Bank Bailouts and Redistributive Monetary Policies: a political economics approach

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Abstract

Since the outset of the Financial Crisis, Central Banks have been widely supporting the governments' effort to rescue troubled banks. Their support often consisted in generous monetization policies. This paper studies the efficient level of such policies. It also argues that often these policies yield large redistributive effects, which in turn fuel political conflict within society. High political pressure on Central Banks lowers their independence, leading to excessive bailout and monetization levels. This kind of political distortion is more likely to occur when troubled banks are big and their ownership is widespread. This in turn strengthens the incentive for big banks to engage in moral hazard.

Keywords: Central Bank Independence, Redistributive Monetary Policy, Bank Bailout, Systemic Risk, Political Economy.

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1 Introduction

Since 2008, one of the effects of the financial crisis has been the massive state intervention in bank bailouts and subsequent deterioration of public finances in many countries. The instability in the financial system resulted, at least partly, in the instability of government budgets. Central banks were widely involved in the bailout process by supporting directly and indirectly the government's effort to rescue banks. The crisis brought about a different perception of the trade-off between financial stability and monetary stability.

Since the financial crisis people have been much more concerned about the consequences of rescuing troubled banks on their tax bill, and on the value of their financial portfolios. Bank bailouts, and the level of involvement of central banks are subject to the attention of the media and the scrutiny of public opinion.[1] Politicians who make decisions about saving a bank are aware that they will face the electoral consequences for their choices.[2]

There is agreement in the literature that big banks are more likely to receive generous bailouts, because the systemic consequences of them going bust would be too costly for society. Thus, being more generous with larger banks is optimal for the social planner. This paper makes a different point. Since the majority is more likely than the social planner to be interested in saving a big bank, the bailout of a big bank will be even more generous than the socially optimal level. This in turn has two consequences. First, the political pressure on the central bank to facilitate the bailout of large banks will lead to excessive monetization. Second, big banks anticipate that,

[1] E.g. King, "Era of Independent Central Banks Is Over", *Financial Times*, January, 10, 2013. Blanchard O., "Ten Takeaways from "Rethinking Macro Policy: Progress or Confusion?", *Vox*, May 25, 2015.

[2] Recently, German finance minister Wolfgang Schäuble blamed Mario Draghi's easy money policies for the rise of the rightwing "Alternative for Germany" party, in April 2016 (Financial Times, April 10, 2016).

Also in the US, a lively political debate originated from the monetary policy that the Federal Reserve designed and implemented to face banking imbalances (cf. J. Taylor, "The FED Policy Is a Drag on the Economy", *The Wall Street Journal*, January 28, 2013).

in case they fail, the majority will be in favor of bailouts. This gives them additional incentive to engage in moral hazard.

The argument is the following. Risk-taking in financial intermediation is a social cost which is not fully internalized either by banks or other financial institutions.[3] When a government decides to rescue a bank, the cost of the bailout is charged to the entire population.[4] As a result, distortionary taxation increases. There is a socially optimal level of bailout, which trades off the cost of instability against the cost of tax distortion. A way to reduce tax distortion is to have a less independent central bank which monetizes, at least partially, the debt issued to bail the bank out. This lowers the cost of servicing the debt, reduces social conflict about bailouts, but increases monetary instability.[5] Assuming that the degree of monetization is inversely correlated with the degree of central bank independence (CBI), normatively, we characterize the optimal level of CBI. Such level solves the trade-off between the cost of higher monetary instability and the cost of servicing public debt. But if one approaches the issue from a positive point of view, the story is quite different.

When it comes to politics, heterogeneity of preferences and redistribution effects matter. Large banks' stakeholders (e.g. depositors or shareholders) receive more benefits than the average if the bailout is implemented. Thus they want relatively generous bailouts. They also want monetary policy to shoulder a large share of the bailout burden, in order to reduce its fiscal cost.

[3]E.g. Perotti and Suarez (2011), Korinek and Kreamer (2014).

[4]Becker (1999) shows that fiscal and quasi-fiscal costs of banking crises during the reconstruction period could exceed 40%.of GDP. Laeven and Valencia (2010) find that median output loss of recent banking crises accounted for about 25% of GDP. Veronesi and Zingales (2010) find that the U.S. government intervention in October 2008 increased the value of banks by over $100 billion but at an estimated cost for taxpayers of between $25 and $47 billion. Panetta et al. (2009) study Eurozone bailouts. They observe that while bank equity was wiped out in most cases, bank creditors were backstopped, reflecting a war of attrition between bank regulators and governments.

[5]Higher monetary instability implies higher variability of the price level, the interest rate and the exchange rates.

If these individuals represent a large mass to influence policy makers, then two forms of political distortion will take place: too generous bailouts, and too much monetization. This double political distortion is even larger if the majority own a relatively low amount of government bonds. This majority is in fact relatively uninterested in the yield of this bonds. Thus, it will exert a strong political influence on the central bank to extensively monetize bailouts. To the best of our knowledge, this paper is the first to pin down such redistributive effects, studying how they lead to political distortions.

The model in this paper can be extended in several directions. First, in the case of a bail-in, policy is less distorted because shareholders receive no money, thus they are uninterested in making any political pressures. Second, if foreign investors control large percentages of bank's shares/deposits, then the amount of money injected in the bank is smaller. The reason is that foreign investors do not vote. Thus the majority of domestic voters is unwilling to refund them through a large bailout. Third, policy is more distorted toward monetization if the level of taxation is already high. The reason is that at the margin monetization yields a larger reduction in tax distortion.

The 2008 crisis has challenged the traditional central banking model, where monetary policy is conducted by an independent agency which follows an interest rate rule-based approach to stabilize inflation and output.[6] A significant number of reforms are taking place, which affect in particular the role of central banks in supervision. In 2010, the US passed the Dodd-Frank Act, which ended up increasing the responsibilities of the Fed as prudential supervisor (Gorton and Metrick, 2013). In the EU, the heads of state and government of the eurozone established the Single Supervisory Mechanism, which was headquartered at the ECB in November 2014. In 2010, the UK government put the key prudential functions of the Financial Services Authority within the purview of the Bank of England. In the same year the

[6] C.f. Bernanke B. (2013), Goodhart et al. (2009); Curdia and Woodford (2011); Gertler and Karadi (2011); Giavazzi and Giovannini (2011); Cukierman (2008 and 2013), Cecchetti et al. (2011), Reis (2013), Reichlin and Baldwin (2013), Svensson (2010), Woodford (2012).

