage by temporarily disregarding the behaviors of depositors and foreign lenders, which comes down to thinking of the taxation cost of bailouts as being exogenous. We show that the representative agent's posterior belief that the social cost of a bank crisis is high, conditional upon a bailout proposal by the government plays a key role in determining which Perfect Bayesian Equilibrium arises. Indeed, the less precise this inference the more incentives to overthrow the government. At this point, we derive our first main result. The possibility of a political crisis in equilibrium is increasing the more likely there are political distortions. This result goes in the sense of the causation from financial instability to political instability. By construction in this model, bank runs feed political instability as voters overthrow the government if it announces a bailout and voters believe that the bailout is not optimal for the economy. We therefore make a step further by linking the extent of this political instability to political distortions.

We then take account of the expectations of depositors and foreign lenders and prove our second main result. Political uncertainty, due to the fact that voters can overthrow the government, increases financial instabil-

ity as it enlarges the set of parameters for which expectations of financial and political crises indeed make optimal a bank run and the dismissal of the government. In particular, banking panics in equilibrium are less likely if voters believe that the probability of having a self-interested government is low. This result is somewhat surprising since self-interested governments have a higher propensity to bailouts in our model, and thus one would expect depositors to be less prone to run with a self-interested government. However, in equilibrium, agents account for the possibility that the government will be overthrown to assess the likelihood of a bailout.

We also highlight that foreign lenders' expectations about the outcomes of the political game are self-fulfilling in that they can raise the likelihood of financial crises and lead to political crises. Indeed, whenever two equilibria coexist, if lenders hold adverse expectations about the political outcome that will eventually prevail, then they are willing to buy the new debt issued by the bank for a lower price, which aggravates the illiquid position of the representative bank. In the end, the higher taxation cost of bailout becomes compatible only with the PBE that features more likely financial and political crises, therefore, validating lenders' adverse expectations. In other words, political crises may stem from foreign lenders' loss of confidence.

In Section 4, we prove that a politico-financial crisis in a country may spread to other similar countries as citizens update their beliefs on the type of their government. Doing so, they may reinforce their beliefs that the government is self-interested and bank bailouts are not socially optimal.

In Section 5, we recapitulate our main results and suggest follow-ups. For ease of exposition, most proofs are in an Appendix.

2 Model

In this section, a framework of banking crisis and bailout is set up in two steps. A financial stage features foreign lenders who assess their chances of being repaid before enabling banks to rollover their maturing debt. Banks are indeed subject to self-fulfilling depositors' runs due to a maturity mismatch between their liabilities and their assets. In this respect, lenders and depositors must determine the likelihood of bank bailouts by policymakers. This entails that they are able to anticipate the outcomes of a political game between the government and citizens. That political stage displays a non-cooperative Bayesian game with an informational advantage of the government over the representative agent regarding the social costs of bank liquidation. Policymakers may be self-interested in their bailout policies and citizens have the power to dismiss them and overrule their proposal to intervene if they believe that bailouts are not socially optimal.

2.1 Banking sector

In this subsection, a representative bank is described as a maturity transformer that takes liquid deposits and borrows foreign funds, and invests part of the proceeds in illiquid assets. This results in a maturity mismatch between its liabilities and its assets, therefore creating the possibility of self-fulfilling depositors' runs. Foreign lenders assess the probability of a bank failure to enable the bank to rollover its short-term debt, which boils down to appraising the likelihood of depositors' runs and governments' bailouts.

We stress that we mean to highlight the game between the government and citizens as the key strategic interaction in this paper. We will thus aim to make behaviors of other agents of the model entirely determined by the outcomes of that interaction. This implies that we must play down the interaction between depositors and lenders in this financial stage. A way out is to assume that the representative bank is illiquid even if lenders allow for full rollover of its maturing debt. Indeed, depositors will then base their decision to run upon their expectations of a government's rescue package and on sunspot variables if they expect the government not to step in, and this, irrespective of the price bid by lenders for the new debt issued by the bank.

The remainder of this subsection is intended to set up a framework of solvent but illiquid banking sector. The representative bank is solvent in the long run (here, two periods) if depositors behave according to their true type, in the sense of Diamond and Dybvig (1983). The bank is temporarily illiquid (here, one period) because its potential short-term liabilities exceed the liquidation value of its assets.

The following framework builds on a model of international banking crises by Chang and Velasco (2001), which is itself an open-economy extension of Diamond and Dybvig (1983)'s model of banking liquidity crisis. Still, we depart from this model by taking into account lenders' expectations regarding being repaid.

A small open economy is populated by a large number of identical agents. There are three dates (and thus, two periods) indexed by $t = 0, 1, 2$, and only one good, which is freely traded in the world market and can be consumed and invested. The price of consumption in the world market is fixed and normalized to one unit of foreign currency (a "dollar"). Agents decide to form a bank rather than acting in isolation. We posit the desirability of a representative bank and refer to Diamond and Dybvig (1983) for how a combination of preferences and investment technologies can yield this property. This bank sets demand deposits. These contracts stipulate that, at $t = 0$, each agent must surrender to the bank her endowment and her capacity to borrow abroad in return for the right to withdraw, at her discretion, either x units of consumption at $t = 1$ or y units of consumption at $t = 2$. The bank borrows abroad an amount, f , at $t = 0$, with a part, d , of this debt maturing at $t = 1$, referred to as the short-term debt hereafter,

and thus, $f - d$, maturing at $t = 2$. The bank uses the proceeds of its borrowing, f , along with the endowment surrendered by home agents, e , to invest an amount, k , in a long-term technology and to invest an amount, b , in a world liquid asset. The riskfree interest rate on the world capital market is zero. The long-term technology is productive if held for two periods, but illiquid: its yield per dollar invested at $t = 0$ is $R > 1$ dollars at $t = 2$, and $r < 1$ dollars at $t = 1$, with both R and r constant. The bank attends to the requests of depositors on a first-come-first-served basis, which gives late consumers incentives to misrepresent their type if they fear a bank failure, and this paves the way for full bank runs.

