The Soft Budget Constraint of Banks[1]

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Abstract

Soft budget constraint refers to the situation where an economic entity expects to obtain economic assistance when in financial difficulties. During the past decade, a sizable literature has accumulated explaining the causes and consequences of the soft budget constraint. Many of the theories have traced soft budget constraint on enterprises to that on banks. However, why do banks often face soft budget constraint? How to mitigate the resulting problems? In this paper, we first show that owing to their special financial structure, banks as market institutions intrinsically face hard budget constraint and nevertheless remain stable and effective. Since banks' finance mostly comes from deposits, it is very difficult for banks to be refinanced when their investment projects are unsuccessful due to the sequential service arrangement for bank deposits. This limitation hardens the budget constraint on banks and disciplines bankers' investment decisions. However, the advent of instantaneous-social-welfare-minded modern governments, which have both the resources and the incentives to bail out failing banks, gives rise to the soft budget constraint of banks. This causes bankers' moral hazard problems. As an institutional solution to the resulting banking instabilities, banking regulation emerged in order to restrict banks' investment decisions. We provide historical evidence on the genesis and symptoms of, and institutional solution to the soft budget constraint of banks over the past six hundred years to support our theory. We also conduct contemporary econometric analysis to show how the lack of government commitment to a hard budget constraint gives rise to a strict banking regulation. We further explore the predictions of our theory in the paper.

Keywords: Soft budget constraint, the beauty of banking, government failure, banking regulation

JEL Classification Code: G2, D2, H1, N2, P5.

1. Introduction

The growing literature on soft budget constraint (SBC) has mainly focused on the SBC on enterprises (see Maskin, 1996, 1999; Maskin and Xu, 2001; Kornai, Maskin, and Roland, 2003). The prevailing SBC theories almost invariably take for granted that banks serve as rescuers for enterprises that are on the verge of bankruptcy (see, among others, Dewatripont and Maskin, 1995; Shleifer and Vishny, 1994; Berglof and Roland, 1998). To conduct frequent and massive rescues of failing businesses, banks must also face SBC; otherwise they would not be financially viable. In fact, SBC on banks has been frequently observed. In former socialist and transition economies, governments typically pressure banks into extending loans to ailing state enterprises and transfer fiscal resources to maintain the banks' viability. Even in market economies, SBC on banks is a recurrent phenomenon. We have witnessed various bank rescue events such as the Savings and Loan Association crisis in the U.S. in the 1980s, the bailout of the Swedish and Finnish banking systems in the early 1990s, and the Japanese government's bailout of insolvent banks in the late 1990s.

Why do banks face SBC? How to mitigate the problems induced by the SBC of banks? Because ailing businesses are usually rescued by banks, and because commercial banks, overshadowing securities markets, are widely regarded as the most important and stable sources of external financing for corporate investment in most economies, we expect that SBC on enterprises may stem from the SBC of banks to a large extent. Thus the SBC in the banking system should be a major issue that deserves a careful analysis. Understanding the SBC on banks will also enhance our understanding of the whole subject of the SBC syndrome.

By taking a secular, historical perspective, we examine in this study the origin and consequences of the SBC on banks in market economies and the institutional solution to the resulting problems. The main message of our investigation is that in the early days of capitalism the budget constraint on banks was hard under free (*laissez-faire*) banking, thanks to the unique capital structure of banks and the generally noninterventionist approach of governments to national economies. In modern capitalism, the social-welfare-minded government with expanding fiscal capacity cannot possibly commit to

noninterference in banks in financial distress; this government failure destroys the intrinsic self-disciplining mechanism of banks, leading to the SBC of the banking system. The SBC on banks naturally gives rise to moral hazard on the part of bankers. Banking regulation emerges as an institutional response to the SBC in the banking system.

There are three steps in our reasoning. First, we analyze the unique characteristic of banking that generates hard budget constraints and cautious banking strategy. For banks, a significant source of funding comes from deposits that can be claimed back by depositors at any time. Furthermore, these demandable deposits enjoy first-come, first-served sequential service arrangements. This unique financial structure makes refinancing very difficult for a bank in financial distress. Since refinancing means banks often do not have enough funds for reinvestment, a new investor must come in, and the existing investors must collectively give up part of their initial claims. Once a bank is in financial distress, it is impossible to convince the depositors to give up their initial claims in order to accommodate a new investor. This impossibility of refinancing in *laissez-faire* banking is often socially inefficient in that it rules out the *ex post* efficiency in refinancing socially worthwhile projects. But it does constitute a credible commitment device for banks to manage risk very carefully. Thus, absent nonmarket forces, bankers behave in a much more conservative way than businessmen in other industries. This is what we call the *beauty of banking*.

Second, the advent of modern governments puts an end to the beauty of banking. In comparison with hereditary monarchies, modern governments, run by professional politicians, need to be much more responsive to short-term social welfare concerns. Meanwhile, they are also fiscally and financially much stronger than their predecessors. Consequently, facing a bank in financial distress, it is almost impossible for a modern government not to use its fiscal and financial prowess to refinance or to bail out the bank. Though in many cases bailing out banks may be *ex post* efficient, it is *ex ante* inefficient, for it makes both the depositors and the bankers more reckless in their decisions. Ideally, the government must maintain a strategic ambiguity in bank bailouts and commit to implementing a systematically stochastic policy with an optimal probability of bailing out insolvent banks; this can strike a balance in the tradeoff between the *ex post* efficiency in refinancing and the *ex ante* inefficiency of risky banking activity, and can constitute the

second best scenario. In reality, the government cannot stick to such an optimal bailout probability, and ends up rescuing insolvent banks with a much larger probability. We treat the lack of government commitment to no bailout or an optimal probability of bailout as one type of government failure. We trace the origin of the SBC on banks to this government failure that destroys the beauty of banking and leads to widespread reckless business strategy in banking.

Third, banking regulation is an institutional response to the SBC of banks. Anticipating rising moral hazard of bankers due to government failure, governments impose various regulatory requirements such as a bank capital adequacy ratio, interest rate ceilings, and a deposit reserve ratio, aiming to constrain bankers' opportunistic behavior and to guide the private bankers' investment decisions to get closer to social optimality.[2] Though banking regulation cannot harden banks' budget constraints, it can minimize the efficiency losses stemming from bankers' moral hazard under the SBC on banks.

This point of view implies a theory of banking regulation as an institutional solution to the problems arising from the SBC of banks. Instead of justifying banking regulation as a way to correct market failure, we argue that it is the SBC on banks and thus government failure that give rise to government regulation.[3] In other words, banking regulation is a social-welfare-enhancing institutional solution to governments' own weakness.

We provide historical evidence to show how the SBC of banks comes into being and how banking regulation emerges as an institutional solution. Over the past six hundred years of commercial banking, free (*laissez-faire*) banking prevailed until the mid-19th century. Contrary to common perception, banking history shows that free

[2] Dowd (1996) makes a similar argument that *laissez-faire* banking can be efficient and stable, but he proposes to return to the free banking regime without due regard to the existence of instantaneous-welfare-minded modern governments that makes such a move virtually impossible.

[3] Benston and Kaufman (1996) argue that banking regulation can be justified only on the ground that it can deal with the negative externality of bankers' moral hazard generated by a poorly structured deposit insurance scheme. Our theory focuses on how the inevitability of government failure, of which deposit insurance is one aspect, will give rise to the necessity of banking regulation. In our view, even if the deposit insurance system were better structured, government failure would still occur, and thus continue to necessitate banking regulation.

banking was rather stable, without many systemic banking panics, because the market induced a set of mechanisms constraining bankers' behavior.

Capitalist development reached a new stage around the mid-19th century with increasing state intervention. This new development accelerated after the Great Depression in the 1930s and reached a peak after World War II. The growing fiscal capacity led to extensive state intervention in the banking industry, causing the softening of banks' budget constraints. In response, governments around the world started to implement various banking regulations to minimize efficiency losses.

We also present contemporary cross-country evidence that those countries with a larger fiscal capacity to bail out failing banks tend to impose stricter banking regulation.

There is only a small literature on the SBC on banks.[4] Berglof and Roland (1995) focus on how banks in transition economies can trigger bailouts or extract rents from the governments that care about *external effects* such as workers' employment. In their view, sufficient *ex ante* capitalization with reserve requirements would credibly commit the bank not to seek subsidies, and thus harden banks' budget constraints. Mitchell (1998) provides an analysis of bank passivity in which a bank tends to refinance rather than liquidate a poor project, gambling on its resurrection in anticipation of government bailout in case of bank failure. To prevent such gambling, the government may monitor the bank. However, monitoring may be too costly and bankers' gambling may occur in equilibrium. Though these papers contain some ingredients of how bankers misbehave under SBC and what governments can do to mitigate the consequences of banks' SBC, our research provides a systematic analysis of the genesis, consequences, and cure of banks' SBC syndrome. We probe into the financial structure of banks to show the

[4] Some other studies focus on the optimal design of bank bailout policies to harden banks' budget constraints. For instance, Aghion, Bolton, and Fries (1999) consider the optimal design of bank bailouts in transition economies to minimize the negative effects of banks' SBC. Goodhart and Huang (1999) study the government's role as lender of last resort. They suggest that one way to limit the SBC problem of banks would be to restrict bailouts to very large banks. Freixas (1999) argues for a "creative ambiguity" approach, i.e., bailing out banks randomly. In our view, the social-welfare-minded modern governments may not even be able to commit to these optimal bailout policies. Thus *ex ante* banking regulation is probably a more feasible institutional cure for banks' SBC syndrome.

inherent hard budget constraint on banks under free banking, the genesis of banks' SBC under modern governments, and the nature of banking regulation as an institutional solution to banks' SBC.

In terms of modeling, our theory is related specifically to two recent lines of literature. The first one is the theoretical literature on the SBC. Dewatripont and Maskin (1995) show that when the financiers are large, it is impossible to commit not to refinance investment projects that need extra funds *ex post*. Although refinancing such projects is *ex post* efficient, it causes managers to engage in investment projects that should not have been started. One conclusion of their analysis is that financiers, such as banks, should be small in order to gain efficiency through commitment. We apply this logic to the relationship between governments and banks and provide another solution to the SBC problem, namely, regulation that restricts *ex ante* actions of bank managers.