Irish Financial Services Regulatory Authority was legally merged with the central bank. What are the effects of these reforms on independence? The trend towards greater central bank involvement in banking supervision yields monetary instability. One of the channels is bailout monetization. Looking backwards, the monetary policy to tackle the crisis actually yielded enormous wealth redistribution. However the traditional analysis disregards the redistributive consequences of monetization of bailouts and how they shape a societal preferences for CBI. Posen (1995) studied the redistributive effects of monetary policy implemented under different central banking regimes. Brunnermeier and Sannikov (2013) point out that central banks redistribute tail risk when purchasing assets or relaxing collateral requirements. Appropriately redistributive monetary policy can reduce overall risk in the economy, leading to Pareto improvements. However, such policy should be strictly limited to undoing amplification effects. In the present model, similarly to Brunnermeier and Sannikov, it is heterogeneity in agents' asset holdings that enables monetary policy to redistribute wealth. Of course monetary policy comes with the cost of moral hazard also in our model. We however point at the normative aspects. We study the link between redistributive effects and policy outcomes. Then we focus on political distortions.

Several recent papers explore relationships between bailout policy, monetary policy and public debt accumulation. Differently from us, all these papers adopt a normative perspective. Farhi and Tirole (2012) look at bailout expectations, which imply an endogenous loss of public control over money supply. Acharya et al. (2014) show that bailouts triggered the rise of sovereign credit risk in the Eurozone. They claim (and empirically verify) that a distressed financial sector induces government bailouts. Sovereign credit risk increases. This in turn weakens the financial sector by eroding the value of government debt guarantees and bond holdings.[7] Gennaioli et al. (2013) find on average that banks hold a significant share of their assets in government

[7] Cf. also Sgherri and Zoli (2009), Attinasi et al. (2009).

bonds and that these holdings may crowd out loans during crises. Reality shows that credit crunches lead to more expansionary monetary policy. We do not consider credit crunches explicitly, but one of our normative results is that bailouts lead to less independent monetary policy.

Finally, this paper is also related to a literature studying financial markets from the viewpoint of political economics (e.g. Modigliani and Perotti, 2000; La Porta, et al., 2008). Voters can influence political decisions and induce policy choices that better suit their interests. Perotti and von Thadden (2006) adopt the perspective of the median voter to account for the evolution of financial systems. Degryse et al. (2013) study the development of the banking system from a historical perspective. They hold that the median voter has a mixed identity as investor and worker. If the median voter has sufficient financial wealth, a majority will support strong minority shareholder's protection and therefore a greater role for stock markets. In contrast, if the median voter relies on labor income, he/she will assign a central role to banks. Masciandaro and Passarelli (2013) claim that the choice between financial regulation and taxation reflects the preferences of the median voter. Pagano and Volpin (2005) consider how electoral rules (majoritarian versus proportional) affect the design of financial systems.

The paper is organized as follows. Section 2 presents the theoretical model. Section 3 studies the relationship between the bailout policy and CBI. Section 4 discusses the results and presents some extensions of the model. Section 5 concludes. The Appendix contains details on some mathematical passages of the model.

2 The model

The economy consists of a banking system, a government, a central bank, and a population of individuals. Credit intermediation is a risky activity, and the insolvency of a bank has adverse systemic consequences for the economy, a form of negative externality. In case of a bankruptcy, the government has to decide whether to let the bank fail or rescue it by injecting fresh capital. In the latter case, the government issues public debt for the amount of the bailout. Government bonds are purchased either by individuals or by the central bank. The degree of independence tells us the amount of public debt that the central bank is forced to subscribe.

The sequence of events is the following. At $t = 0$ banks engage in risky activities and make profits. The latter determine the market value of banks' shares but also the chance that banks are not able to meet their obligations (i.e. repay deposits and bonds). At $t = 1$ bank failures eventually occur and the government sets up the rescue policy. This policy is made by two decisions: first, how much capital to inject in the troubled banks (i.e. the amount of bailout); second, how much government debt issued to save banks must be bought by the central bank (i.e. the obverse of CBI). At $t = 2$, the government charges an income tax to repay debt and interest. Citizens, given the tax, decide how much they want to work. Then the central bank transfers back to the government payments for interests received on its bonds.[8] The sequence eventually repeats in future periods.

To simplify, we assume that there is only one bank in the economy. We also assume that the population size is one. Thus, total and per-capita amounts are the same for all the variables in the model.

2.1 The bank's problem

Banking activity is measured by a variable r which also parametrizes the amount of risk that the bank bears while making loans or purchasing assets. The bank's profits are increasing as a function of risk, and so are dividends, and the equity value of the bank. Let this value be $\pi(r)$, with $\pi'(r) > 0$,

[8] The sequence of events may be changed without any substantial changes in the results. Specifically, any of the two policy decisions (i.e. bailout policy, and CBI policy) may occur prior to the bank failure.

and $\pi''(r) < 0$. Without loss of generality, we normalize the number of bank shares to one, then $\pi(r)$ also represents the market price of the bank's shares. Let $\lambda \cdot \pi$ be the total amount of the bank's liabilities, where λ is the liability-to-capital ratio, which parametrizes the bank's financial leverage. If the bank is unable to meet its obligations, the bank's equity value falls to zero, and a series of systemic consequences take place. In this case, the government may choose to bailout the bank. Rescuing a bank entails injecting fresh capital in a proportion β of its equity value and its liabilities: $\beta \cdot (\pi + \lambda\pi)$. Thus β is the policy variable which parametrizes a bailout ($\beta \in [0, 1]$). We assume that $\beta \cdot \pi$ represents the equity value of the bank (and its share price) after the bailout.[9]

Let $p(r)$ denote failure probability, which is increasing and convex in risk: $p'(r) > 0$, and $p''(r) > 0$. At time 0 the bank chooses how much risk to take in order to maximize its own *expected* equity value:

$$Max_r \quad \pi(r) \cdot (1 - p(r)) + \beta^* \cdot \pi(r) \cdot p(r)$$

The first term in the maximand is the expected value of the bank in case of no bailout; the second one is the expected amount of bailout, where β^* is the bailout policy implemented by the government in equilibrium. As we show in the following, the current choice on risk made by the bank positively affects the equilibrium bailout. The reason is that the bank anticipates that bailout policy is more generous with larger banks: $\beta^* = S(\pi)$, with $S_\pi > 0$ (cf. subsection 2.3). One remark is in order here. Although the bank does not fully internalize the systemic consequences of its activities, it nonetheless has a consistent view of the future consequences of its current choices. Specifically, the bank is farsighted and correctly takes into account how its current risk choice will affect future equilibrium bailout policy.

[9] This is the case of bailout: the shareholders only bear a cost $(1 - \beta) \cdot \pi$ in case of failure. We study below how things change in case of bail-in; i.e., they bear the full cost π.