We now concentrate on Date 1, with the short-term debt maturing. The representative bank attempts to roll it over by selling to foreign creditors claims to d dollars, payable at Date 2, in a competitive auction. Assuming that these foreign creditors are risk-neutral, and since they have an opportunity cost of funds of zero within Period 2, they will buy the new debt issue if and only if its price, denoted by S , is equal to their subjective probability that the debt will be honored. The auction proceeds, $X = Sd$, are immediately transferred to the bank, which simultaneously pays out its maturing debt amounting to d . Hence, the net outflow attached to the debt operation at Date 1 is $(1 - S)d$.

DEFINITION 1: The bank illiquidity position, L , is the excess of its potential short-term liabilities over the liquidation value of its assets, i.e., formally:

$$L = x + (1 - S)d - (rk + b), \quad (1)$$

with the understanding that x stands for the withdrawal of all depositors (bank runs are total, as underscored above), as the number of depositors is normalized to one.

ASSUMPTION 1: The representative bank is solvent but illiquid even if lenders allow for full debt rollover.

The solvency condition means that demand deposit parameters are set by the bank to make sure that it can service withdrawal requests in both periods, provided that depositors behave according to their true types. This condition is intended to ensure that an equilibrium without runs always exists.

On the other hand, the parameters chosen are such that the bank winds up in an illiquid position even if international lenders allow for complete rollover of the foreign debt (i.e., $x - rk - b > 0$). As vindicated upon introducing this subsection, this assumption is meant to play down the interaction between depositors and lenders in the financial stage, so as to make the behavior of all agents essentially determined by their expectations regarding a government's bailout, as will be clarified below.

This illiquidity assumption is not so stringent as it may first appear. Indeed, this is a rational position from the bank's standpoint if the cost of

doing so is more than offset by the expected payoff of the long-term technology. In addition, this may be thought of as the upshot of over-investment induced by moral hazard associated with bank managers being optimistic about governments' guarantees in case of trouble.

ASSUMPTION 2: Depositors base their decision to run upon the realization of sunspots and their beliefs about government's bailouts. More specifically, there is a publicly-observed random variable that takes the value 1 with probability $p \in]0, 1[$ or 0 with probability $(1 - p)$. While this variable does not affect the fundamentals of the economy, it acts as a coordination device of depositors' behavior. A bank run takes place if and only if depositors expect the government not to bail-out the bank and the realization of the sunspot variable is 1.

Depositors need not take lenders' behavior into account, since the bank ends up illiquid anyway. This enables us to focus on the interaction between the government and the citizens.

All in all, lenders and depositors must determine the likelihood of bailouts by policymakers. This entails that they are able to anticipate the outcomes of a political game, which we turn to next.

2.2 Political stage

This subsection features a strategic interaction between the government and the average citizen with an informational edge of the former over the latter regarding the social costs of bank liquidation. The government may be self-interested in its bailout policy and citizens have the power to overturn her and overrule her decision to rescue collapsing banks if they believe that a bailout is not socially optimal.

The political stage, which takes place at Date 1, captures the political nature of bailouts. Rescuing failing banks is indeed a highly political decision, since not doing so entails overwhelming economic costs and because of political distortions. In its most exacerbated form, this can lead to the dismissal of the government.

The remainder of this subsection is organized as follows. We model the policymakers' propensity to rescue a collapsing bank as a tradeoff between the costs of not rescuing the system and the costs associated with raising taxes to finance a bailout package. The former involve social costs for the society as a whole and personal costs for policymakers if they are self-interested. In addition, they have an informational advantage over citizens and foreign lenders regarding the costs of bank liquidation. It may then be beneficial to citizens to dismiss policymakers and overrule their decision. This strategic interaction between the government and citizens is the counterpart for bank bailouts of Chang (2004)'s sovereign debt service.

To start with, let us note that the status of citizens in this model is twofold. As taxpayers, they are willing to overturn a government if they deem that the taxation necessary to finance a bailout package is too heavy a burden. In this role of interaction with the government, we will resort to a “representative agent”. We will refer to citizens with banking accounts as depositors. Incidentally, citizens may incur banking crises as depositors, while at the same time reluctant to bailouts that would prevent those crises as taxpayers. Still, there is no contradiction. The amount used to rescue a failing bank exactly matches the taxes levied on them, in the end. On the other hand, the key points are that bank liquidation may have consequences that overwhelm the mere figure that captures the illiquid position, and that raising taxes may also have distortionary effects. At the country scale, it is the comparison between those two overall quantities that really matters. In addition, the majority of poor citizens have no banking account in many emerging markets. As they are worse off because of increased taxes, those poor citizens definitely have incentives to dismiss a government who proposes bailout.