The second line of literature is on the role of banks' capital structure in enabling banks to create liquidity. Calomiris and Kahn (1991) provide rationale for the role of demandable debt in an optimal banking arrangement. Demandable deposits attract funds by giving depositors an option to force liquidation so as to prevent the informed bankers from acting against the interests of uninformed depositors. Recently, Diamond and Rajan (2001) also argued that the fragility of banks' financial structure is a good commitment device. Diamond and Rajan (2000) is based on Diamond and Rajan (2001) and studies the optimal bank capital structure that trades off the benefit mentioned above against the cost of instability. Their concern is managerial expropriation of investors and borrowers. Our concern is about government failure leading to SBC on banks and the need for banking regulation.

The next section presents the setup of a model of SBC on banks. Section 3 analyzes a few benchmark cases of the model. Section 4 studies in detail the case of banking regulation as a solution to banks' SBC. Section 5 provides historical evidence on the working of free banking and the emergence of banking regulation in response to government failure. Section 6 contains some contemporary cross-country econometric analysis. The last section, section 7, summarizes the whole paper.

2. A Model of Soft Budget Constraint on Banks

There are three active players in the model:

(A) A bank manager. His payoff is monetary value from holding equity shares in the bank plus a nonpecuniary private benefit of control.

(B) The depositors. They are concerned with the expected rate of return on their deposit in the bank.

(C) The government. It is controlled by politicians, who, in our context, aim to enhance social welfare at any moment. Note that maximizing social welfare at any moment is oftentimes achieved at the expense of not reaching the highest expected (overall) social welfare.

We consider a typical operation cycle of the bank. The timing of the events is illustrated in Figure 1. At time 1, depositors put their savings into the bank, responding to the expected rate of return that they calculate from observed parameters of the bank, including the nominal interest rate. At time 2, the bank manager decides on the investment portfolio by balancing risk and mean return. The investment becomes sunk once made. At time 3, the uncertainty of the return to the investment is resolved, and there are two possibilities. In the first case, the return is high enough to cover the deposit and the promised interest payment. This is the end of the operation cycle. In the other case, the investment projects cannot generate any positive cash flow unless additional investments are made. Negotiations between the bank and other parties arise regarding whether and how to refinance the additional investment. When pertinent, we add a time 0, when the government decides on the configuration of banking regulation.

(Insert Figure 1 Here)

For simplicity, we assume that the feasible investment projects for the bank manager to choose are all of constant returns to scale, that is, if the total investment is increased, the return will also increase proportionately. Let the continuum of feasible investment projects be indexed by y in the following way. With probability p, the gross

rate of return is $ky(p)$, where k is a parameter. With probability $1-p$, the gross rate of return is 0 unless an extra investment of x is made, in which case the gross rate of return becomes $z-x$. The banker is needed for finishing up the project, who earns private benefits of control.

Given that the investment projects are of constant returns to scale, we can scale down all operation variables of the bank by fixing one of the variables at a preset value. If we increase this variable, all other variables will change proportionately. We choose to fix the amount of total initial bank equity at 1. We assume that the bank manager holds proportion α of equity shares and enjoys private benefits of control B for one unit of finished investment.

For the depositors, we assume that given one unit of total bank equity, they are willing to supply $d = \beta s(r^e)+s_0$ to the bank as a deposit, where s_0 is a constant. s_0 captures the proportion of depositors who use the service of the bank for convenience. We maintain the assumption that $s_0>0$, i.e., for various reasons (e.g., for transactional convenience) there is a fixed supply of deposits to banks regardless of the rate of return. β is a parameter and r^e is the depositors' expected rate of return to one unit of deposit, which will be modeled as a function of various variables observable to the bank manager.

We will make a few explicit assumptions through our analysis of the model. The first assumption is about the investment projects. Assumption 1 is about the quality of the set of investment projects.

Assumption 1:

$$(1)\ \exists p : kpy(p) > 1 + r;$$
$$(2)\ \lim_{p \to 0} py(p) = 0;$$
$$(3)\ y'(p) < 0;$$
$$(4)\ [py(p)]'' < 0.$$

Part (1) of Assumption 1 makes sure that there exist investment projects that can make the bank profitable, since even if refinancing is impossible, the expected return of some projects is more than enough to pay the deposit plus the promised interest, leaving the equity holder with nonnegative return. Part (2) says that it is not socially worthwhile to choose projects with very small p, while (3) indicates that the smaller p is, the higher

the return in the good state, implying that such projects are high-risk, high-return ones. Part (4) is a technical assumption implying that the response of expected return to a change in p is decreasing when p is sufficiently small.

Assumption 2: $z - x + B < c < 1$, *where* c *is a constant*.

Assumption 2 means that *ex ante*, the refinancing outcome is socially inefficient and should be avoided. That is, should a social-welfare-minded decision maker know beforehand that a project will need refinancing at a later stage, he would not invest in the project. Note that, if furthermore $z - x + B > 0$, then *ex post*, bank bailout is socially efficient. That is, in the case that a project needs refinancing, a social-welfare-conscious investor will still want to refinance it.

It is interesting to note that Assumption 2 links the model to two benchmark models in recent economic literature. In models of the Diamond-Dybvig (1983) type, it is implicit that $z - x > 1$, so that refinancing is socially efficient not only *ex post* but also *ex ante*. In contrast, Dewatripont and Maskin (1995) use an assumption similar to Assumption 2, i.e., refinancing is *ex post* efficient but *ex ante* inefficient.

Assumption 3: *Depositors cannot collectively agree to lower the terms of their existing claim rights.*

This is a nontechnical but key assumption of the model. It reflects the fundamental feature of banks' financial structure—banks' operations are financed by a large amount of deposits. Therefore, bank runs may happen.

Assumption 4: $[py(p)]''' < 0$.

This is a nonessential technical assumption in order to make some of the analysis easier. In fact, the most important conclusions of the paper do not depend on this assumption. The assumption says that $py(p)$ becomes more concave with higher p.

3. Benchmark Cases

There are three important benchmark cases. The first best arrangement is a hypothetical situation in which a social-welfare-maximizing planner acts in the capacity of the bank manager in choosing investment projects and later, when necessary, decides whether to fund those projects that need refinancing.

3.1. The Case of First Best Banking

Following the principle of backward induction, let us first consider the decision of the social planner at date 3. In the case that the investment project needs refinancing, the social planner should decide to provide funding for the project if the social welfare of refinancing is larger than that of no refinancing, i.e., $z-x+b>0$. Note that in order to conduct refinancing, the depositors need to be paid the full amount of principal plus interest. Otherwise, a bank run will happen. Normally, an important drawback caused by refinancing is that this may induce risky investment decisions at date 1. However, in the first best case, the date 1 decision is also made by the social planner, so that the drawback disappears.

Given that refinancing is always provided by the social planner at date 3 when it is necessary, the expected social welfare at date 1 associated with an investment decision indexed by p is

$$S=(1+d)\,[pky(p)+(1-p)(z-x)+B-1].$$

Note that in this expression for the social welfare, the interest rate r does not enter, since it only affects the amount of transfer from one group of agents (investors of the bank) to another (depositors). The social planner maximizes the social welfare S by choosing an optimal p. We therefore have the following proposition.

Proposition 1: *If $z-x+B>0$, then the first best arrangement is the following:*

(1) Choose an investment project p^{FBB} such that $[kp^{FBB}y(p^{FBB})]' = z-x$.

(2) When the investment project is unsuccessful, provide investment funds x and pay all depositors their principal and interest.

3.2. The Hard Budget Constraint—*Laissez-Faire* Banking

Laissez-faire banking (LFB) in our context refers to the situation where the government is not involved in any decision relevant to the bank. There is no regulation. Neither is there government decision to refinance investment projects when necessary.

The most important feature of *laissez-faire* banking is that refinancing of investment projects may not be possible at date 3, which is inefficient *ex post*. To be more precise, we have:

Lemma 1*: If* $c<(1+r)d/(1+d)$*, then in laissez-faire banking, no refinancing is possible for unsuccessful investment projects.*

To show this, note that the depositors cannot be collectively persuaded to lower their claims on the bank. Suppose that refinancing is provided. The original equity holder will obtain at most $(1+d)(z-x)$ minus the total payment to the depositors $(1+r)d$, i.e., $(1+d)(z-x)-(1+r)d$. According to Assumption 2 and the condition in the lemma, $(1+d)(z-x)-(1+r)d < c(1+d)-(1+r)d < 0$. Therefore, it must not be the case that refinancing can be provided by a profit-maximizing new investor.

Lemma 1 illustrates the beauty of banking: Because of the unique financial structure of banks, no *ex post* refinancing is possible without government intervention. This forces the bank manager to be cautious in operation decisions.

Given Lemma 1, we can calculate the bank manager's payoff, which is

$$W^B(d) = \alpha p[(1+d)ky(p) - d(1+r)] + pB - \alpha,$$

which is maximized by the bank manager by choosing a proper p. Note that the optimal p is the best response to the total amount of deposits that the bank can attract, d. Meanwhile, the depositors anticipate the bank manager's decision on p and decide on their aggregate supply of deposits. The supply function is $d = \beta s(r^e)+s_0$, where r^e is the expected rate of return. In our context, there is no refinancing: $r^e = p(1+r)-1$. In an equilibrium of *laissez-faire* banking, the expected rate of return is consistent with the bank manager's actual choice of p. We have the following proposition.

Proposition 2: *In the case of laissez-faire banking, if* $c<(1+r)d/(1+d)$*, the unique equilibrium of laissez-faire banking consists of* p^{LFB} *and* d^{LFB} *satisfying*

$$[kpy(p^{LFB})]' = (1+r)d^{LFB}/(1+d^{LFB}) - B/\alpha;$$

$$d^{LFB} = \beta s[p^{LFB}(1+r)-1]+s_0.$$

Figure 2 illustrates an equilibrium of *laissez-faire* banking. We can examine how that equilibrium changes with exogenous variables.

(Insert Figure 2 here)

Proposition 3: *The equilibrium of laissez-faire banking has the following properties:*

(1) p^{LFB} *decreases in* r, α, β *and increases in* k *and* B*;*

(2) d^{LFB} *decreases in* α *and increases in* k, B, *and* β.