The optimality condition that pins down the level of risky activities undertaken by the bank, r^*, is the following:

$$[\pi'(1-p) - p'\pi] + S \cdot (\pi' p + p'\pi) + S_\pi \pi' \cdot \pi p \leq 0 \tag{1}$$

where strict inequality implies $r^* = 0$.[10] The first bracketed term in (1) represents the marginal effect of r on the bank's expected equity value. If the bank had no chance to be bailed out, only this term would appear in the LHS of (1). The second term represents the moral hazard induced by a larger level of government support in case of insolvency: larger bailouts by the government lead to more risk taking by the bank. The third term is a second-order effect on moral hazard: by choosing a higher level of risk today, the bank leads the government to implement a bigger bailout tomorrow. The bank correctly anticipates this effect, then it takes on more risk today.[11]

2.2 The government's problem

The government injects an amount $\beta\pi(1+\lambda)$ of fresh money in the bank. It issues new debt at time 1, and it charges a linear income tax for servicing the debt at time 2. The government budget constraint at time 2 is then:

$$\beta(1+\lambda)\pi \cdot (1 + i(1-\delta)) = \tau y \tag{2}$$

where τ is the tax rate and y is income before taxes. The term $\beta(1+\lambda)\pi$ in the LHS of (2) is the amount of debt issued to rescue the bank; i is the interest rate paid on government bonds; δ is the debt portion purchased by the central bank ($\delta \in [0,1]$). The latter parametrizes debt monetization or, in negative, the level of Central Bank Independence (CBI), which is an endogenous variable in this model. The interest rate on government bonds i

[10] The Appendix verifies the second order condition.

[11] In section 3 we study what appens under bailin, where shareholders are not refunded, not even partially, of their losses in case the bank go bankrupt.

is determined according to a no-arbitrage condition with respect to a risk-free interest rate, ρ, that we normalize to zero for simplicity. For any dollar of debt, the government repays $1+i(1-\delta)$ dollars. The government's borrowing costs, $i(1-\delta)$, are positively related to CBI. This has three, non-mutually exclusive, interpretations. First, when the central bank is more independent (low δ), a larger portion of the debt has to be sold to the market. This lowers government bond prices, and increases the nominal interest rate from i up to $i(1-\delta)$. Second, when the central bank is more independent, the real interest rate that the government pays on bonds is higher; in this case $i(1-\delta)$ parametrizes the real interest rate paid by the government to service one dollar of debt. Third, the central bank rebates back to the government the payments for interests on government bonds. Thus the higher the CBI, the larger the debt portion sold to the market, and the higher the net payment for interests made by the government.[12] We retain the third interpretation. The central bank is modeled as an agent that strictly follows the monetization rule set by the government.[13] Thus for simplicity we keep i and bond prices fixed, and we do not consider the effect of CBI on the real interest rate.[14]

[12] An alternative assumption is that the government never repays the debt sold to the central bank. In this case the budget constraint would be $\beta(1+\lambda)\pi(1-\delta)(1+i) = \tau y$. The model would be slightly different, but the main implications would remain qualitatively the same.

There is not an explicit model for the central bank's behavior. Implicitly, the central bank does not buy any of the government bonds issued to save the bank, unless it is forced to do so by the government.

[13] This modelization choice is typical in the literature on CBI, which assumes that the degree of independence is associated with and measured by the rules governing the quantity and the conditions under which the central bank lends money to the government (e.g. Grilli et al., 1991; Cukierman et al., 1993; Alesina and Summers, 1993; Eijffinger and De Haan, 1996; Crowe and Meade, 2008).

[14] In section 3 we discuss how our results change if inflation hits asymmetrically the yield and the value of the individuals' porfolios.

2.2.1 Labor supply and labor income

Individuals are risk neutral and draw utility from consumption and disutility from labor. They use labor income (after taxes) and assets in their portfolios to buy consumption goods. In this paper we want to focus on heterogeneity due to portfolio composition. Thus we assume that labor income is the same for all individuals while portfolios differ. Let individual utility from labor be:

$$l(1-\tau) - U(l) \tag{3}$$

Labor productivity is normalized to one, thus $l(1-\tau)$ is after-tax labor income. $U(l)$ is an increasing and convex effort function. After observing τ, an individual chooses how much to work in order to maximize (3). The optimality condition yields his/her labor supply function:

$$L(\tau) = U_l^{-1}(1-\tau) \tag{4}$$

$L(\tau)$ is decreasing in the tax rate: $L_\tau < 0$.[15] Labour supply is the same for all individuals. Since population size is one and labor productivity is one as well, the labor supply also represents total income in the economy: $y = L(\tau)$. Using (2), and (4) the government budget constraint can be written as

$$\tau L(\tau) = \beta(1+\lambda)\pi \cdot (1 + i(1-\delta)) \tag{6}$$

[15] More precisely, the FOC to maximize (3) is:

$$1 - \tau - U_l(l) = 0 \tag{5}$$

This equation yields, in implicit form, the labor supply function in (4). The SOC is satisfied thanks to the convexity of $U(l)$.
To ensure that the optimal taxation problem described here is well behaved, we assume that $L_{\tau\tau}(\tau) = \frac{U_{lll}}{U_{ll}^2} L_\tau < 0$. This amounts to assuming that $U_{lll} > 0$.

Equation (6) defines, in implicit form, the function linking the tax rate to the policy parameters: $\tau = T(\beta, \delta)$. Differentiating (6) yields

$$T_\beta = \frac{(1+\lambda)\pi \cdot (1+i(1-\delta))}{l^*(1-\eta(\tau))} > 0 \tag{7}$$

$$T_\delta = -\frac{\beta(1+\lambda)\pi \cdot i}{l^*(1-\eta(\tau))} < 0 \tag{8}$$

where $l^* \equiv L(\tau)$ is the equilibrium labor supply (and income) and $\eta(\tau) \equiv -\tau L_\tau / L$ accounts for tax distortions.[16] Larger bailouts are financed by higher tax rates ($T_\beta > 0$). However, if CBI is lower the tax rate is lowered accordingly ($T_\delta < 0$), since a larger part of the debt is monetized and the cost of servicing the debt is lower.

2.2.2 Financial assets and consumption possibilities

There are four different assets in this economy: 1. banking shares, 2. banking deposits and obligations, 3. government bonds eventually issued to bailout the bank, 4. all remaining financial assets. Suppose a bank failed and a bailout of size β occurred at time 1. The *average* value of an individual's portfolio at time 2 is the following:

$$\beta\pi + \beta\lambda\pi + \beta(1+\lambda)(1-\delta)\pi(1+i) + [w - \beta(1+\lambda)(1-\delta)\pi] \tag{9}$$

The first term is the value of the bank's shares after the bailout. The second term is the value of the bank's deposits/obligations. The third term is the amount of government bonds inclusive of interest payments. This amount does not include bonds purchased by central bank. The term in brackets is the value of remaining assets, given by initial financial wealth, w, minus government bonds purchased by individuals. The bailout positively affects

[16] Since taxes distort the incentive to provide labor effort, tax revenues $\tau L(\tau)$ are concave in τ, and reach a maximum at $\tau = \tilde{\tau}$, where $\eta(\tilde{\tau}) = 1$. Thus the tax rate is constrained in the range $[0, \tilde{\tau})$.

average portfolio value through three channels. First, it increases the value of the bank's shares. Second it restores, at least partially, the value of banking deposits and obligations. Third, it originates interest payments on government bonds that would not have occurred in the absence of bailout.