The amount necessary to bail-out a collapsing banking system matches the bank illiquidity position L . The rescue package is financed by taxes, denoted by T , raised on citizens. This taxation may have a distortionary effect on the economy, of which the government takes account. We introduce a non-decreasing function ψ that captures this effect, and it follows that the cost of rescuing the system, denoted by V , is $V = T + \psi(T)$.

On the other hand, not saving a collapsing banking system may result in an economic crisis and a stop of foreign capital inflows. The social cost of not bailing-out the banking system, denoted by χ , captures those pitfalls. We assume that χ is a Bernoulli random variable, taking a low value χ_L , with probability $q \in]0, 1[$, or a high value $\chi_H > \chi_L$, with probability $(1 - q)$.

ASSUMPTION 3: The government has an informational edge over the public regarding the social cost of bank liquidation. More precisely, the true value of χ becomes known to the government at Date 1, upon deciding whether or not to rescue the bank. On the other hand, the representative agent, home depositors and foreign creditors only know its prior distribution, when about to make a decision about firing the government, running on the bank and buying the new debt issue respectively.

Indeed, policymakers often obtain information regarding the pros and cons of bailouts beforehand, from their political advisers and economic research team, and this information is not generally available to the public until there actually is a crisis.

ASSUMPTION 4: The bailout decision is made by the government on behalf of the representative agent. Still, the latter can overturn the former and overrule her decision, at some cost $\phi > 0$ though.

The dismissal of the government constitutes a “political crisis” in the model. This is a possible outcome because the representative agent has in-

complete information about the social cost of bank crisis and because policymakers may not have the same objective as the representative agent.

ASSUMPTION 5: There are political distortions. Policymakers may incur personal costs if they do not rescue a failing bank, in addition to the social cost of bank liquidation. More precisely, they suffer personal costs β of either zero or $\gamma\chi$, with probabilities $s \in]0, 1[$ and $(1 - s)$ respectively. s is the probability that they are "benevolent", and $(1 - s)$ the probability that they are "self-interested". In addition, the personal costs incurred by self-interested policymakers overshadow the cost of bank liquidation and the cost of dismissal in the following sense:

$$(1 + \gamma)\chi_L \geq \chi_H, \quad (2)$$

and

$$\gamma\chi_L > \phi. \quad (3)$$

In a strict interpretation, personal costs may translate into policymakers loss of reputation or questioning about their abilities. On a broader register, political distortions capture any discrepancy between the fate of average citizens and policymakers' objectives, such as catering for special groups. We stress that the public never observes whether the policymakers are self-interested or not, in contrast to clear-cut situations where the government in charge is either pro-business or benevolent. We also emphasize the distinction between being self-interested or not, which is independent of the cost of liquidation, and the personal cost incurred if distorted, which depends on that cost.

Condition (2) implies that, in the case: $\chi_L < V \leq \chi_H$, whereas a benevolent policymaker will propose to step in if and only if the liquidation cost is high, a self-interested one will propose to bail-out even if that cost is low.

Condition (3) means that policymakers are more concerned about their personal fate than about the cost implied by being fired when proposing an action that does not suit the representative agent. That condition will imply that they may propose bailout while knowing that they will be dismissed in doing so. Technically, (2) and (3) allow to limit the number of equilibria.

All in all, the government proposes to step in if the overall cost of bank liquidation, $\chi + \beta$, is higher than or equal to the taxation cost of a rescue package, $V = T + \psi(T)$, i.e.,

$$\chi + \beta \geq x + (1 - S)d - rk - b + \psi(x + (1 - S)d - rk - b). \quad (4)$$

If she is retained, her proposal is implemented. Otherwise, the representative agent learns the value of χ , and chooses whether or not to save the bank. This ends the political stage.

We stress that a bailout proposal is only based on the previous comparison, and is therefore independent of the depositors' behavior. That is, we do not impose that the government observes the onset of panics to make

a decision. Indeed, we have assumed that the bank ends up illiquid even if there is full rollover of its debt, and thus a run is always possible, conditional upon the realization of a sunspot variable; and this is common knowledge. By disregarding at this step the depositors' behavior, we will be able to focus on the game between the policymaker and the representative agent, and we will bring in the depositors' behavior once the outcomes of that interaction are determined.

We will refer in the sequel to the policymakers' incentives to bail-out a collapsing system, as a catch-all that captures the social costs of a bank crisis incurred by citizens as well as the personal costs suffered by the policymakers, as compared with the value of not intervening, in terms of tax relief.

3 Equilibria

In this section, we first determine the Perfect Bayesian Equilibria of the political game between the government and the voters and then derive the rational-expectations equilibria of the model by taking account of the behaviors of depositors and foreign lenders.

Those equilibria allow us to stress several important results about the interrelations of financial instability and political instability. First, we expound the causation from financial instability to political instability. By construction in this model, bank runs feed political instability as voters overthrow the government if it announces a bailout and voters believe that the bailout is not optimal for the economy. We make a step further by linking the extent of this political instability to political distortions. We prove that the possibility of a political crisis in equilibrium is increasing the more likely there are political distortions.