The interpretation is that a higher r makes the banker gamble with a lower p, since this makes the upside of his gamble smaller; a lower p and higher $y(p)$ compensate for this effect; a higher B or α makes the case of $1-p$ more costly and therefore induces higher p.

(Insert Figure 3 Here)

3.3. The Soft Budget Constraint—Banking with Government Intervention

A fundamental difference between this case and the case of *laissez-faire* banking is that now the government decides to provide funding to refinance investment projects of the bank, if doing so enhances the *ex post* social welfare. There are three important implications of refinancing the bank's investment projects. First, the government also has to bail out depositors, for otherwise, individual depositors, anticipating insufficient bank funds to pay them interest and principal in full, will make a run on the bank before the refinancing of the investment projects can be carried out. Second, the bank manager has to be retained, since by our assumption he has indispensable knowledge for finishing the project. Thus, anticipating refinancing, the manager faces no risk of losing his management position. Third, refinancing the bank's investment projects and bailing out the depositors may be inefficient *ex ante*, since this course makes both the depositors and the bank manager less careful in their deposit and investment decisions. We summarize this discussion by Lemma 2.

Lemma 2: *If and only if* $z-x+B > 0$*, an ex post social-welfare-maximizing government with no budgetary constraint rationally chooses to refinance the bank's unsuccessful investment projects and pay the depositors principal and interest.*

In this case, the banker's expected payoff is

$W^B(d) = \alpha\, p[(1+d)ky(p) - (1+r)d] + B - \alpha.$

Maximizing the expected payoff, the bank manager chooses his optimal project indexed by p following the first-order condition:

$[kpy(p)]' = (1+r)d/(1+d),$

which gives p as a function of d. Meanwhile, given the possibility of government bailout, the depositors' expected rate of return is the same as r, the announced interest rate of the bank. In turn, there is a deposit supply schedule $d = \beta s(r)$. The intersection of the two curves, $p=p(d)$ and $d = \beta s(r)$, describes the equilibrium of the case of private banking with government intervention.

Proposition 4: *If $z-x+B>0$, in the case of government intervention without ex ante regulation, the unique equilibrium consists of p^{BGI} and d^{BGI} satisfying the following conditions, and in the case of unsuccessful investment projects the government will provide refinancing and pay the depositors principal and interest:*

$[kpy(p)]' = (1+r)d/(1+d),$

$d = \beta s(r) + s_0.$

3.4. Optimal Soft Budget Constraint—Banking with Optimal Bailout Probability q^{BOB}

A hypothetical but interesting scenario is one in which the government can optimally choose q, the probability of bailout. This is hypothetical in that in reality it is very difficult for a government to commit to implementing a systematically stochastic policy. It is, however, an interesting case in that it helps illustrate the tradeoff in choosing q. A high q may increase *ex post* efficiency in the case that the bank's investment projects need refinancing and refinancing is socially worthwhile. At the same time, a high q makes the bank manager less concerned with the possibility of losing his job and therefore reduces p, which is socially undesirable. The optimal q trades off these two competing forces. Policies based on the optimal q can be called *strategic ambiguity*.

Proposition 5: *There exists an m such that if $c<m$, then the optimal probability of refinancing unsuccessful investment project is less than 1, i.e., $q^{BOB} < 1$.*

We can compare the efficiency of the four alternative institutional arrangements of banking. By definition, the first best case where a social planner makes both decisions on p and refinancing is the best. The BOB case, in which the government can optimally decide on q, is better than the case of banking with government intervention (BGI).

Proposition 6: *Suppose* $z-x+B>0$ *and* c *is sufficiently small. Then*

(1) $p^{BGI}< p^{FBB}$, $p^{BGI} < p^{BOB}<p^{LFB}$;

(2) the ranking of social welfare per unit of total investment is

$$sw^{BGI} < sw^{LFB}< sw^{BOB} < sw^{FBB}.$$

When $0<z-x+B <c$ and c is small, bailout is not very socially beneficial; the benefit of bailout is dominated by the loss of p.

4. Soft Budget Constraint and Banking Regulation

The analysis above shows that a social-welfare-conscious government with access to fiscal and financial resources rationally chooses to refinance banks' unsuccessful investment projects and compensate depositors. This, consequently, reduces the quality of bank investment projects and lowers *ex ante* (overall) social welfare. In this section, we will show that banking regulation is an institutional solution to this problem. Banking regulation can constrain *ex ante* investment decisions of the bank manager and therefore is often needed to enhance social welfare.

Many types of banking regulations are imposed in reality. One common regulation is the so-called capital adequacy requirement, which requires banks to maintain a minimum ratio of equity to total assets. Capital adequacy is inversely indexed by d in our model. A higher level of capital adequacy, as indexed by a lower d in our model, according to the analysis above, induces the bank manager to be more cautious in his investment decisions.

In the following analysis, we will focus on the capital adequacy regulation. We treat it as a proxy of more general prudential banking regulation. One reason for doing so is that in reality this is one of the most common and important types of prudential banking regulations. The main reason, however, is that the purpose of our theoretical analysis lies in shedding light on the rationality and general intensity of prudential

banking regulation. Consequently, the model is too general to study the detailed differences among various types of prudential banking regulation. For the latter purpose, a different model is needed.

In the following analysis, we suppose that the government refinances unsuccessful bank investments and fully compensates depositors for their losses in deposit and interest payment with probability q. The value of q is exogenously determined by the government's commitment power or other factors such as budgetary capacity. Modeled this way, government failure refers to the situation that $q > q^{BOB}$, i.e., the government bails out the banks too frequently from the point of view of social welfare maximization.

The driving force of the model is that the government refinances unsuccessful investment projects and bails out depositors too frequently. Thus the key exogenous variable is q, and we are most interested in knowing how changes in q give rise to changes in banking regulation. There are also a number of auxiliary factors at play, including the competitiveness of the banking industry. We will not put much emphasis on them.

We will focus on two key questions in the following analysis. The first is when there is need for prudential banking regulation. We will provide conditions under which prudential banking regulation arises. The other question is when prudential banking regulation should be stricter. We again will analyze the conditions behind the answer to this question. Through analyzing these questions, we hope to relate our theory to observations of banking regulation around the world.

We proceed by the following order of analysis. First, suppose that there were no prudential banking regulation. What would be the equilibrium? In such an equilibrium, the supply of deposits, which is determined in anticipation of the bank manager's decision, may help to discipline the latter. Let the associated level of deposits be d^E. Second, suppose that the government could dictate the amount of deposits the bank takes. What would be the government's optimal choice? Let the government's optimal choice be d^G. If $d^E \leq d^G$, the prudential banking regulation would be no help, since it cannot force depositors to put more deposits into the bank. That is, in this case there is no need for banking regulation. The other case is $d^E > d^G$, in which banking regulation helps and

is needed, since the unregulated level of deposits is too high and encourages the choice of too risky investment projects. As a result, the bank needs to reduce the amount of deposits it takes or to increase its own capital.

Let us first analyze the equilibrium without banking regulation. Given the amount of deposits ***d***, the bank manager chooses ***p*** to maximize his expected payoff, which is

$$W^B(d) = \alpha\, p[(1+d)ky(p) - (1+r)d] + (1+d)pB + (1+d)(1-p)qb,$$

from which we can derive the first-order condition on the bank's investment choice ***p***:

$$[kpy(p)]' = (1+r)d/(1+d) + (q-1)B/\alpha, \qquad (1)$$

This defines the reaction function of the bank manager, ***p=p(d).***

Meanwhile, the depositors expect the bank manager to choose investment project ***p*** and the resulting expected rate of return to be ***p(1+r)+(1-p)q(1+r)-1*** . Thus, the depositors' supply function is ***d=d[p(1+r)+(1-p)q(1+r)-1]***.

The two reaction functions define a banking equilibrium under no government regulation, (p^E, d^E), satisfying the equations (1) and ***d=d[p(1+r)+(1-p)q(1+r)-1]***.

What is the government's most desired level of bank deposits, d^G ? The government chooses to maximize the expected social welfare associated with the bank:

$$SW=(1+d)\{pky(p)+pB+(1-p)q(z-x) + (1-p)qB\}$$
$$=(1+d)U, \qquad (2)$$

where ***U*** is defined as the social welfare per unit of bank assets, and ***p*** is chosen by the bank manager in a way described by equation (1).[5] That is, ***p*** is a function of ***d***.

What is the social-welfare-maximizing regulation d^G? Treating ***p*** as a function of ***d***, we take the first derivative of the social welfare function:

[5] To be more precise, suppose that there are *n* banks, with the individual banks' own assets being a_1, a_2, …, a_n , respectively. Given our assumption of constant return to scale, the total social welfare is $(1+d)a_1U+(1+d)a_2U+\ldots+(1+d)a_nU = (a_1+a_2+\ldots+a_n)(1+d)U$. That is, the government's objective is to maximize (1+d)U.

$$\frac{\partial SW}{\partial d} = U + (1+d)U_p p_d$$
$$= U + (1+d)[\frac{(1+r)d}{1+d} + (1-\frac{1}{\alpha})(1-q)B - q(z-x)]p_d, \quad \textbf{(3)}$$

where in calculating U_p we have used the condition (1), which should be satisfied after the government announces d. Let us examine how government's optimal d varies with exogenous variables such as q, r, etc. We will do the same with the equilibrium d under no regulation. Therefore, we will be able to study when banking regulation is more likely to emerge and how it varies across different economic environments.

One of the most important exogenous variables is q, the probability that the government refinances bank projects and bank depositors. We can examine how changes in q affect d^G and d^E. From (2), we take the cross partial derivative of the social welfare function between d and q:

$$\frac{\partial^2 SW}{\partial d \partial q} = U_q + U_p p_q$$
$$+ (1+d)U_{pq} p_d + (1+d)U_p p_{dq}, \quad \textbf{(4)}$$

where Uq can be either positive or negative, since there are two effects going on: an increase in q may increase U, since it is more likely that those *ex post* profitable projects are refinanced; however, it may also decrease U, since an increase in q makes the bank manager less fearful of losing the private benefits of control, B, and thus he may choose riskier investments with lower p. If the salvage value, z-x, is not very high, the second effect dominates the first, so that Uq is negative. U_p is positive, since an increase in p means better quality of investment projects and this helps enhance social welfare. p_q is negative, since a higher q encourages more reckless investment. The last two terms in equation (4) are shown to be negative in the appendix, under our technical assumptions.