Individuals draw utility from consumption c at time 2. Consumption is financed by portfolio assets plus disposable labor income. The budget constraint of an individual who owns an average portfolio is then

$$c = l^*(1 - T(\beta, \delta)) + w + \beta(1 + \lambda)\pi(1 + i(1 - \delta)) \equiv C(\beta, \delta) \qquad (10)$$

2.2.3 Social welfare

Banking failures have negative consequences for the entire financial system. First, bankruptcies increase the risk of systemic financial collapse, and threaten to trigger a deep recession with adverse impact on output and employment. Let the externality function that captures systemic risk be

$$\frac{\varepsilon}{2}\left[(1 - \beta)(1 + \lambda)\pi\right]^2 \equiv E(\beta) \qquad (11)$$

with $\varepsilon > 0$. Systemic risk is increasing and convex in the amount of "toxic" bank liabilities that cannot be honored by the bank. After a bailout of size β, the amount of these liabilities is $(1 - \beta)(1 + \lambda)\pi$.[17]

Second, monetizing the bailout, at least partially, comes at the cost of increased monetary instability. As mentioned earlier, this cost is due to higher variability of the price level, the interest rates and the exchange rates. To ensure that the government's maximization problem is concave (see next subsection), the cost of monetary instability, $I(\beta, \delta)$, is quadratic in the mon-

[17] A quadratic externality function yields a closed form solution for the bailout policy, it also greatly simplifies comparative statics. Qualitatively, all results go through with a more general increasing and convex function.

etization parameter, δ:

$$\phi/2 \cdot \delta^2 \beta(1+\lambda)\pi \equiv I(\beta,\delta) \tag{12}$$

where $\phi > 0$.

Individuals draw utility from consumption and disutility from labor. They also bear the cost of systemic risk and inflation. Realistically, we assume that this cost is equally borne by every individual in society.[18] An *average* individual is the one who owns the average portfolio defined by (9). By (3), (10), (11) and (12), the indirect utility function of the average individual at time 2 is

$$V(\beta,\delta) = C(\beta,\delta) - U(l^*) - E(\beta) - I(\beta,\delta) \tag{13}$$

Since population size is one, $V(\beta,\delta)$ also represents the indirect welfare function of the entire society. Maximizing the utility of the average individual amounts to maximizing social welfare. We proceed to do this in the next subsection.

2.3 Socially optimal policy

Socially optimal bailout policy, β^*, and socially optimal monetization policy, δ^*, represent the normative benchmark to evaluate the actual policy chosen by the majority. The benevolent government sets these policies simultaneously at $t = 1$ in order to maximize social welfare, $V(\beta,\delta)$. By (13) and (10), the two optimality conditions are

$$V_\beta = C_\beta(\beta,\delta) - E_\beta(\beta) - I_\beta(\beta,\delta) \leq 0 \tag{14}$$

$$V_\delta = C_\delta(\beta,\delta) - I_\delta(\beta,\delta) \leq 0 \tag{15}$$

[18]In section 3 we discuss how risults might change if inflation cost is heterogeneous across individuals.

where strict inequalities imply corner solutions (i.e. $\beta^* = 0$, or $\delta^* = 0$).[19] The government trades off tax distortions against the benefits of reducing systemic externalities. This trade-off is mitigated by monetization which, however, yields monetary instability. Suppose (14-15) hold as equalities. The first optimality condition says that β^* equates at the margin the gain from lower systemic risk, $-E_\beta(\beta) > 0$, with the loss from larger tax distortions, $C_\beta(\beta, \delta^*) < 0$, and higher monetary instability, $-I_\beta(\beta, \delta^*) < 0$. The second condition tells us that δ^* is set where at the margin the cost of monetary instability, $-I_\delta(\beta^*, \delta) < 0$, equals the gain from lower tax distortion due to lower cost of servicing the debt, $C_\delta(\beta^*, \delta) > 0$ (cf. Appendix for mathematical details).

By solving the FOC system (14-15) and using (10-12) we obtain the socially optimal policies:

$$\beta^* = 1 - \frac{1}{\varepsilon(1+\lambda)\pi}\left[\frac{\eta}{1-\eta}(1+i(1-\delta^*)) + \frac{\phi}{2}\delta^{*2}\right] \tag{16}$$

$$\delta^* = \frac{\eta}{1-\eta}\frac{i}{\phi} \tag{17}$$

The Appendix verifies the second order conditions. Comparative statics, see Appendix, shows that the equilibrium has the following features:[20]

- If labor supply is relatively elastic (high η), then it is optimal to choose a low bailout together with large monetization. The reason is that high labor elasticity implies high tax distortion. The social cost of saving the bank is large. Thus β^* is low. High tax distortion also provide a strong incentive to monetize, since it is a way to lower payments for interest as well as taxation.

[19] We consider the general case of $\beta \in [0, 1]$. Of course, one might only consider "yes-no" bailout decisions (i.e., $\beta \in \{0, 1\}$). In this case, the government's choice is simple: it saves the bank (i.e., $\beta^* = 1$) if social benefits are larger than social costs, otherwise it lets the bank fail ($\beta^* = 0$).

[20] By (17), δ^* is independent of β. Moreover, as shown in Appendix, $\partial\beta^*/\partial\delta^* = 0$. This is a consequence of assuming quadratic functions for systemic risk and inflation cost. It allows us to get rid of substitutability/complementarity effects between β^* and δ^*, making comparative statics results much sharper.

- If the interest rate is high (large i) the cost for servicing the debt sold to the market is large. The government then reduces the amount of the bailout and chooses to monetize a larger share of debt.

- If monetary instability is costly (large ϕ), the government finds it optimal to have lower levels of both policies. First, it reduced to total amount of debt issued to rescue the bank. Second, it chooses to monetize a smaller portion of debt.

- If systemic risk externalities are large (high ε), the government will inject more capital in the bank, because otherwise the cost for society would be too large. The portion of monetized debt is kept constant. Thus the total amount of debt sold to the central bank increases.

- A large bank size (large π) or high financial leverage (high λ) will push the government to opt for a big bailout. Specifically, as pointed out earlier, $\beta^* = S(\pi)$ with $S_\pi > 0$. This is a version of the standard "too big to fail" argument. Moral hazard by the bank hinges precisely on this mechanism (cf. subsection 2.1). The monetization parameter, δ^*, is held constant. Thus the amount of debt monetized by the central bank increases. In synthesis, an increase in bank size yields a more than proportional increase in debt/taxation/monetization.

2.4 The voting stage

2.4.1 Portfolio heterogeneity and individual utility

Bailout and monetization policies have important redistributive effects. However, the Benthamite government described in the previous subsection is only concerned about economic efficiency, and neglects issues of redistribution. When it comes to the effects of these policies for individuals the problem is totally different. Net transfers implied by efficient policies can be largely positive for some, and largely negative for others. Different individuals may different views regarding these policies. This is an important issue as long as policies are chosen through the political process. This paper considers majority voting.

The model focuses on three sources of heterogeneity amongst voters. First, the amount of banking shares held by each voter. Second, the amount of banking deposits. Third, the amount of government bonds. Of course there might be other forms of heterogeneity (e.g. income - cf. section 3). But the model presented here helps the reader understand how this framework can be applied in other policy settings.