Reciprocally, and this is our second result, political uncertainty, due to the fact that voters can overthrow the government, increases financial instability as it enlarges the set of parameters for which expectations of financial and political crises indeed make optimal a bank run and the dismissal of the government. In particular, banking panics in equilibrium are less likely if voters believe that the probability of having a self-interested government is low.

Third, foreign lenders' expectations about the outcomes of the political game are self-fulfilling in that they can raise the likelihood of financial crises and lead to political crises.

In the remaining of this section, we will first concentrate on the political stage by temporarily disregarding the behaviors of depositors and foreign lenders, which comes down to thinking of the taxation cost of bailouts

as being exogenous. And then, we will bring in those agents' expectations about collecting their due and derive the equilibria of the model.

3.1 Perfect Bayesian Equilibria of the political stage

The restriction of the model to the political stage is a non-cooperative Bayesian game with private information between the policymaker and the representative agent. Its outcomes are given by its Perfect Bayesian Equilibria (PBE). At this point, the game is similar to that of Chang (2004) about the decision of default on the sovereign debt, and we follow along the same lines.

The representative agent's posterior belief that the social cost of a bank crisis is high, conditional on a bailout proposal by the government plays a key role in determining which Perfect Bayesian Equilibrium arises. Indeed, the less precise this inference the more incentives to overthrow the government.

PROPOSITION 1: Let z be the representative agent's posterior belief that the social cost of a bank crisis is high, conditional on a bailout proposal by the government. PBE are of five types:

Type *i*: If $V \leq \chi_L$, both types of policymakers always propose to bail-out and there is never political crisis;

Type *ii*: If $\chi_L < V \leq \chi_L + \phi/(1 - z)$, a self-interested policymaker always proposes to bail-out, whereas a benevolent one proposes to bail-out if and only if the social cost liquidation is high; and the representative agent chooses not to dismiss the policymaker. Thus, the probability of no bailouts is sq , and the probability of a political crisis is 0;

Type *iii*: If $\chi_L + \phi/(1 - z) < V \leq \chi_H - \phi$, the policymaker follows the same strategy as in PBE Type *ii*, but she is overturned unless she proposes not to bail-out. In addition, the representative agent does not bail-out when firing a self-interested policymaker and the cost of liquidation is low; and bails-out in other cases. Therefore, the probability of no bailouts is q and the probability of a political crisis is $1 - sq$;

Type *iv*: If $\chi_H - \phi < V \leq \chi_H$, a benevolent policymaker proposes not to bail-out regardless of χ , which the representative agent accepts, while a self-interested one proposes to bail-out and is dismissed; in the latter case, the representative agent does not bail-out if the social cost of liquidation is low. Hence, the probability of no bailouts is $s + (1 - s)q$ and the probability of a political crisis is $1 - s$;

Type *v*: If $\chi_H < V$, a benevolent policymaker proposes not to bail-out regardless of χ , which the representative agent accepts, while a self-interested one proposes to bail-out for both values of χ and is dismissed; in the latter case, the representative agent does not bail-out regardless of χ . So, the probability of no bailouts is 1 and the probability of a political crisis is $1 - s$.

In addition, $z = (1 - q) / [(1 - q)s + (1 - s)]$.

Note that the condition for Type *iii* makes sense provided that ϕ and z are sufficiently small relatively to the difference $(\chi_H - \chi_L)$, which is assumed.

Proof: See Appendix A.

In the range $\chi_L < V \leq \chi_H$, z captures the probability that the representative agent bails-out after overthrowing the government. This probability impinges on the expected gain from dismissing the government and therefore on the decision to retain her if she proposes a bailout. This mechanism is what drives the difference between equilibria *ii* and *iii*, as we now expound.

The right-hand inequality of PBE Type *ii* allows shedding light on the representative agent's standpoint. In PBE Type *ii*, there is no political crisis. The intuition is that the representative agent has no incentive to fire the government if she proposes bailout, since the cost of dismissal is greater than the cost of accepting the government's proposal. Indeed, the cost of retaining the government is V , while the expected cost of firing her is $\phi + zV + (1 - z)\chi_L$, since the representative agent expects that he will himself bail-out with probability z and won't bail-out with probability $(1 - z)$. Now, $V \leq \phi + zV + (1 - z)\chi_L$ reduces to the right-hand inequality of the condition of Type *ii*.

Likewise, the probability of bailouts in PBE of Type *ii* ($1 - qs$) is higher than the probability of bailouts in the case of no political distortion ($1 - q$). This stems from that a self-interested government will bail-out in the case of a low cost χ_L , whereas the representative agent has no incentive to fire her after such a proposal as the expected gain from doing so is too small.

The right-hand inequality of PBE Type *iii* allows highlighting the government's standpoint as well as the fact that even benevolent policymakers may propose bailout while acknowledging that they will be fired. If the cost of default is high, the benevolent government's cost from proposing bailout is $V + \phi$, as she knows that she will be fired following such an announcement, after which the representative agent will bail-out eventually ($V < \chi_H$). On the other hand, by not proposing bailout, the cost is χ_H , as the political crisis will be avoided at the price of a bank default. Hence, it is optimal for the benevolent government to propose bailout if $V \leq \chi_H - \phi$.