Thus, we show that when q is higher, the government's optimal d, d^G, should be smaller. This makes intuitive sense, since a higher q means more chances of bailout and more reckless investments.

Meanwhile, as for the equilibrium deposit level d^E, when q increases, it may change either way due to two opposing effects. The first effect is that a higher q makes the bank manager more reckless and thus lowers p. Other things being equal, this lowers

the supply of deposits. The opposite effect is that when q is higher, the higher chances of government bailout of depositors increase the supply of deposits. If the deposit supply schedule is relatively flat (insensitive to the real interest rate), the second effect is small and is dominated by the first.

Summarizing the analysis above, we have the central proposition of the paper, which says that when the government has less ability to commit itself not to refinance the bank's unprofitable investment projects, it should be more inclined to impose tight banking regulation.

Proposition 7: *There exist* h, m, *and* $\underline{\beta}$ *such that*

(1) if $c<h$, $k/B<m$, *and* $\beta<\underline{\beta}$, *then when* q *is higher, it is more likely that banking regulation will be necessary for social welfare maximization;*

(2) if $c<h$, *then when banking regulation is necessary, the higher* q *is, the tighter the banking regulation.*

The interpretation of Proposition 7 is very simple. c is the upper limit on the *ex post* social welfare benefits of bailing out the bank's investment project. When c is sufficiently small, bailing out the bank's investment projects decreases social welfare and does so increasingly with increasing q. Also, we need k to be sufficiently small relative to B. For k to be small indicates that good banking projects are not numerous, so that the bank manager's decision is likely to be socially inefficient. As a measure of the bank manager's personal stake in the success of the project, B being large reduces the tendency of bank managers to choose low-quality (risky) projects. Therefore k/B is a relative index of how poor the quality of the pool of projects is and of the tendency of bank managers to choose socially inefficient projects. Under these conditions, a higher q needs to be curbed by a lower d. Meanwhile, when β is low, the depositors' supply of deposits is not sensitive to the expected rate of return. Therefore, if the bank is left unregulated, when q gets higher, the quality of bank investments gets lower, since depositors are not lowering d enough to counteract the effect of a higher q. In this case, regulation of d is called for.

Proposition 7 is the central prediction of our theory. It states that when the government is less capable of committing to a hard budget constraint for banks, banking

regulation should be strengthened to minimize the negative effects of the SBC. In the following, we explore further the predictions of our theory.

First we study the impact of changes in the salvage value of the bank's investment project that needs refinancing, ***z-x,*** on banking regulation. The salvage value is the value of a bank's investment project after refinancing is obtained. It does not incorporate the cost of the initial investment.

Intuitively, when the salvage value is lower, the bank manager's reckless decisions become more socially costly. Therefore, it is increasingly beneficial to improve the quality of the investment project. Meanwhile, the equilibrium under no banking regulation is unchanged, since the payoff to the bank manager is independent of the salvage value, which all goes to the depositors and the government (the refinancer). Thus, with a lower salvage value, there is no need for tighter banking regulation. Proposition 8 restates the conclusion of the discussion.

Proposition 8: *Ceteris paribus, a higher value of* ***z-x*** *makes it less likely for banking regulation to be necessary, and if the regulation is in place, it becomes less strict.*

An interpretation of Proposition 8 is that when an overall economic slowdown leads to a lower ***z-x***, i.e., a bad investment project becomes worse, banking regulation is called for.

We can also study how the level of private benefits of control of the bank manager, ***B***, affects the necessity and intensity of banking regulation. ***B*** depends on the specific institutional setup of the economy. For example, in an economy with a long tradition of banking, bankers are given high social prestige and ***B*** is high. Similarly, if in an economy there is a strong professional association of bank managers, so that in order to become a bank manager one needs to be certified by the association (i.e., there is significant entry barrier to the banking profession), then ***B*** is likely to be high. To the contrary, in former socialist economies, or in economies where banks are mostly state-owned, so that bank managers are government bureaucrats who are appointed to and removed from banks arbitrarily, ***B*** is expected to be low, since there is not much special about the job of a bank manager.

Proposition 9: *There exists a* $\underline{\beta}$ *such that if* $\beta < \underline{\beta}$*, then the higher* ***B*** *is, the less likely for banking regulation to be necessary and the less strict the regulation should be.*

The intuition of Proposition 9 is rather straightforward. When B is lower, the government's preferred level of deposits, d^G, should be lower due to two effects. The first is that the bank manager's loss due to lack of refinancing of the bank's bad investment projects (happening with probability $1-q$) is smaller. Therefore, he is less concerned with the quality of investment projects and chooses riskier projects. As a result, the need for banking regulation increases. The other effect is that, like $z-x$, B is part of the social benefit of refinancing a unsuccessful bank project, and a lower B is equivalent to a lower $z-x$. This consideration also increases the social benefit of improving the quality of investment projects by choosing less risky projects. Thus these two effects lead to a positive relationship between B and d^G. However, whether bank regulation becomes more necessary also depends on d^E. From the depositors' point of view, under no regulation, the equilibrium level of deposits d^E is also lower, since the depositors understand the impact of a lower B on the quality of investment projects. Again, when depositors are not sensitive to the rate of return, i.e., when β is low, the impact of lowering B on d^G dominates that on d^E. Thus a lower B makes banking regulation more necessary and stricter.

Interestingly, the impact of changes in α is opposite to that in B. In fact, a higher value of α makes the bank manager care more about monetary benefits, reducing the relative importance of the private benefits of control, B. Thus, an increase in α is similar to a decrease in B. An implication of this analysis is that from the point of view of social welfare improvement, banking regulation is more likely to be in place when bank managers have higher stakes in the profitability of the bank. To summarize this result, we have the following analysis.

Proposition 10: *There exists a $\underline{\beta}$ such that ceteris paribus, if $\beta < \underline{\beta}$, then when α is higher,*

(1) it is more likely for banking regulation to be necessary;

(2) when banking regulation is necessary, the regulation is stricter.

What is the impact of a higher deposit interest rate on banking regulation? The deposit interest rate r is oftentimes fixed or regulated by monetary policies. A common

instrument or consequence of tighter monetary policy is an increase in r. This gives rise to two changes in the model. A higher r is equivalent to reducing the payoff of a successful project without changing that of an unsuccessful one, inducing the bank manager to take on riskier investment projects. Thus, the first effect of a higher r is that a social-welfare-minded regulator desires a lower d^G in order to combat the tendency of the bank manager to choose riskier projects.

The other effect is that a higher r lowers the expected rate of return to the depositors, who, in turn, reduce their aggregate supply of deposits for the bank. Thus, the unregulated equilibrium d^E decreases. But it is not clear whether the reduction in d^G is lower than that in d^E. However, when β is low, d^E is not very sensitive to the expected rate of return, so that this second effect will be dominated by the first effect. We summarize the discussion by the following proposition.

Proposition 11: *There exists a $\underline{\beta}$ such that, ceteris paribus, if $\beta < \underline{\beta}$, then when r is higher:*

(1) It is more likely for banking regulation to be necessary.

(2) When banking regulation is necessary, the regulation is stricter.

Suppose that in an economy, the overall average rate of return on all investment projects decreases (or increases), as in periods of economic slowdown (or boom). What is the impact on banking regulation? Is it more likely to be necessary to impose stricter banking regulation? In our model, changes in the overall average rate of return of projects are captured by changes in k. As in the analysis of an increase in r, there are two effects. On the one hand, the regulator would like to see a lower d^G in order to induce better quality investment projects, which is necessary to compensate a decrease in k. On the other hand, the unregulated equilibrium d^E also decreases, since the success rate of the bank's investment projects goes down, so that the depositors' supply of deposit decreases. Again, if β is small, the equilibrium d does not decrease much, so that the former effect dominates the latter one. To summarize, we have the following proposition.

Proposition 12: *There exists a $\underline{\beta}$ such that, ceteris paribus, if $\beta < \underline{\beta}$, then*

(1) when k is higher, it is less likely for banking regulation to be necessary for social welfare maximization;

(2) when banking regulation is necessary, the regulation is less strict.

5. Historical Evidence for the Theory

In this section, we provide historical evidence for the three basic assumptions and the central prediction of the theory. First, we show that in early historical episodes, *laissez-faire* banking (the so-called free banking) existed, where banks did face a hard budget constraint, but since they managed risk well, the banks functioned efficiently and systemic banking crises were rarely observed. Second, in more recent history, governments have tended to intervene in and rescue failing banks; this gives rise to a soft budget constraint on the banks, leading to reckless investments. Third, in response to the soft budget constraint, governments began to regulate banks to prevent them from falling into financial distress, and this gives rise to the emergence of banking regulation.

5.1. The Hard Budget Constraint on Banks in the Free Banking Era

Free banking refers to the institutions of banking with no or little government regulation.[6] Governments do not provide explicit deposit insurance, and more importantly, governments have no motivation and no sufficient financial resources to ensure the solvency of any bank. Free banking did exist in history.[7] Contrary to what people might have imagined, free banking was not synonymous with banking panics. Individual banks did fail occasionally in the free banking era, but there do not seem to

[6] Under this regime, there is no government control of the quantity of exchange media, no state-sponsored central bank, no legal barriers to the entry, branching, or exit of commercial banks, no government restriction on interest rates or bank asset and liability portfolios, and no government deposit guarantees (Selgin and White, 1994).

[7] Compared with the Scottish free banking, the so-called "free banking" or "wildcat banking" era in the U.S. in the 19th century is largely a misnomer (Rockoff, 1974; Selgin and White, 1994). Actually there existed various government restrictions and protections: the federal or state governments prohibited or restricted bank branching; the governments required that note issuers deposit approved bonds with state officials as collateral; the governments also sheltered nonredeeming banks from dissolution by the courts, which removed the bank closure threat and bore resemblance to a government soft budget constraint. The different approaches to free banking led to strikingly different outcomes. The U.S. "free banking" resulted in financial chaos, whereas the Scottish banking system was intrinsically stable, so that no bank runs ever developed under free banking in Scotland.

have been major banking panics and crises.[8] This helps us reach two conclusions. First, banks did face hard budget constraints in the free banking era, as banks did go bankrupt and get closed down occasionally. Second, banks' hard budget constraints led to cautious banking operations, and thus not many bank failures were observed in equilibrium.