First, consider the banking shares. There are big and small shareholders in the society. Let $\pi + \pi^j$ be the amount of banking shares in j's portfolio, valuated before the failure. Specifically, if $\pi^j > 0$ ($\pi^j < 0$) then j holds more (less) shares than the average. Let $F(\pi^j)$ be the distribution of π^j.[21] It describes how bank ownership is distributed across the population. If for instance $F(\pi^j)$ is skewed to the right and the median is negative, then negative values of π^j occur for more than a half of the population. This means that the majority holds less shares than the average. In other words, the ownership of the bank is concentrated in the hands of a minority.

Voters can be big or small bank depositors/creditors. Let $\left(\lambda + \lambda^j\right)\pi$ be the amount of bank deposits/obligations in j's portfolio, where $\lambda^j \pi \lesseqgtr 0$ is the excess amount with respect to the average. The distribution $L(\lambda^j)$ describes how bank deposits/obligations are allocated across voters' portfolios.[22] If for instance the median is negative, large depositors and bank creditors represent a minority of the population.

Voters can be heterogeneous in the amount of government bonds they hold in their portfolios. Let this amount be $(\beta + b^j)(1+\lambda)(1-\delta)\pi$, where $b^j \lesseqgtr 0$ parametrizes the excess amount held by j with respect to the average. The ownership of government bonds issued to save the bank is described by

[21] Oberve that $F(\pi^j) : [-\pi, \infty) \to [0,1]$; $F(-\pi) = 0$; $\lim_{\pi^j \to \infty} F(\pi^j) = 1$. The average of $F(\pi^j)$ is zero: $\int_{-\pi}^{\infty} \pi^j dF(\pi^j) = 0$.

[22] By definition, $L(\lambda^j) : [-\lambda, \infty) \to [0,1]$; $L(-\lambda) = 0$; $\lim_{\lambda^j \to \infty} L(\lambda^j) = 1$. The average of $L(\lambda^j)$ is zero: $\int_{-\lambda}^{\infty} \lambda^j dL(\lambda^j) = 0$.

the distribution of b^j, call it $G(b^j)$.[23] The average of $G(b^j)$ is zero. If the median of $G(b^j)$ is negative then those who hold less bonds than average represent a majority.[24]

By (13) and the above definitions of π^j, λ^j and b^j, voter j's indirect utility is

$$V^j(\beta, \delta) = V(\beta, \delta) + \beta\pi^j + \beta\lambda^j\pi + b^j(1+\lambda)\pi i(1-\delta) \tag{18}$$

where the last three terms in the RHS account for the three forms of heterogeneity in j's portfolio with respect to the average. Because of these three terms the preferences of j can be different from those of the government.

At time 1, after the bank failure has been realized, the society makes two voting decisions. First, how much money to inject in the troubled bank. Second, how much of this money should be sold to the market and how much should be monetized by the central bank. Voting takes place sequentially.[25] Let $\hat{\beta}$ and $\hat{\delta}$ denote the voting outcomes of the first and second voting stage, respectively. The next two subsections solve the two voting stages backwards.

2.4.2 Voting on CBI

In the second voting stage individuals compute their bliss points, let us call them δ^j, which maximize their indirect utility functions, $V^j(\beta, \delta)$, defined by (18). The FOC that pins down δ^j is

$$V^j_\delta = V_\delta - b^j(1+\lambda)\pi i \leq 0 \tag{19}$$

[23] $G(b^j) : [-\beta, \infty) \to [0, 1]$, with $G(-\beta) = 0$; $\lim_{b^j \to \infty} G(b^j) = 1$, and $\int_{-\beta}^{\infty} b^j dG(b^j) = 0$.

[24] With straighforward small changes this model can be extended to the case in which part of bank ownership/deposits or government debt is owned by foreign investors. This is relevant because these investors are directly interested in the bailout, while they do not hold any voting right. This issue will be discussed in Section 3 and in the Conclusions.

[25] This voting sequence is realistic and, in addition, allows bypassing the problems of multidimensional voting; i.e, the possible non-existence of a Condorcet winner (cf. De Donder et al., 2012).

where V_δ is given by (15).[26] Suppose (19) holds as equality, solving it yields

$$\delta^j = \left[\frac{\eta}{1-\eta} - \frac{b^j}{\beta}\right]\frac{i}{\phi} \tag{20}$$

By comparing (20) with (17), it is immediately apparent that, if $\beta \neq 0$, all voters who own more government bonds than the average (i.e. all j's such that $b^j > 0$) want less monetization than the socially optimal level. The reason is that, more than the average, they are interested in high earnings on government bonds. Thus they want a relatively independent central bank which prevents earnings from falling down too much.

Let us solve the voting game. The concavity of $V(\beta, \delta)$ ensures single peakedness (see Appendix for details), while differentiating (20) wrt b^j yields $\frac{\partial \delta^j}{\partial b^j} = -\frac{i}{\beta\phi} < 0$. Thus bliss points are inversely monotonic in b^j. Under single peakedness and bliss point monotonicity, the voting equilibrium is the level of monetization preferred by the voter who owns the median amount of government bonds. Call this voter $m\delta$, where $b^{m\delta}$ is the median of $G(b^j)$. By (20) and (17), the monetization policy chosen by the majority is

$$\hat{\delta} = \delta^* - \frac{b^{m\delta}}{\beta}\frac{i}{\phi} \equiv D(\beta) \tag{21}$$

Another remark is in order here. The monetization policy chosen by the majority is not independent of bailout policy: $\hat{\delta} = D(\beta)$, with $D_\beta > 0$ ($D_\beta < 0$), if $b^{m\delta} > 0$ ($b^{m\delta} < 0$). The reason is the following. Suppose for instance that the median voter holds more bonds than the average bondholder. Compared to the latter, her gains from higher interest payments raise linearly in the amount of bonds in her portfolio, while tax distortion increases more than proportionally. Thus she prefers more monetization with respect to the average bondholder, as a way to mitigate tax distortion.

[26] The concavity of the $V^j(\beta, \delta)$'s follows from the concavity of $V(\beta, \delta)$. Strict inequality of (19) implies that $\delta^j = 0$.

By (21), political distortion, $\left|\hat{\delta} - \delta^*\right|$, reflects the following four features of the model:

- A larger distance between the median bondholder and the average bondholder, $\left|b^{m\delta}\right|$. Suppose $b^{m\delta} > 0$. There is a majority of voters who own more bonds than the average. This majority is strongly interested in high earnings on government bonds. Thus they want too low monetization and too high central bank independence: $\hat{\delta} < \delta^*$. The distance between the majority's choice and the social optimum is increasing in $b^{m\delta}$. Of course, for the opposite reason, if $b^{m\delta} < 0$ then $\hat{\delta} > \delta^*$.

- A higher interest rate, i. As the interest rate on government bonds increases, the preference of the majority diverges from the preference of the social planner. Thus the political distortion is larger.