By the same token, there are too little bailouts in PBE of Type *iv* (probability $(1 - s)(1 - q)$), as compared to the case of no political distortion ($1 - q$). This stems from that a benevolent government won't propose bailout even though the cost of crisis is high, as she acknowledges that she will be overthrown after such a proposal while the cost of a political crisis is high.

THEOREM 1: The possibility of a political crisis in equilibrium is increasing the more likely there are political distortions.

This broader possibility takes place through two channels: First, within each PBE type where a political crisis arises; second and more interestingly,

in the sense that more likely political distortions increase the set of parameters for which a PBE of Type *iii* (with a political crisis) arises – at the expense of Type *ii* (with no political crisis).

Proof: First, the probability of a political crisis is increasing in $(1 - s)$ in PBE of Types *iii*, *iv* and *v*. Second, as s gets closer to 0, z decreases toward $1 - q$, and thus $\chi_L + \phi/(1 - z)$ is lower. It follows that a PBE of Type *iii* takes place – at the expense of Type *ii* – for lower values of T or higher values of ϕ .

The economic rationale goes as follows. First, the fact that the probability of a political crisis is increasing in $(1 - s)$ simply stems from the fact that a bailout proposal becomes more likely for each government's strategy of PBE of Types *iii*, *iv* and *v*. Second, the more likely the government is self-interested (s gets closer to 0), the less precise the inference that the cost of crisis is high if the government proposes bailout (z gets closer to $1 - q$, the prior probability that the cost is χ_H). Therefore, the representative agent fires the government so as to learn the true value of the cost of crisis for a larger set of parameters, i.e., a PBE of Type *iii* arises more often – at the expense of Type *ii*.

We now factor in the behaviors of foreign lenders and depositors.

3.2 Equilibria of the model

In this subsection, we determine the rational-expectations equilibria that match the political-stage PBE types when bringing in the behaviors of foreign lenders and depositors.

Rational-expectations lenders take account of the outcomes of the political game when bidding a price for the new debt issued by the bank. This impinges on the liquidity position of the bank, and thus on the taxation cost of bailout. Home depositors also take account of the outcomes of that political game. They run on the bank if and only if they expect no bailouts and an adverse sunspot materializes. Those behaviors eventually yield the following result.

PROPOSITION 2: The rational-expectations equilibrium types matching the PBE types are:

$$\text{Type } i: \quad x - rk - b + \psi(x - rk - b) \leq \chi_L \quad (5a)$$

$$\text{Type } ii: \quad \chi_L < x + psqd - rk - b + \psi(x + psqd - rk - b) \leq \chi_L + \phi/(1 - z) \quad (5b)$$

$$\text{Type } iii: \quad \chi_L + \phi/(1 - z) < x + pqd - rk - b + \psi(x + pqd - rk - b) \leq \chi_H - \phi \quad (5c)$$

$$\text{Type } iv: \quad \chi_H - \phi < x + p[s + (1 - s)q]d - rk - b + \psi(x + p[s + (1 - s)q]d - rk - b) \leq \chi_H \quad (5d)$$

$$\text{Type } v: \quad \chi_H < x + pd - rk - b + \psi(x + pd - rk - b) \quad (5e)$$

Proof: It straightforwardly follows from Proposition 1. To illustrate, take Type *ii*. In the corresponding PBE type, the probability of no bailout is sq . Together with that the bank is always in an illiquid position, this implies that runs are tied to the realization of an adverse sunspot for depositors. Hence, the probability of a depositors' run is psq . It follows that rational lenders bid $S = [1 - psq]$ to buy the new debt issued by the bank, which amounts to a net outflow attached to the debt operation of $psqd$. We thus obtain the illiquid position of the bank and the resulting taxation cost of rescuing it, which yields (5b).

The economic interpretation of Proposition 2 is analogous to that of Proposition 1. Again, the difference between Equilibria *ii* and *iii* is driven by z , which determines the expected gain from dismissing the government. We are now in a position to study the determinants of crises.

3.3 Determinants of crises

In this subsection, we show that political uncertainty increases financial instability as it enlarges the set of parameters for which expectations of financial and political crises indeed make optimal a bank run and the dismissal of the government. In addition, we show that foreign lenders' expectations about the outcomes of the political game are self-fulfilling.

COROLLARY 1: Foreign lenders' expectations about the PBE are self-fulfilling in that they can raise the likelihood of financial crises and lead to political crises.

Proof: Any two consecutive equilibria can concomitantly stand. To be concrete, take Types *i* and *ii*. If the parameters are such that Condition (5a) is close to an equality, then (5b) will hold for realistic values of p , q and s . In that configuration, there are two equilibria, one with no financial crises (sure bailout), and one in which runs take place with positive probability. By the same token, Conditions (5b) and (5c) can simultaneously hold. In that configuration, there are two equilibria, one with no political crises, and one in which a political crisis occurs with positive probability.

This possibility of multiple equilibria means that both financial and political crises may result from foreign lenders' self-fulfilling prophecies. The underlying rationale is that, whenever two equilibria coexist, if lenders hold adverse expectations about the PBE that will eventually prevail, then they are willing to buy the new debt issued by the bank for a lower price, which aggravates the illiquid position of the representative bank. In the end, the higher taxation cost of bailout becomes compatible only with the PBE that features more likely financial and political crises, therefore, validating lenders' adverse expectations. In other words, political crises may stem from foreign lenders' loss of confidence. On the other hand, if they hold favorable expectations about the outcome, then they allow a debt rollover in better

conditions and the taxation cost of bailout gets consistent with the PBE that displays less likely financial and political crises.