Here we provide some notable examples illustrating the following mechanism: in the free banking era, anticipating no refinancing or rescue for ailing banks from private investors or governments, bankers pursued conservative lending policies and remained cautious in their operations. In addition, bankers created various institutions to impose self-discipline, to submit to outside scrutiny, and to win customer confidence. As a consequence, free banking was rather stable, and there were few systemic banking panics.

Free Banking in Lucca[9]

In the thirteenth century, the Tuscan city of Lucca was the hub of a network of mercantile banking partnerships. Though without systematic government regulation of banks, the banking sector didn't go into turmoil, because market discipline mechanisms played an effective role in constraining bankers' opportunism.

Facing the threat of bank failure, banks in Lucca were particularly cautious in managing their assets and liabilities to minimize the risk of financial distress. On the liability side, they managed the deposit-loan ratio carefully so that the size of deposits consistently averaged about five times that of the loans, which ensured that the banks' financial resources were much larger than the use of funds, a fact that would enhance bank liquidity and stability. Bankers accepted a small amount of demand deposits and preferred time deposits with relatively long maturity, ranging from three months to a year. The concentration of deposits in fixed-term time deposits enhanced the predictability and stability of the banks' liability. On the asset side, the banks in Lucca kept the loans smaller in size and shorter in duration than their deposits, that is, banks tended to borrow long and lend short. In offering loans, banks usually asked for collateral such as crops,

[8] Based on the case studies of some countries such as Canada, Scotland, Switzerland, and the U.S., Dowd (1992) summarizes evidence that bank failure rates in free banking episodes or less regulated banking regimes are lower than those in more regulated ones.

[9] See Blomquist (1979) for detailed descriptions of banking in Lucca.

clothing, utensils, or horses in pledge against the loans. These measures substantially enhanced banking stability.

In order to win credibility for themselves in the absence of government warrants, bankers established various institutions to exercise self-discipline. They inscribed an oath upon the façade of the cathedral of San Martino, in which the early bankers swore to commit "no theft, nor trick nor falsification," and made it visible to their clients. Collective enforcement reinforced the power of oath. Bankers established guilds to enforce discipline, each guild normally consisting of about 50 people. Guild members were often further tied by intermarriage to strengthen the guild's disciplinary power.

With bankers' cautious banking practices, free banking didn't cause massive banking panics or crises. Some banks did fail, but usually it was not because of bankers' fraudulence or recklessness. One important reason for bank failure in that period was that banks succumbed to the political authority by extending loans in an inappropriate way. For example, some banks with international business in Britain lent money to British aristocrats under political pressure without daring to ask for collateral. Some British aristocrats simply defaulted on loans to escape liability (Kindleberger, 1993).

Scottish Free Banking

The Scottish experience of free banking in the 18th and 19th centuries presents another classic example of how market discipline can stabilize the banking system. In the absence of government regulation, the market generated effective mechanisms for disciplining bankers' behavior. Virtually all bank owners carried unlimited liability: all but three of Scotland's banks operated with unlimited liability during the free banking era. This contributed to banking stability by removing the temptation to risk taking on the part of bank owners. Bankers made very careful decisions and practiced risk management to avoid financial risk contagion. To protect itself from any spillover effects from other banks' difficulties, each bank attempted to establish a distinct brand-name identity and reputation, and held as little of other banks' liabilities as possible (White, 1984).

5.2. The Soft Budget Constraint of Banks under Modern Governments

Accompanying the development of capitalism was the rise of government intervention in economic affairs and the tremendous fiscal and financial capacity of

governments. With few exceptions, modern governments—not just democracies—are subject to the pressure of public opinion and popular demand, and therefore are concerned with instantaneous social welfare. At the same time, the expansion of the power of taxation and monetary policy equips modern governments with ever-increasing resources, making them usually the single largest economic entity in their respective economies. This prompts governments to intervene on occasions where social welfare can be clearly enhanced, even when doing so will harm long-term economic efficiency. Bailing out failing banks is one important aspect of government intervention to provide social safety net, which gives rise to bankers' risky investment strategy. Here we look at some early examples of government bailout of insolvent banks that took place in Chile.[10]

Chilean Mortgage Bank

The Chilean Congress created the Chilean Mortgage Bank in 1855 with the purpose of assisting landowners to obtain agricultural loans by using land as collateral. Most of the landowners were aiming to export wheat to the new market that the California and Australian gold rushes had opened up. The Chilean government offered explicit guarantees of the funds lent to the Chilean Mortgage Bank, including deposits. In 1859 and 1860, grain prices fell, the economy suffered a recession, and landowners tended to default on the loans. To rescue the bank, the government secretly transferred unutilized funds from an 1858 railway construction bond to landowners in order to prevent them from declaring insolvency on their mortgage loans. This constitutes one of the earliest examples of government bailout of banks in 19th century Latin America.

Deposit Guarantee and Bank Bailout in Chile

The Chilean government's involvement in the banking industry expanded in the 1860s as the government extended the safety net to some large private banks. In 1866, amid economic instability induced by a war against Spain, the Chilean government granted a guarantee on bank notes to some banks, which stated that the bank notes would be redeemable at par at government fiscal offices. This guarantee gave rise to reckless banking behavior. Banks with the government guarantee turned out to have strikingly

[10] See Brock (1999) for details.

different business strategies than those without. The Chilean economy began to suffer from the worldwide recession in 1873. During the period between 1873 and 1878, the largest of the nonguaranteed banks (*Banco Valparaiso*) cut its dividends, whereas the largest of the guaranteed banks (the *Banco Nacional de Chile*) kept paying its stockholders lavish dividends. This suggests that guaranteed banks responded to adverse economic conditions in a way that would lower their capital reserve and raise the likelihood of a bailout by the government. Their deteriorating profitability finally led to bailout.

5.3. Banking Regulation as a Cure for the Effects of Soft Budget Constraint on Banks

In this subsection, we review a few historical cases to illustrate the logic that when a government is economically strong enough and has incentive to bail out banks, it quickly realizes that in order to prevent undesirable consequences of the SBC, it needs to impose prudential banking regulation to guide banks' behavior. Our evidence will show that the origin of banking regulation in a broad sense, including primitive forms, can be traced back to the end of the Middle Ages, right after the emergence of the banking industry. In some city-states, such as Barcelona in the late 13th century, and some countries, such as Germany in the 16th century, the governments had acquired relatively abundant fiscal resources and exhibited some strong tendency to rescue ailing banks. In other words, some governments in the premodern era already bore some resemblance to modern governments. This bred the early-era banking regulation: those governments implemented various primitive forms of banking regulation to constrain bankers' behavior. This demonstrates clearly how banking regulation originated from the purpose of overcoming the government failure and the SBC of banks. However, not surprisingly, systematic and extensive banking regulation originated only in the mid-19th century, when government involvement in the national economy began to expand and modern governments came into being in many countries around the world.

Banking Regulation in the Early Banking Era[11]

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[11] This part is based on Riu (1979).

The late medieval (late 13th century) experience of Aragon demonstrates vividly the genesis of banking regulation as a response to moral hazard following government guarantees. In some city states such as Barcelona, Valencia, and Tortosa, the economy was booming and the government had relatively abundant fiscal resources. Understanding well the importance of bank stability to the society, the kings of these cities offered guarantees on bank deposits. Government insurance caused moral hazard problems: irresponsibility, speculation, and lack of foresight on the part of some early bankers led to fraudulent bank failures during the last third of the 13th century.

In response to fraudulent bankruptcies, the legislatures in Barcelona and Lerida passed the first laws governing banking in Catalonia in 1300 and 1301 respectively. The law in Barcelona provided stringent rules to punish those bankers who went bankrupt: they should be publicly denounced, not only in the streets of Barcelona but also in all the towns where they had done business. They could not open any exchange or bank thereafter, and would be imprisoned and kept on bread and water until they paid off all their creditors.

The government also strengthened the regulation of bank accounting and enhanced creditors' rights. The banker was declared responsible for all entries made for his clients, and no one, not even the king, could postpone settlement of credit beyond the set time. In Lerida, the king decreed that money changers were responsible to their creditors and that their goods could be confiscated in cases of default.

In addition, the government required banks to submit a deposit as guarantee: no one would be allowed to open a bank in Catalonia without first depositing 1000 silver marks in Barcelona and Lerida and 300 marks in all other towns and cities in Catalonia. Only after the deposit was paid could the money changer place the tapestry bearing the shield of the city on his table, indicating that his office was guaranteed. Those who did not pay the fee had to leave the wooden top of their tables bare, without tapestries or other cloths, as a warning to their clients. This is in nature similar to the deposit reserve or capital adequacy requirement in contemporary banking practice, which no doubt can contribute to banking stability.

Regulation in Early German Banking: Bank of Basel[12]

During the decades around 1500, German banks rose quickly in strength. Among them were certain public banks that depended on the state. They were created to handle local needs and to put to good use the financial resources of rich cities that did not know how to invest their capital. By establishing these banks, the governments could retain control of them and were able to mobilize the funds easily in case of need.

The Bank of Basel was one example. It was founded by the city in 1504. It accepted deposits from public bodies such as the municipal governments of Basel, Strasbourg, and Bern and from private persons; it offered credit to public and private clients; and it carried out transfers. The city of Basel offered guarantees to the numerous depositors in the Bank of Basel. In order to minimize the bankers' risk taking, the city government imposed various regulations. Firstly, there was geographical restriction on bank branching. The operations of the Bank of Basel were limited to the surrounding region (Switzerland, Alsace, and southern Germany) to prevent overexpansion. Secondly, the government gave advice on borrower screening. Bankers were instructed to be cautious in selecting clients by avoiding debt-laden ones such as other financiers or Europe's great debtors. Thirdly, to minimize the risk of loan losses, the bankers were restricted to a moderate size, so that the amounts on balance sheet were hardly impressive. Above all, the government gave priority to rigorously prohibiting all speculation in banking: the bank statues made this matter clear, and the municipal authorities closely watched over the morals of bank management.

Early Banking Regulation in Japan[13]

The history of banking system formation during Japan's modernization also illustrates vividly how government regulation of banks emerges as a response to bankers' moral hazard under a government safety net. The Meiji restoration opened a new era in which a modern banking system was called for. The Japanese government established

[12] This part is based on Bergier (1979).