- A smaller cost of monetary instability, ϕ. Suppose $b^{m\delta} > 0$. Since monetary instability is not a big concern, the social planner would choose a much higher δ than the majority.

- A smaller β. As discussed above, if the bailout is small the gains from monetizing debt are low. Thus if for instance $b^{m\delta} > 0$, the majority will choose a much smaller $\hat{\delta}$ with respect to δ^*.

2.4.3 Voting on the bailout

In the first voting stage, the majority chooses $\hat{\beta}$. Individuals compute their most preferred bailout policies, β^j, which maximize their indirect utility functions, V^j. Following the same steps as above, by (18), the FOC that pins down β^j is

$$V_\beta + (\pi^j + \lambda^j \pi) + V_\delta^j D_\beta \leq 0 \tag{22}$$

where strict inequality implies $\beta^j = 0$. The Appendix studies second order conditions. The last term in (22) accounts for the strategic consequences of β on the majority's choice about monetization. Thus j correctly anticipates that her current voting choice on β will affect voting equilibrium on δ, and the latter will influence her utility. In order to determine the voting equilibrium, we have to understand how voters' bliss points are ordered. Assume that (22) holds as equality. Re-write it as

$$V_\beta + V_\delta D_\beta + x^j = 0 \tag{23}$$

where by (19)

$$x^j \equiv \pi^j + \lambda^j \pi - b^j (1+\lambda)\pi i D_\beta \tag{24}$$

By the concavity of V^j it follows that the LHS of (23) is decreasing in β (cf. Appendix for details). Therefore, the higher x^j, the higher the most preferred bailout policy, β^j. Thus, voters' bliss points can be ordered according to "their" value of x^j. Take for instance two voters, h and k. If $x^h > x^k$ then h wants a larger bailout than k: $\beta^h > \beta^k$. By (24), the x^j's are given by a weighted average of bank shares/deposits, $\pi^j + \lambda^j \pi$, and government bonds, b^j, in j's portfolio. The higher the amount of bank shares/deposits the larger the preferred bailout. The impact of b^j depends on the sign of D_β. If, say, the latter is positive, then higher b^j leads j to prefer a lower β. The reason is strategic: with a lower β, majority voting on monetization results in a smaller δ^* which in turn implies higher earnings on government bonds. This is exactly what j wants.

All voters in the first voting stage can be ordered by a distribution $B(x^j)$, which is a transformation, using (24), of the distributions $F(\pi^j)$, $L(\lambda^j)$, and $G(b^j)$. The median voter in the first voting stage is then voter $m\beta$ such that $x^{m\beta}$ is the median of $B(x^j)$. The voting equilibrium, $\hat{\beta}$, coincides with the bliss point of $m\beta$. By (23), the condition that pins down $\hat{\beta}$ is:

$$V_\beta + \bar{x} + x^{m\beta} \leq 0 \tag{25}$$

where $\bar{x} \equiv V_\delta D_\beta$. Strict inequality implies $\hat{\beta} = 0$.

2.4.4 Political distortion

We can use (25) to characterize the possible political distortion arising from the decision about the bailout. Suppose (25) and (14) hold as equality. Since the LHS of (25) is decreasing in β, then if $x^{m\beta} > -\bar{x}$ the bailout policy is socially too generous from a social point of view. We believe that this situation occurs with high frequency in reality. The reason of this is that $\bar{x}$ is always positive. This implies that the "first majority" has always an incentive at the margin to raise β in order to induce the "second majority" to choose a more favorable δ (cf. Appendix, for details). Thus the policy is too generous, not only when $x^{m\beta}$ is larger than zero, but also when it is smaller than zero, but not too low. This means that a majority formed by major holders of banking shares/deposits will always choose too large a bailout. However, even a majority formed by small holders of bank shares/deposits might end up choosing too generous levels of bailout in terms of aggregate welfare.

The size of the political distortion, $\left|\hat{\beta} - \beta^*\right|$, is increasing in the distance between $\bar{x}$ and $x^{m\beta}$, and it has the following characteristics:

- If $x^{m\beta}$ is in the range $(-\infty, -\bar{x}] \cup [0, +\infty)$ then political distortion increases in $\left|\pi^{m\beta}\right|$. The median holds an amount of shares that is much different from the average. Hence her interest in saving the bank is very different from the social planner's. This leads the majority to choose a level of bailout that is much different from the socially optimal level. The political distortion rises also if $\left|\lambda^{m\beta}\pi\right|$ rises. If the median holds a substantially larger (or smaller) amount of banking deposits/obligations, she has an incentive to save the bank that is substantially stronger (weaker) than the social planner's.

- If $x^{m\beta}$ is in the range $(-\bar{x}, 0)$ then, somehow paradoxically, the political distortion is decreasing in $\left|\pi^{m\beta}\right|$. The reason is that, within this range, two contrasting forces are at work. On the one hand, since $x^{m\beta} < 0$, the median wants a bailout level that is lower than the social optimum because she is relatively uninterested in saving the bank. On the other hand, as pointed out earlier, she wants to choose a higher bailout in order to strategically influence the monetization decision made by the second majority. If $x^{m\beta} \in (-\bar{x}, 0)$ these two forces tend to offset each other, reducing political distortion as $x^{m\beta}$ increases.

The following table summarizes our results. Columns show what happens when the bank shares in the portfolio of the median is smaller/equal/larger then the average (i.e. $x^{m\beta} \gtreqless \bar{x}$). Rows show what happens when the amount of government bonds held by the median is larger/equal/smaller wrt the average ($b^{m\delta} \gtreqless 0$).

	$x^{m\beta} < \bar{x}$	$x^{m\beta} = \bar{x}$	$x^{m\beta} > \bar{x}$
$b^{m\delta} > 0$	Bailout: too small Monetiz.: too small	Bailout: efficient Monetiz.: too low	Bailout: too big Monetization: ?
$b^{m\delta} = 0$	Bailout: too small Monetiz.: too small	Bailout: efficient Monetiz.: efficient	Bailout: too big Monetiz.: too large
$b^{m\delta} < 0$	Bailout: too small Monetization: ?	Bailout: efficient Monetiz.: too large	Bailout: too big Monetiz.: too large

It is apparent from the table that political distortions on β and δ are not independent one of another. Take for instance $b^{m\delta} = 0$ and $x^{m\beta} < \bar{x}$ (second row, first column). The second majority chooses the socially efficient level of δ. However, since the bailout chosen by the first majority is too small, monetization is too low. In two cases the sign of the distortion on monetization can be positive or negative ("?" in the table). Take for instance $x^{m\beta} > \bar{x}$ with $b^{m\delta} > 0$ (first row, third column). The first majority chooses too big the bailout. However, since the second majority chooses too small δ, the amount of money issued by the central bank to buy public debt might be larger or smaller than the socially efficient amount. The sign of the political distortion depends on the parameter values. Finally observe that if $b^{m\delta} = 0$ then $\bar{x} = 0$. This means that both policies are efficient (second row, second column), if and only if both medians are in the average position (i.e. $x^{m\beta} = 0$

and $b^{m\delta} = 0$).