Whenever there are multiple equilibria, we need a mechanism to coordinate the expectations of foreign lenders and depositors. We assume that there is a random variable that enables them to select a particular equilibrium. Incidentally, it may be the case that more than two types of equilibrium simultaneously arise. Yet, to keep notation to a minimum, we will only consider cases where two equilibria may concomitantly stand. And if so, we will bring in Bernoulli variables with weights of $\frac{1}{2}$, also for the sake of simplicity. This sunspot variable has no effects on the costs of bank liquidation and is independent of that one defined for home depositors alone. An unfavorable occurrence of those sunspots can be equated with possibly unjustified but self-fulfilling adverse expectations.

Now that the coordination device is specified, the model determines the probability that bank runs arise in equilibrium. To illustrate, suppose that the fundamentals are such that Conditions (5a) and (5b) simultaneously hold. With probability $\frac{1}{2}$, the equilibrium is reflected by (5a) and the probabilities of financial and political crises are 0. With probability $\frac{1}{2}$, the equilibrium is given by (5b) and the probability of financial crisis is psq while the probability of political crisis is 0. It follows that the probability of a financial crisis is $\frac{1}{2} psq$ and the probability of political crisis is 0.

THEOREM 2: Political uncertainty increases financial instability as it enlarges the set of parameters for which expectations of financial and political crises indeed make optimal a bank run and the dismissal of the government.

Proof: As seen in the comments of Theorem 1, a PBE of Type *iii* takes place – at the expense of Type *ii* – for lower values of T or higher values of ϕ if political uncertainty is higher, i.e., if a political distortion is more likely. Therefore, no bailouts (probability q in Type *iii* vs. sq in Type *ii*) and the dismissal of the government (probability $1 - sq$ in Type *iii* vs. 0 in Type *ii*) are optimal for a larger set of parameters. This is acknowledged by depositors and foreign lenders. The former run for that larger set of parameters. The latter bid $S = [1 - pq]$ (instead of $[1 - psq]$) to buy the new debt issued by the bank, which yields a higher taxation cost of bailout V indeed consistent with the Equilibrium *iii* for that larger set of parameters.

In particular, banking panics in equilibrium are less likely if voters believe that the probability of having a self-interested government is low. This result is somewhat surprising since self-interested governments have a higher propensity to bailouts in our model, and thus one would expect depositors to be less prone to run with a self-interested government. However, in equilibrium, agents account for the possibility that the government will be overthrown to assess the likelihood of a bailout. Now, the inference that the cost of crisis is high following a bailout proposal is more precise (z closer to 1) with

a lower probability of having a self-interested government. Therefore, the expected gain from dismissing the government becomes too small, that is, the expected cost of firing the government is too high compared to the cost of retaining her (see comments following Proposition 1). It follows that a bailout proposal is accepted for a larger set of parameters (higher T or lower ϕ), and thus that bank runs are less likely.

Not surprisingly, the probability of a banking crisis in equilibrium is increasing in q , the probability that the social cost of bank liquidation is low. This result straightforwardly follows from Proposition 2 and the aforementioned way of computing those probabilities in cases of multiple equilibria. This is reinforced by the fact that z is decreasing in q , which implies that an equilibrium of Type *iii* – with a probability pq of banking crisis – will arise for a larger set of parameters at the expense of Type *ii* (psq).

To conclude this section, it is noteworthy that financial fragility not only does exacerbate financial instability but also can result in political crisis. This consequence is captured by that, for any given set of probability parameters, the effect of deteriorating bank fundamentals, such as an increase in the bank external borrowing d and investment k^1 , may result in the equilibrium jumping from one type (say, 5b) up to the next one (5c) with a higher probability of bank runs and political crisis. This is merely because the taxation cost of bailout is higher, following the aggravated bank liquidity position. This is of particular interest in the zones where two equilibria coexist. News of slightly deteriorating fundamentals may suffice to result in political instability, as the public coordinates on the less favorable equilibrium.

So far, we have likened the subjective assessment by the public of the country types with their prior distributions, and have not thought of what may trigger expectational shifts. We turn to this issue in the next section.

4 Contagion

In this section, we prove that a politico-financial crisis in a country may spread to other countries as agents update their beliefs on the type of their government and on the cost of a banking crisis, provided that policymakers' personal costs and liquidation costs are correlated across countries.

4.1 Two-country model

We extend here the framework of Section 2 to a two-country model. To do so, we specify the distributional relation across countries between the social

¹ A higher k aggravates the bank illiquidity ($= x + (1 - S) d - rk - b$). Indeed, this rise is done at the expense of b , the amount invested in the world liquid asset; and then, using that $r < 1$: if $K' > k$, and b and b' are such that $K' + b' = k + b$, then $rK' + b' < rk + b$.

costs of bank liquidation and between the policymakers' personal costs, and we pay attention to the sequential coordination of the public's expectations.