[13] This part is based on Juichi Soyeda (1896).

Tsushioshi (the Board of Trade) and induced rich merchants to set up companies for trading and bill discounting, which were primitive forms of banks. Beginning in 1869, discount companies (Kawnase Kaisha) sprang up in many cities such as Tokyo, Osaka, and Kobe. They were under the control of the Board of Trade, and were artificial creations of the government. Large amounts of funds were placed at their disposal, and they were granted the privilege of issuing gold, silver, dollar, and coin certificates. As they played a paramount role in the national economy, the government, being their originator, attached utmost priority to maintaining their survival and stability. Under government guarantee, however, these discount companies exhibited poor management and reckless operation, which caused them to fail in nine cases out of ten. By 1872, most of them had suffered enormous liabilities and losses. Naturally, the Japanese government was primarily responsible for the losses. The government not only gave up its claims for moneys lent to it, but also freely advanced funds to satisfy the claimants against the companies, which was a typical case of government bailout.

These failures taught the government a hard but salutary lesson. The government tightened the regulation and supervision of banks and quasi-banks to preclude fraudulent banking activities. First, the government concentrated the power to permit the organization of banks in the Comptroller of the Currency so as to set a high standard for entry into the banking industry. Banks were also required to report regularly to the Treasury. Second, a commercial code was promulgated in 1890 to govern banks. The banking act set up various prudential regulation measures: banks were required to deposit a sum not less than one-half of their paid-up capital in interest-bearing Government bonds as a guarantee for deposits, to make their directors subject to unlimited liability, to limit the maturity of loans to six months with national debt bonds as securities, to present half-yearly reports to the Treasury, to make public every half-year a list of assets and a balance sheet in a newspaper, and not to advance as loans any sum beyond one-tenth of their capital to any one customer.

Beginning in 1870, Japan experimented with and finally established a system of national banks by following the U.S. model. Realizing that the government couldn't commit to not taking responsibility for these national banks once they were in distress, the Japanese Treasury insisted that even first-rate national banks had to take precautions

so as to put the finances of the country on a firm and solid basis. The government thus adopted a series of restrictive regulations on national banks, which included restrictions on their investment portfolios and requirements for deposit reserves. The banks were forbidden to conduct transactions in land, buildings, or other real property as well as in shares of joint-stock companies. They couldn't lend to one customer more than ten percent of their capital. They had to keep in hand twenty-five percent of their total deposits in order to meet sudden demand.

If we review the history of banking regulation in the U.S., it is easy for us to see that many of the developments in strengthening banking regulation were made in response to the expansion of implicit and explicit government guarantee for banking stability, in particular, the upgrading of the deposit insurance system.

State Deposit Insurance and the Strengthening of Banking Regulation: The Case of Oklahoma[14]

The U.S. experimented with state-sponsored deposit insurance programs in the post-bellum banking era. Oklahoma was a forerunner in this respect. It hastily established a deposit guarantee system in 1907. Under this scheme, all deposits were insured, and immediate payment upon bank closure was promised. With virtually no supervision or further regulation, deposit insurance encouraged risk taking and overexpansion of state banks. For example, Columbia Bank overextended itself, expanding its deposits from $365,000 in September 1908 to $2,806,000 in September 1909. The excessive growth of the bank and excessive risk taking in investment portfolio choice finally led to the demise of Columbia Bank, which triggered a series of bank failures. The state deposit insurance fund was also threatened with insolvency. The state legislature responded to the banking crisis by overhauling the deposit insurance law in 1909. To maintain the adequacy of the insurance fund, the new law provided for fixed annual assessments of one fourth of 1 percent of average daily deposits to raise the insurance fund gradually from its original 1 percent to 5 percent of average daily deposits.

[14] This part is based on Eugene White (1981)

Furthermore, the new law imposed strict capital adequacy regulation on the banks: banks could only have deposits up to ten times their capital and surplus. Bank supervision was also strengthened. A stiff fine was imposed on banks that endeavored to attract new depositors by advertising that deposits were guaranteed by the state rather than by the deposit guarantee fund. The state bank commissioner was also granted considerable discretion to determine which new banks merited charters. The new assessments and regulations slowly brought the situation under control in Oklahoma, and by 1920 the deposit guarantee fund was restored to solvency. All states adopting deposit guarantee afterwards attempted to limit the morally hazardous expansion by setting capital/deposit ratio requirements.

The Emergence of FDIC and the Accompanying Banking Regulation[15]

Founded in 1913, the Federal Reserve System hadn't played a large role in regulating the country's banking system at the beginning. The Banking Act of 1933 (the Glass-Steagall Act) established the FDIC and thus the federal-level deposit insurance system, but at the same time gave increased regulatory authority to the Fed. The Banking Act of 1935 was primarily intended to strengthen the Fed, giving the Fed board expanded reserve requirement authority and the power to regulate the interest rate paid by member banks on time deposits. It ended the "free banking" era in the U.S. through entry regulation by giving the Comptroller greater authority to exercise discretion in the granting of national bank charters. The 1933 and 1935 Banking Acts set up a new regulatory framework that places restrictions on banks in aspects such as pricing of deposits, entry and expansion, scope and nature of activities, leverage (minimum capital requirements) and other balance sheet elements, and geographic expansion.

Following the 1935 Banking Act, there was centralization of authority within the Fed. The power of regional reserve banks was pruned; the Washington-based Board of Governors was endowed with extensive powers to conduct open market operations, and was given increased control over the commercial banking sector.

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[15] Part of the following discussion is based on Eugene White (1998) and Cooper and Fraser (1986).

To prevent moral hazard and adverse selection following deposit insurance, the FDIC had strong regulation attached to it: Non-Fed-member banks could receive insurance only if they joined the Fed within two years and met the higher requirements and stricter regulations imposed on members.

The extension of deposit insurance to savings and loan associations (S&Ls) also clearly illustrates how regulation tends to be strengthened following the deposit insurance scheme. The National Housing Act of 1934 extended deposit insurance to S&Ls by establishing the FSLIC. As a companion development, the government strengthened regulation of S&Ls: the government provided a full set of institutions to S&Ls that paralleled those for banks; a dual federal-state regulatory system that paralleled the dual banking system was established for S&Ls.

U.S. Regulatory Response to S&L Crisis[16]

The U.S. S&L crisis in the 1980s is a classic case of risk-taking following a government deposit guarantee. The deposit insurance was not phased out following the crisis, but Congress learnt a lesson and enacted the FDIC Improvement Act (FDICIA) in 1991 in response to the moral-hazard-induced crisis. Its theme is "structured early intervention and resolution" (SEIR): to require specific intervention by the regulatory authorities on a timely basis. Specifically, SEIR calls for the S&Ls to maintain a higher capital level and measure capital by market value accounting and reporting so as to monitor the change in the value of capital. SEIR authorizes discretionary intervention by regulators should capital decrease below an established number. SEIR prescribes mandatory, prespecified imposition of regulatory restraints and capital restitution should capital decrease to a lower level. It also allows for mandatory resolution of a capital-depleted bank at a prespecified point while capital is still positive. The main purpose of SEIR is to give banks an incentive to strive for high capital levels, and to replace regulatory discretion by mandatory rules so as to ensure prompt regulatory intervention in banks.

[16] This part is based on Benston and Kaufman (1997).

6. Contemporary Cross-Country Econometric Evidence for the Theory

Our theory of the SBC of banks can explain not only the historical emergence of banking regulation, but also the contemporary cross-country variation in the adequacy of banking regulation. We argue that social-welfare-minded modern governments tend to rescue failing banks. When governments have stronger fiscal capacity, it will be harder and less credible for them to commit to a hard budget constraint for banks. As a result, these governments will impose stricter and more careful prudential banking regulations to prevent massive bank fraud from happening. In short, our theory predicts that countries with more abundant fiscal resources will establish more adequate banking regulation.

6.1 Measuring the Strength of Banking Regulations across Countries

To measure the cross-country differential in the adequacy and stringency of banking regulation, we employ the data set of the project on "Banking Regulation and Supervision" of the World Bank Group, in which comprehensive information on commercial bank regulatory practices for a large sample of countries is collected. The data were collected in the year of 1999, and generally reflect the recent practices of banking regulation across countries. Barth et al. (2001, 2002) provide a detailed description of the survey questions used and the data collection process, and conduct some data analysis. Li (2003) also employs the same data set to reclassify the banking regulation categories and analyze the fundamental determinants of banking regulation across countries.

Banking regulation consists of a broad range of dimensions. In this paper, we focus on three major features of banking regulation ─ the preconditions for banking regulations, the *ex ante* banking regulations, and the ongoing regulations of banks. Each major feature has several component features. We synthesize these component features to establish an index for each major feature. These major features mainly capture the efforts made by governments to monitor and discipline bankers in order to avoid bank fraud.

The Preconditions for Banking Regulations

This refers to the extent of regulatory agencies' independence and flexibility in conducting bank regulation and supervision. We construct the index of the preconditions

for banking regulations by following Li (2003). It has two components: the operational independence and the supervisory flexibility of bank regulators. The gauge of operational independence covers several dimensions, such as whether bank supervisors are legally liable for their actions and whether auditors' reports are given to the supervisory agency. Supervisory flexibility has to do with whether infraction of any prudential bank regulation found by a supervisor must be reported and whether there are any mandatory actions in the cases of infraction. A high degree of independence and flexibility of bank regulatory agencies is an essential precondition for the maintenance of the quality of banking regulation and supervision.

Ex Ante Banking Regulation

Prior to or on the establishment of banks and before the banks start business operations, regulators set up requirements for them. This *ex ante* banking regulation mainly covers the ownership structure of banks, the initial bank capital stringency, and the ownership of nonfinancial firms by banks.

To prevent bank fraud, banking regulators may set requirements on the ownership structure of banks, such as that no related parties can own capital in a bank and a single owner cannot own more than a certain percentage of the capital in a bank.

A sufficient and stable amount of bank capital is essential to maintaining the soundness of banks. Bank regulators pay particular attention to the initial bank capital stringency by stipulating that information on sources of funds for capital must be provided, no borrowed funds can be used as bank capital, and no assets other than cash or government securities can be used to increase bank capital.