Political distortion on bailout affects moral hazard. The higher $\hat{\beta}$ the higher the last two terms in (1), then the stronger the bank's incentive to take risk. This mechanism implies that if society chooses too big a bailout, it bears an additional cost in terms of more moral hazard by the bank. This "political" effect on moral hazard is more likely to occur when the bank is big, with widespread ownership of shares and deposits.

3 Discussion and extensions

Voters have different policy preferences because their portfolios are heterogeneous. The model shows how this kind of heterogeneity can lead to possibly inefficient policy outcomes. When ownership of the bank and deposits are widely spread across the population, the majority is somehow "more interested" in saving a big bank than the social planner. Big banks, which have an increased incentive to become bigger. This "political" incentive adds on the typical "too big to fail" incentive.

The model also shows that the bailout decision is not independent of the monetization decision. Often bailouts are too generous because they strategically lead to more favorable monetization policies. A big bailout puts a lot of political pressure on central bank and leads to extensive use of monetary instruments. This and the other political mechanisms emphasized in this paper perhaps account for the higher risk of fiscal dominance over monetary policy that many observers consider one the by-products of the financial crisis.

The model can be extended in many fruitful directions.

1. Bail-in. The government does not refund, not even partially, the loss borne by bank shareholders. Only bank creditors receive money. The government budget constraint is then $\beta\lambda\pi^{BI} \cdot (1 + i(1 - \delta)) = \tau y$. For any β, the government needs to issue a lower amount of debt to rescue the bank.

The impact of β and δ on the tax rate is lower at the margin: both T_β and T_δ are smaller in absolute value (cf. (7-8)). Since shareholders lose the entire value of the shares they own, the indirect consumption utility function is $C^{BI}(\beta, \delta) \equiv l^*(1 - T(\beta, \delta)) + w + \beta\lambda\pi^{BI}(1 + i(1 - \delta))$, where the superscript BI stands for "bail-in". The externality is larger, since it does not include the benefits of partially rescuing shareholders: $E^{BI}(\beta) \equiv \varepsilon/2 \cdot \left[\pi^{BI} + (1 - \beta)\lambda\pi^{BI}\right]^2$. The monetary instability cost is lower, because for any value of β and δ, the amount of debt that is monetized is lower: $I^{BI}(\beta, \delta) \equiv \phi/2 \cdot \delta^2\beta\lambda\pi^{BI}$. Repeating the same steps of section 2.3, the socially optimal bail-in policy is

$$\beta^{*BI} = 1 - \frac{1}{\varepsilon\lambda\pi^{BI}}\left[\frac{\eta}{1-\eta}(1 + i(1 - \delta^*)) + \frac{\phi}{2}\delta^{*2}\right] \tag{26}$$

By (26), $\beta^{*BI} < \beta^*$: under bail-in the government finds it optimal to inject a lower amount of money in the bank. The reason is that it does not have to take care of shareholders. By (16), the socially optimal level of δ is unchanged. However, since β is lower at the social optimum, the central bank issues a lower amount of money. Moral hazard is smaller under a bail-in. Both the last two terms in (1) are smaller, compared to a bailout. This means that the bank's incentive to take risk is smaller at the margin: the bank is more cautious if shareholders are aware that they will lose all their money in case of failure. Thus in equilibrium the bank takes less risk, $r^{*BI} < r^*$, and liabilities are smaller: $\lambda\pi^{BI} < \lambda\pi$. This further decreases, for any β, the amount of recapitalization by the government.

Consider the majority's decision. Since voters lose the total value of their bank shares anyway, their policy preferences are unaffected by the amount of shares in their portfolios. This in turn implies that the voting outcome is independent of the distribution of shares, $F(\pi^j)$. We are unable to say if in bail-ins political distortion is larger or smaller than in bailouts.[27] It is

[27] Recall that the last two terms in (25) account for the political distortion on β. Under bailin, $x^{jBI} \equiv \lambda^j\pi - b^j\lambda\pi i D_\beta(\beta^{BI})$ and $\bar{x}^{BI} \equiv V_\delta D_\beta(\beta^{BI})$. Both these terms can either

unambiguously smaller only if $\left|\pi^{m\beta}\right|$ is sufficiently large; i.e. shareholders are either a large majority or a small minority. If $\pi^{m\beta} > 0$ ($\pi^{m\beta} < 0$) the amount of money inflated in the bank is smaller (higher) and it is closer to the social optimum. The reason is simple. If shareholders are a big majority or a small minority, then in a bailout the policy would be strongly distorted away from the social optimum. With a bail-in, shareholders are uninterested and uninfluential. Thus the policy decision is less distorted, if not undistorted.

2. Financial wealth and monetary instability. This model assumes that monetary instability is a social cost that is equally borne by individuals. Earnings on assets other than public bonds are fixed and normalized to zero. In order to gain in realism, one may assume that portfolios are heterogeneous also in size and in yield's ability to match monetary instability. Individuals bear a larger cost due to monetary instability when their portfolios are bigger or when they hold assets with relatively rigid nominal yields. Allowing for this kind of heterogeneity in our framework would lead to a straightforward prediction: the smaller the mass of individuals with these characteristics, the stronger the political pressure on to monetize.

3. Income. Individuals can be rich or poor. If a bank is saved, the richer have a higher the tax burden to bear, relative to other individuals. Thus, other things being equal, we expect richer people to desire smaller bailouts. And in a society with highly concentrated income, we expect large bailouts. The idea is that the poor, who are the majority, want too high a bailout because the minority of rich will bear the lion part of the cost. Of course income can be correlated to other forms of heterogeneity, such as portfolio size or the amount of bank shares/obligations held an individual's portfolio. This leads to interesting trade-offs. Consider a rich individual. On the one hand she wants a low bailout in order to save on the tax bill. On the other hand, she wants a large bailout because, as a large stakeholder, she is strongly interested in saving the bank. The framework in this paper possibly

be larger or smaller than under bailout.

helps the reader to solve this kind of trade-offs.

4. Initial public debt and tax pressure. The model assumes that government debt is issued only to save the bank, while taxes are raised only to service this debt. These are of course two extreme simplifying assumptions. Realistically, prior to bailout, the level of taxation and the stock of public debt can be large and vary substantially across countries. Inserting initial taxation and initial debt in the model would be very interesting, but at the cost of increased complexity. Specifically, the interest rate i should be an endogenous variable depending on the stock of debt. Moreover, the tax distortion variable η should depend on the initial level of taxation. Under such a framework, one would expect that more indebted countries, or countries with higher levels of taxation, would have smaller incentives to save troubled banks and stronger incentives to monetize debt. If tax pressure is already high, a new tax to finance the bailout can be highly distortionary, with negative consequences for the entire economy. If the debt stock is large, the market will anticipate a higher risk of sovereign debt crisis, with the consequence of an increased cost of servicing new debt. As a result, the central bank would be forced to monetize a large part of the debt because it would help lower the cost. One would expect also that policy choices are subject to larger political distortion. The reason is that, as the tax burden and payments for interest increase, the majority's policy preferences diverge from those of the minority, leading to bigger tax distortion.