We consider two small open economies, say, A and B , during two consecutive periods. Country A is the economy previously examined, and we re-label its parameters with Superscript A , while we use Superscript B in the other country. The two countries have the same fundamental structure. The analysis in Country B is analogous to A , except for the crucial fact that the public (international lenders, depositors and the representative agent in B) know whether or not a crisis has occurred in A when about to make a decision regarding buying the new debt issue, running on the bank, and dismissing the policymaker in B . We will prove that a crisis in A impinges on the likelihood of a crisis in B due to this additional information. We first lay down two important assumptions.

ASSUMPTION 6: Policymakers' propensities to bailouts are correlated across countries. Formally, social costs of bank liquidation χ^A and χ^B are positively correlated, as well as policymakers' personal costs β^A and β^B .

Groups of countries in emerging markets display clear-cut similarities relevant for the costs of banking liquidation. The fragility of their financial systems, their reliance on foreign capital inflows, the likelihood of social unrest following a collapse. This homogeneity entails that liquidation costs are correlated across these countries. Besides, together with that information acquisition is costly, it also implies that the public is likely to reappraise these costs should a crisis materialize in any of those countries.

We linked political distortions to reputation considerations. A correlation between policymakers' personal costs can then be vindicated on the grounds of countries' membership to "clubs", in the sense of Drazen (2000). These clubs may be explicit (such as the former European Exchange Rate Mechanism) or implicit (more or less formal cooperative agreements) or ongoing (such as being part of the Free Trade Area of the Americas). The governing abilities of policymakers in one country are assessed relative to the abilities of policymakers in other countries of the club. In this sense, policymakers' personal costs are correlated. Likewise, the commitment to saving failing banks in one country may be considered less important after the collapse of the banking system in an important member of the group.

ASSUMPTION 7: The sunspot variables coordinating foreign lenders' expectations are independently and identically distributed across time and countries. This is also true for the sunspots relevant to depositors. This not only means that the way an equilibrium is selected in B is the same as in A when multiple equilibria coexist, but also that the coordination mechanism in B is independent of what occurred in A .

This assumption clears up an ambiguity often seen in the literature of contagion. We rule out alterations in the coordination device of the public's

expectations following a crisis in *A*. It follows that the channel of informational contagion is here the reassessment of country types, which we formally prove next.

4.2 Political contagion

A politico-financial crisis in a country may spread to other countries as citizens update their beliefs on the type of their government. Doing so, they may reinforce their beliefs that the government is self-interested and bank bailouts are not socially optimal.

THEOREM 3: There is contagion if country types are correlated, namely, a crisis in Country *A* increases the probability of a crisis in Country *B*. More specifically:

- a crisis in *A* that exhibits both financial and political crises spreads to *B* as the public reinforces its beliefs that the government in *B* is self-interested;
- a crisis in *A* that features only a banking crisis spreads to *B* as the public reassesses the cost of crisis to be lower in *B*.

Proof²: First, if both a financial crisis and a political crisis take place in *A*, then the posterior probability of a political distortion in *A* is higher than the prior probability, as a result of Theorem 1 and Bayes' rule. Therefore, the public reinforces its beliefs that the government in *B* is self-interested since the governments' types are correlated. It follows from Theorems 1 and 2 that the probability of a banking crisis and a political crisis in *B* is higher.

Second, if only a banking crisis occurs in *A*, namely, an equilibrium of Type *ii* arises in *A*, then the probability – conditional on this information – that the cost of crisis in *A* is low is higher than the unconditional probability of a low cost of crisis, as a result of that the probability of a banking crisis in equilibrium is increasing in the probability that the social cost of bank liquidation is low (see end of Section 3) and of Bayes' rule. Therefore, the public revises its beliefs that the cost of crisis is low in *B* since those costs are cross-country correlated. It follows that the probability of a banking crisis in *B* is higher. Conversely, the posterior probability of a political distortion in *A* is lower, as a result of Theorem 1 and Bayes' rule. So, the public reinforces its beliefs that the government in *B* is benevolent, and it follows that the probability of a political crisis in *B* is lower. All in all, the probability – conditional on the event that only a banking crisis occurs in *A* – that only a banking crisis takes place in *B* is higher than the unconditional probability of an equilibrium of Type *ii* in *B*.

² A more formal proof is available from the author upon request.

The idea behind this result is somewhat reminiscent of the political contagion of currency crises highlighted by Drazen (2000), in the context of the collapse of the European Exchange Rate Mechanism in 1993. To Drazen, membership effects can explain why a currency crisis in a member of the club may dampen the commitment of policymakers in other countries to keeping their exchange rate pegged.

To conclude this section, it is noteworthy that the previous two-economy model can be straightforwardly adapted to more economies. The only amendment is that the Bayesian update of beliefs about the costs of liquidation and the political distortions in a third country, say *C*, entails conditioning expectations on the outcomes in both Countries *A* and *B*; and so on, when accounting for more countries.

5 Conclusion

This paper built a model of bank runs and bailouts with political distortions and where citizens have the possibility to dismiss policymakers and overrule their bailout announcement. To do so, we featured a non-cooperative Bayesian game between the government and the representative agent with an information asymmetry regarding the social cost of bank liquidation and the government type, and then brought in the expectations of foreign lenders and home depositors about the outcomes of that political game. Our main findings have been the following.