Bank regulators also tend to put various restrictions on bank ownership of nonfinancial firms as a way to prevent banks from getting involved in many risky business activities that could threaten their solvency and liquidity.

Ongoing Regulations of Banks

After banks are established and have started business operations, bank regulators still impose various restrictions on the banks to prevent subsequent problems. We categorize these regulation and supervision measures as *ongoing regulation* of banks. It covers such dimensions as overall capital stringency, credit risk management, and the prompt corrective power of regulatory agencies. Overall capital stringency requirements

include such questions as whether the capital adequacy ratio is risk-weighted and whether it varies with a bank's credit risk and market risk. The main purpose of these requirements is to adjust the required capital for individual banks to the business risks that they bear.

With regard to credit risk management, the regulatory agencies may promulgate guidelines for asset diversification, prohibit banks from making loans abroad, and formally define *nonperforming* loans.

Once banks misbehave, whether the regulatory agencies have the power to promptly correct their misdeeds is another indicator of the adequacy and efficiency of banking regulation and supervision. This kind of power may include the authority of bank supervisors to force banks to change internal organizational structure, to order bank directors or management to institute provisions to cover actual or potential losses, and to suspend directors' decisions to distribute dividends, bonuses, and management fees.

In constructing the indices of preconditions for banking regulation, *ex ante* banking regulation, and ongoing banking regulation, we follow Barth et al. (2002) and Li (2003) by creating indices using the first-principal-component method. If we construct banking regulation indices by simply summing all the numerical values of individual components of the index, we are assigning equal weight to all components, which may be questionable. In contrast, the first-principal-component method will seek and apply the optimal weight so as to avoid arbitrariness in assigning weights to each component. The indices of banking regulation are constructed in such a way that a higher value indicates more adequate and stringent banking regulation.

6.2. Fiscal Capacity and Banking Regulation Strength

The central prediction of our theory is that governments with stronger fiscal capacity will regulate banks more stringently. How to measure the fiscal capacity of governments? As we are dealing with the issue of government bailout or rescue of failing banks, the measure of governments' fiscal capacity must be able to reflect the capability of the governments to meet the emergency funding needs of ailing banks. Some popular measures of government fiscal power, such as the ratio of tax revenue to GDP and the ratio of government subsidies and transfers to GDP, can provide a general picture of the relative size or scale of government fiscal activity in the national economy, but can

hardly gauge whether the governments have the surplus revenue at their discretion to rescue insolvent or illiquid banks on short notice.

To better judge the government's capability to bail out banks, we choose the ratio of overall budget balance to GDP as the measure of fiscal capacity. We use the average value of this ratio in the period 1985–97, a period before the year when the data on banking regulation strength were collected. This variable largely reflects the magnitude of the budget surplus relative to the total of economic activities.

Our theory predicts a positive relationship between the stringency of banking regulation measures and the overall budget balance as a fraction of GDP. Figures 4–6 give us a visual impression of a strong positive association between overall budget balance as a fraction of GDP and the three banking regulation strength indices. We then turn to systematic regressions. As shown in the three panels of Table 1, when overall budget balance as a fraction of GDP enters the regressions for three banking regulation indices as the sole independent variable, it shows a consistently positive and statistically significant effect.

(Insert Figures 4 to 6 Here)

Some other factors may also be important in explaining the cross-country variation in the strength of banking regulation. Like Li (2003), we consider the effects of the level of economic development, legal origins, religious composition, latitude, and ethnolinguistic fractionalization in our statistical analysis.

The level of economic development is argued to be one important factor in the determination of banking regulation strength. If banking regulation is created in the public interest to overcome market failures (Pigou, 1920; Stiglitz, 1989), less developed economies with presumably higher chances of having market failures will need tighter *ex ante* and ongoing banking regulation and more independent and flexible regulatory agencies. Alternatively, if banking regulations are instruments of politicians to control as many social resources as possible for their own benefit (Shleifer and Vishny, 1994), less developed economies with smaller amounts of total social wealth tend to have more stringent *ex ante* and ongoing banking regulation but less independent and flexible regulatory agencies. However, it could be the case that even though governments in less developed economies are willing to have stricter banking regulation, the economic

underdevelopment may preclude paying the costs of establishing good institutions for regulation. In sum, the relationship between the economic development level and the adequacy of banking regulations is rather ambiguous.

Legal origins are presumably one set of fundamental determinants of the quality of government institutions including banking regulations. Legal origins differ in the priority attached to the protection of the rights of private investors vis-à-vis that of the State. This difference affects the strength of private property rights and of government institutions, which in turn may give rise to a difference in banking regulation strength. In general, the common law provides better protection of property rights and creates better institutions than civil law (especially the French civil law) and socialist law do (La Porta et al., 1999; Beck et al. 2002). More concretely, we predict that the professionalism of common law leads to greater independence and flexibility of regulatory agencies than under civil law and socialist law. Furthermore, the emphasis on private property rights in common law countries may result in less direct regulation of banks and thus less *ex ante* and ongoing banking regulation than in civil law and socialist law countries (Li, 2003).

The cultural theory of institutional development argues that culture influences human beliefs and social attitudes, and thus the quality of institutions. Religious beliefs play a central role in shaping culture. In general, the Protestant religions foster a strong work ethic and interpersonal trust that contribute to the development of institutions, whereas the Catholic and Muslim religions are more likely to be associated with intolerance and closed-mindedness, which deters institutional development (Landes, 1998; La Porta et al., 1999). Applied to the banking regulation, the cultural theory of institutional development predicts that the weaker State power in the Protestant countries will lead to less direct regulation of banks and thus lower intensity of *ex ante* and ongoing banking regulation but more independent and flexible regulatory agencies than in Catholic and Muslim countries (Li, 2003).

Latitude, as an indicator of endowment, has also been shown to affect the quality of government institutions. Countries located in the temperate zones have more productive agriculture and healthier climates, which has enabled them to develop economies and institutions, while countries close to the equator are subject to epidemic diseases and weak agriculture. According to this view, countries with higher latitude may

exhibit greater independence and flexibility of bank regulatory agencies, and fewer *ex ante* and ongoing banking regulations.

In Table 1, we also present various specifications of regressions of the three indices of banking regulation strength on overall budget balance as a fraction of GDP and other factors. The regressions show that a higher ratio of overall budget balance as a fraction of GDP is consistently and statistically significantly positively associated with a more independent and flexible bank regulatory agency, more strict *ex ante* bank regulations, and more stringent ongoing banking regulation and supervision even after we control for a host of other explanatory variables.

(Insert Table 1 Here)

The logarithm of GDP per capita doesn't show consistent and statistically significant effects on banking regulation indices, which indicates that the level of economic development is not particularly relevant for the three features of banking regulation that we are examining.

The legal origins fare best in explaining the independence and flexibility of regulatory agencies. The regressions show that civil law and socialist law countries do have a smaller extent of independent and flexible banking regulatory agencies. There is also some evidence that the French civil law countries have more ongoing regulation and supervision, which is largely consistent with our predictions.

The statistical analysis doesn't produce strong support for the role of religious composition in shaping banking regulation strength. Only in one regression specification do the Catholic countries have significantly more ongoing regulation and supervision.

As predicted, latitude shows statistically significant positive effect on the preconditions for banking regulation.

6.3. Instrumental Variable Regressions

One potential concern with the previous regressions is the possible endogeneity of our fiscal capacity measure—the overall budget balance as a fraction of GDP. For example, some countries may have stronger banking regulation for reasons unrelated to fiscal capacity. But higher-quality banking regulation may minimize the likelihood of bank insolvency and thus bank bailouts, which may lead to a higher level of fiscal reserves.

In general, we don't think that endogeneity should be a big concern here. The independent variable (fiscal capacity) is predetermined relative to the dependent variable (banking regulation strength indices). More importantly, for a government, the bulk of expenditure is on government consumption, transfers and subsidies, public enterprises, and various social welfare programs. Fiscal outlays for bank bailouts would not have a significant impact on the average level of fiscal balances for long.

However, we still adopt an instrumental variable approach to deal with the possibility of an endogenous fiscal capacity variable. We consider one potential instrumental variable—the Gini coefficient in income distribution. On an *ex ante* basis, it is plausible to expect that Gini coefficient and budget balance are negatively correlated. A high level of inequality in income distribution may imply a large proportion of low-income people in the population, which may reduce the tax base and raise the demand for government transfer payments in a society; this leads to a low level of fiscal reserves. Alternatively, a modern government with large fiscal reserves may offer more transfer payments, so that inequality in income distribution may also be reduced. Furthermore, it seems unlikely that income inequality has a direct impact on banking regulation strength.

To have an idea of whether the instrumental variable is actually correlated with the ratio of overall budget balance to GDP, we report in Panel A of Table 2 the regression of that ratio on the Gini coefficient. We observe that the Gini coefficient is negatively and significantly associated with fiscal capacity: countries with a larger degree of inequality in income distribution are likely to have a lower level of budget balance.

The results of the two-stage least squares estimations are reported in Panel B of Table 2.[17] To save space, we present two regression specifications for each bank regulation index. In one specification, the overall budget balance as a fraction of GDP serves as the sole independent variable, whereas in the other specification, it is included in the regression together with all other independent variables. We see that in most cases the estimated coefficients of the budget balance are positive and statistically significant. We also perform a formal Hausman test for the null hypothesis that the differences in the coefficients between the IV regressions and the corresponding OLS regressions are not

[17] Because the Gini coefficient is not available to some countries, the sample size in the TSLS regressions is reduced to some extent.

systematic. It turns out that this null hypothesis cannot be rejected at conventional statistical significance levels. In other words, from a pure statistical point of view, as indicated by the Hausman test, we cannot say that the IV regression is necessary.

(Insert Table 2 Here)

6.4. Fiscal Capacity: A More Fundamental Factor than Explicit Deposit Insurance

We explain the emergence and strength of banking regulation from the perspective of the SBC of banks under social-welfare-minded modern governments. In appearance, our explanation bears some resemblance to the view held by some observers that treats explicit deposit insurance as an important motivation for banking regulation (see Dewatripont and Tirole, 1993, for a description).