5. Foreign debt and foreign ownership of the bank. The model can easily be extended to account for the existence of foreign investors. They do not have the right to vote. In order to solve the voting game they should not be included in the distributions of bank shares and deposits and the distribution of government bonds. As a result the political decision is highly distorted in favor of domestic individuals. If the majority is made by small domestic investors, the policy outcome is straightforward: too small a bailout with too large a monetization. The reason is that the majority of domestic voters is in the position of "tyrannizing" foreign stakeholders. A small bailout followed by large monetization is a way to have foreign investors foot a larger bill. The risk of this kind of tyranny is relevant if the bank belongs to a small country and has many foreign customers. The "Icesave Dispute" is consistent with this theoretical prediction. In 2008 the Icelandic bank Landsbanki went bankrupt. UK and Dutch governments covered the losses of foreign customers of the bank in full (mainly customers of the UK and Dutch branches). In a referendum on March 2010, Icelanders rejected the proposal to guarantee repayments to the UK and Netherlands.

4 Conclusions

During three decades prior to the 2008 crisis - all over the world the mandate of central banks progressively narrowed to a strictly defined area of monetary policy, characterized by a high degree of independence and the goal of price stability. Consequently, traditional responsibility for financial stability became less important. Things have changed as a consequence of the financial crisis. Central banks have recently been given new tasks to maintain financial stability, especially when, due to deterioration of public budgets and high levels of tax pressure, fiscal policy tools are of limited use.

We presented a model in which bank bailout policy and the level of central bank independence are related, and possibly subject to political distortions. The reason is that bank bailouts and public debt monetization have redistributive effects, since their impact on individuals' portfolios can be different. Political distortions can be quite large when the distribution of financial assets in individuals' portfolios is highly asymmetrical. The more central banks are involved in bank bailouts, the larger the redistributive consequences of their choices. This possibly explains why one observes such a surge of interest by public opinion in the policies carried out by central banks.

The redistributive effects of bailouts and monetization are most apparent when a substantial quota of government debt and/or banking liabilities is held by foreign investors. By choosing smaller bailouts and by monetizing debt, domestic voters have the chance to transfer part of the cost onto foreign investors.

5 Appendix

Bank's optimization problem, SOC.

By (1), the SOC is

$$\pi''(1-(1-S)p)-(1-S)(2\pi'p'+\pi p'')+S_\pi\pi''\pi p+S_\pi\pi'(\pi'p+p'\pi)+S_{\pi\pi}\pi'\pi p<0$$

Since the first, the second and the third terms are positive, the SOC is satisfied if the last two terms are sufficiently small. In this case, r^* is interior.

Government's optimization problem, Regularity Conditions.

By (10) and (7) and applying the envelope theorem, $C_\beta(\beta,\delta^*) = -\eta(1+\lambda)\pi(1+i(1-\delta^*))/(1-\eta) < 0$. By (11), $-E_\beta(\beta) = \varepsilon(1-\beta)(1+\lambda)^2\pi^2 > 0$. By (12), $-I_\beta(\beta,\delta^*) = -\phi(1+\lambda)\pi\delta^{*2}/2 < 0$. Moreover, by (10) and (8) and applying the envelope theorem, $C_\delta(\beta^*,\delta) = \eta\beta^*(1+\lambda)\pi i/(1-\eta) > 0$. By (12), $-I_\delta(\beta^*,\delta) = -\delta\phi\beta^*(1+\lambda)\pi < 0$. Suppose (14-15) hold as equality. The two FOCs of the system can be written as

$$-\frac{\eta}{1-\eta}(1+i(1-\delta))+\varepsilon(1-\beta)(1+\lambda)\pi-\frac{\phi}{2}\delta^2 = 0 \quad (27)$$

$$\beta(1+\lambda)\pi i\left[\frac{\eta}{1-\eta}-\frac{\phi}{i}\delta\right] = 0 \quad (28)$$

Solving this system yields (16-17). At the equilibrium point $\{\beta^*,\delta^*\}$, $V_{\beta\beta} = -\frac{1}{(1-\eta)^2}\eta_\tau T_\beta(1+i(1-\delta))-\varepsilon(1+\lambda)\pi < 0$, $V_{\delta\delta} = \frac{1}{(1-\eta)^2}\eta_\tau T_\delta-\phi/i < 0$, and $V_{\delta\beta} = \frac{1}{(1-\eta)^2}\eta_\tau T_\beta > 0$. Thus the regularity conditions for a maximum are satisfied. Moreover, by (17) it is immediately apparent that $\partial\beta^*/\partial\delta^* = 0$.

Government's optimization problem, Comparative Statics.
Implicit differentiating of (27) and (28) yields, respectively,

$$\begin{array}{rr}
\partial\beta^*/\partial\eta = \frac{-(1+i(1-\delta^*))/(1-\eta)^2}{\varepsilon(1+\lambda)\pi} < 0 & \partial\delta^*/\partial\eta = \frac{1/(1-\eta)^2}{\phi/i} > 0 \\
\partial\beta^*/\partial i = \frac{-\eta(1-\delta^*))/(1-\eta)}{\varepsilon(1+\lambda)\pi} < 0 & \partial\delta^*/\partial i = \frac{\delta^*}{i} > 0 \\
\partial\beta^*/\partial\phi = \frac{-\delta^{*2}/2}{\varepsilon(1+\lambda)\pi} < 0 & \partial\delta^*/\partial\phi = -\frac{\delta^*}{\phi} < 0 \\
\partial\beta^*/\partial\varepsilon = \frac{(1-\beta^*)}{\varepsilon} > 0 & \partial\delta^*/\partial\varepsilon = 0 \\
\partial\beta^*/\partial\pi = \frac{(1-\beta^*)}{\pi} > 0 & \partial\beta^*/\partial\lambda = \frac{(1-\beta)}{(1+\lambda)} > 0
\end{array}$$

SOCs of the voting stages.

1. Voting on CBI. By (19), $V^j_{\delta\delta} = V_{\delta\delta} < 0$. Thus the SOC in this voting stage is satisfied.

2. Voting on bailout. By (21), $D_\beta = ib^{m\delta}\beta^{-2}/\phi$. Thus $sgn(D_\beta) = sgn(b^{m\delta})$. Therefore, $D_{\beta\beta} = -2ib^{m\delta}\beta^{-3}/\phi$. This implies that $sgn(D_{\beta\beta}) = -1 \cdot sgn(b^{m\delta})$. By (22), the SOC of this voting stage is $V_{\beta\beta}+V^j_{\delta\delta}D^2_\beta+V^j_\delta D_{\beta\beta} < 0$. Since the first two terms of this inequality are negative, the SOC is satisfied if $b^{m\delta}$ is positive or if it is not too negative.

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