First, the possibility of a political crisis in equilibrium is increasing the more likely there are political distortions. Second, political uncertainty increases financial instability as it enlarges the set of parameters for which expectations of financial and political crises indeed make optimal a bank run and the dismissal of the government. Third, foreign lenders' expectations about the outcomes of the political game are self-fulfilling in that they can raise the likelihood of financial crises and lead to political crises. Fourth, there may be contagion if country types are correlated. In particular, contagion happens if after a first banking crisis in a country, the citizens of other similar countries update their beliefs on the type of their government. Doing so, they may reinforce their beliefs that the government is self-interested and bank bailouts are not socially optimal.

A possible follow-up is paving the way for concomitant drops in securities prices. Indeed, collapses of asset values have often been observed in recent crises. Introducing collateralized borrowing in the model may be a step in the right direction. Another possible continuation, motivated by the recent events in Latin America, is to analyze the interaction between electoral uncertainty and financial fragility, while maintaining a framework of political distortions.

References

- Burnside C., M. Eichenbaum and S. Rebelo, (2004), "Government Guarantees and Self-fulfilling Speculative Attacks", *Journal of Economic Theory*, 119, pp. 31-63.
- Chang R., (2004), "Financial Crises and Political Crises", *Working Paper*, Rutgers University, NJ.
- Chang R. and A. Velasco, (2001), "A Model of Financial Crises in Emerging Markets", *Quarterly Journal of Economics*, 116, pp. 489-517.
- Corsetti G., P. Pesenti and N. Roubini, (1999), "Paper Tigers? A Model of the Asian Crisis", *European Economic Review*, 43, pp. 1211-1236.
- Diamond D. W. and P. H. Dybvig, (1983), "Bank Runs, Deposit Insurance, and Liquidity", *Journal of Political Economy*, 91, pp. 401-419.
- Drazen A., (2000), "Political Contagion in Currency Crises", in P. Krugman (ed.), *Currency Crises*, Chicago: University of Chicago Press.
- Giannetti M., (2003), "Bank-Firms Relationships and Contagious Banking Crises", *Journal of Money, Credit and Banking*, 35, pp. 239-261.
- Irwin G. and D. Vines, (2003), "Government Guarantees, Investment and Vulnerability to Financial Crises", *Review of International Economics*, 11, pp. 860-874.

Appendices

Appendix A: Derivation of Proposition 1

To illustrate, we elaborate the derivation of PBE of Types *ii* and *iii*. The full proof can be found in Chang (2004).

We start with Type *ii*. First of all, the policymaker's strategy is optimal. This is clear if she is benevolent since $\chi_L < V$ and $V < \chi_H$. This is also clear if she is self-interested, making use of Condition (2): $(1 + g)\chi_L \geq \chi_H$, in Assumption 5 and of $V < \chi_H$.

Now, as for the representative agent, first, he has no incentives to overturn the policymaker if she proposes no bailouts. Indeed, given the policymaker's strategy, the representative agent infers that $\chi = \chi_L$ with probability one. Thus, no bailouts is socially optimal, and there is no reason to dismiss the policymaker. Second, he has no incentives either to fire the policymaker if she proposes bailout, since the cost of dismissal is greater than that of accepting the policymaker's proposal. To see that, the cost of retaining the policymaker is V , while the expected cost of firing her is $\phi + zV + (1 - z)\chi_L$, with $z = P(\chi = \chi_H | \text{policymaker proposes to bail-out})$. Indeed, the representative agent expects that he will himself bail-out with probability z and

won't bail-out with probability $(1 - z)$. Finally, $V \leq \phi + zV + (1 - z)\chi_L$ boils down to the right-hand inequality of the condition of Type *ii*.

It is easy to show that: $z = (1 - q) / [(1 - q)s + (1 - s)]$ by means of Bayes' rule.

In PBE Type *iii*, a political crisis occurs unless the policymaker is benevolent and the social cost of bank liquidation is low. The preceding reasoning implies that $\chi_L + \phi / (1 - z) < V$ must hold for that the representative agent chooses to dismiss the policymaker if she proposes to bail-out.

Now, as for the policymaker, we first consider the case where she is benevolent. It is optimal for her to propose not to step in when the cost of bank liquidation is low (since $\chi_L < V$). If the cost of liquidation is high, the benevolent policymaker's cost from proposing bailout is $V + \phi$, as she knows that she will be fired following such an announcement, after which the representative agent will bail-out eventually ($V < \chi_H$). On the other hand, by proposing no bailouts, the cost is χ_H , as the political crisis will be avoided at the price of liquidation. Hence, it is optimal for the benevolent policymaker to propose to bail-out if: $V \leq \chi_H - \phi$, when $\chi = \chi_H$.

We now consider the case where the policymaker is self-interested. First, when $\chi = \chi_H$, since $V \leq \chi_H - \phi$ holds, then $V \leq (1 + \gamma)\chi_H - \phi$ holds, and it is optimal to propose bail-out and be dismissed. Second, when $\chi = \chi_L$, proposing no bailouts means avoiding the political crisis, but the cost to the policymaker is $(1 + \gamma)\chi_L$, whereas proposing bailout means dismissal, after which the representative agent won't bail-out since the cost of liquidation is low, which yields a cost of $\chi_L + \phi$. It follows that proposing bailout is optimal for the policymaker, making use of Condition (3): $\gamma\chi_L > \phi$, in Assumption 5. This ends the derivation of PBE Type *iii*.

Deriving Type *iv* follows along similar lines, while Type *i* and *v* are easier to show.