It is worth pointing out that our theory proceeds along a fundamentally different line from this kind of observation. First, as argued by Dewatripont and Tirole (1993), deposit insurance could be provided by the private sector in the same way as most forms of insurance such as life insurance and health insurance. It is not clear, in their scheme, why deposit insurance has the unique power to justify banking regulation. Second, our theory emphasizes that it is the government's failure to commit to no rescue of ailing banks that gives rise to the necessity for banking regulation. Explicit government guarantee of bank deposits is only one symptom.[18] In our theory, government failure encompasses much broader dimensions than explicit deposit insurance. It could apply to any of various types of implicit deposit insurance and other government assistance schemes. Third, in our theory bank rescue or bailout of failing banks is not confined to compensating or bailing out depositors. The government can provide financial assistance to parties other than depositors, such as bank shareholders. The recent experience of bank rescue in Japan also confirms that bank bailout is far from being limited to depositors. For example, in the massive bank bailout in Japan in the late 1990s and early 2000s, the Japanese government set aside large amounts of money to cover depositors, inject capital into ailing banks, and effectively nationalize the insolvent banks (*Business Week*, 1998).

[18] Because explicit deposit guarantees provided by governments are the most observable symptom of government failure to commit to a hard budget constraint for banks, we often refer to it in identifying the existence of SBC on banks in the section on historical evidence.

To see more clearly the difference between our theory and the argument for using explicit deposit insurance as a justification for banking regulation, we rerun the regressions in Table 3 by adding the dummy variable for the deposit insurance scheme as an additional major independent variable. If deposit insurance is one important justification for banking regulation and our theory is equivalent to the deposit insurance argument in nature, then the estimated coefficient of the deposit insurance scheme dummy should be statistically significant, and the estimated coefficient of the ratio of overall budget balance to GDP should lose statistical significance.

(Insert Table 3 Here)

The regressions demonstrate clearly that for the three banking regulation indices, the overall budget balance as a fraction of GDP remains consistently statistically significant, while the deposit insurance scheme dummy doesn't produce any consistent and significant results. This reinforces our view that the government failure in our theory exists whether a deposit insurance scheme exists or not. It is the failure to commit to nonintervention in the face of strong fiscal capacity that contributes to the stringency of banking regulation.

7 Summary

In this study, we explore the genesis, symptoms, and institutional solutions to the problems resulting from the SBC of banks. We argue that banks faced a hard budget constraint in the *laissez-faire* banking era, but the rise of modern governments led to government failure, i.e., the failure of modern governments to resist the temptation to bail out ailing banks. This gives rise to the SBC on banks, which in turn gives rise to many symptoms, the most prominent of which is the bankers' moral hazard. Prudential banking regulations emerged as an institutional remedy for the symptoms of banks' SBC. Hence our study yields a theory of banking regulation from the perspective of the SBC of banks.

Our theory makes a few predictions that are not apparent in the existing literature. For example, we show that when the government is more likely to bail out banks, banking regulation is more likely to be imposed and, when in place, is likely to be stricter.

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Mathematical Appendix

A1. Proof of Proposition 7

From the banker's objective function, we can obtain the first order condition for his optimal choice of $\boldsymbol{p}$:

$$(kpy)_p = \frac{(1+r)d}{1+d} + (q-1)\frac{B}{\alpha} \ . \tag{a1}$$

From the social welfare function associated with a bank of *(1+d)* unit of capital, we get:

$$\begin{aligned} &\frac{\partial SW}{\partial d} = U + (1+d)U_p p_d \\ &= U + (1+d)[\frac{(1+r)d}{1+d} + (1-\frac{1}{\alpha})(1-q)B - q(z-x)]p_d \end{aligned} \tag{a2}$$

where, we used (a1) to simplify. Furthermore, we have:

$$\frac{\partial^2 SW}{\partial d \partial q} = U_q + U_p p_q + (1+d)U_{pq} p_d + (1+d)U_p p_{dq} \ . \tag{a3}$$

Note that from (a1) we can get:

$$p_d = \frac{(1+r)}{(1+d)^2 (kpy)_{pp}} < 0 \, ; \tag{a4}$$

$$p_q = \frac{B}{\alpha (kpy)_{pp}} < 0 \, ; \tag{a5}$$

and

$$p_{dq} = -\frac{B}{\alpha[(kpy)_{pp}]^2}(kpy)_{ppp} p_d = -\frac{B}{\alpha[(kpy)_{pp}]^3}\frac{(1+r)}{(1+d)^2}(kpy)_{ppp} < 0 \, . \tag{a6}$$

Also, from the expression of $\boldsymbol{U}$, we have:

$$U_p = \frac{(1+r)d}{1+d} + (1-\frac{1}{\alpha})(1-q)B - q(z-x); \tag{a7}$$

$$U_q = (1-p)[(z-x)+B] > 0; \tag{a8}$$

and

$$U_{pq} = (1-\frac{1}{\alpha})B - (z-x) < 0. \tag{a9}$$

Thus, if $B+(z-x)$ is small enough and $\frac{B}{k}$ is large enough, (a7) is positive and bounded from 0 and the term $(1+d)U_p p_{pq}$ will be negative and dominate all other terms in the right-hand-side of (a3), which will become negative. This shows that when *q* is higher, the social welfare maximizing d^G decreases.

Meanwhile, the impact of higher *q* on the unregulated equilibrium d^E is ambiguous since when *q* is higher, the *p=p(d)* curve shifts downward (due to softer budget constraint) and the supply curve *d=d(p)* shifts outward. However, under the condition that *β* is small enough, the change in d^E is limited. Thus, the effect on d^G dominates.

A2. Proof of Proposition 8

Note that from (a1), we have $p_{z-x} = p_{d(z-x)} = 0$, thus

$$\frac{\partial^2 SW}{\partial d \partial (z-x)} = U_{z-x} + U_p p_{z-x} + (1+d)U_{p(z-x)}p_d + (1+d)U_p p_{d(z-x)} \tag{a10}$$
$$= (1-p)q + (1+d)(-q)p_d + 0 > 0,$$

since $p_d < 0$. Therefore, when *(z-x)* is higher, the social welfare maximizing d^G decreases.

Meanwhile, the unregulated equilibrium d^E does not change with *(z-x)* since both the *p=p(d)* curve and the supply curve *d=d(p)* are independent of *(z-x)*. Thus, the effect on d^G is the net effect.

A3. Proof of Proposition 9

From (a1), we have

$$p_B = \frac{q-1}{\alpha (kpy)_{pp}} > 0 \ ;$$

and (a11)

$$p_{dB} = -\frac{1+r}{(1+d)^2[(kpy)_{pp}]^2}(kpy)_{ppp}\, p_B = -\frac{1}{[(kpy)_{pp}]^3}\frac{q-1}{\alpha}\frac{(1+r)}{(1+d)^2}(kpy)_{ppp} > 0 . \quad \text{(a12)}$$

Thus,

$$\frac{\partial^2 SW}{\partial d \partial B} = U_B + U_p p_B + (1+d)U_{pB} p_d + (1+d)U_p p_{dB} > 0,$$

since $U_{pB} = (q-1)(\frac{1}{\alpha} - 1) < 0$ and all other terms are positive. Therefore, when *B* is higher, the social welfare maximizing d^G decreases.

Note that the unregulated equilibrium d^E also decreases since when *B* is higher, the *p=p(d)* curve shifts outward (due to the concern of losing *B*) and the supply curve *d=d(p)* does not change. However, under the condition that β is small enough, the change in d^E is limited. Thus, the effect on d^G is more important.

A4. Proof of Proposition 10

The proof is the same as that of Proposition 9, since note that $\boldsymbol{\alpha}$ and $\boldsymbol{B}$ always enter in the equations in the form of $\frac{B}{\alpha}$ and therefore an increase in $\boldsymbol{\alpha}$ is equivalent to a decrease in $\boldsymbol{B}$.

A5. Proof of Proposition 11

From (a1), we have

$$p_d = \frac{(1+r)}{(1+d)^2 (kpy)_{pp}} < 0 \ ; \quad \text{(a4)}$$

$$p_r = \frac{d}{(1+d)(kpy)_{pp}} < 0; \tag{a13}$$

and

$$p_{dr} = \frac{1}{(1+d)^2 (kpy)_{pp}} - \frac{d}{(1+d)} \frac{1}{[(kpy)_{pp}]^3} \frac{1+r}{(1+d)^2} (kpy)_{ppp} < 0. \tag{a14}$$

Thus,

$$\frac{\partial^2 SW}{\partial d \partial r} = U_r + U_p p_r + (1+d) U_{pr} p_d + (1+d) U_p p_{dr} < 0, \tag{a15}$$

since $U_r = 0$; $U_p > 0$; and $U_{pr} = \frac{d}{1+d} > 0$. This shows that when *r* is higher, the social welfare maximizing d^G decreases.

The unregulated equilibrium d^E is ambiguous in its direction of change when *r* is higher, since when *r* is higher, the *p=p(d)* curve shifts inward (the banker is more willing to gamble) while the supply curve *d=d(p)* shifts outward. However, under the condition that β is small enough, the change in d^E is limited. Thus, the effect on d^G is more important.

A6. Proof of Proposition 12

From (a1), we have

$$p_d = \frac{(1+r)}{(1+d)^2 (kpy)_{pp}} < 0; \tag{a4}$$

$$p_k = -\frac{(py)_p}{(kpy)_{pp}} > 0 \tag{a16}$$

$$p_{dk} = -\frac{1+r}{(1+d)^2 k^2 (py)_{pp}} - \frac{(1+r)}{(1+d)^2} \frac{(-py)_p}{[(kpy)_{pp}]^3} (kpy)_{ppp} > 0 \tag{a17}$$

Thus,

$$\frac{\partial^2 SW}{\partial d \partial k} = U_k + U_p p_k + (1+d) U_{pk} p_d + (1+d) U_p p_{dk} > 0,$$

since $U_k = py > 0$; $U_p > 0$; and $U_{pk} = 0$. Therefore when *k* is higher, the social welfare maximizing d^G increases.

The unregulated equilibrium d^E also increases when *k* is higher, since the *p=p(d)* curve shifts outward while the supply curve *d=d(p)* stays the same. Under the condition that β is small enough, the change in d^E is limited. Thus, the effect on d^G is more important.

Data Appendix

Index of Preconditions for Government Banking Regulation: constructed as the sum of the indices of operational independence and supervisory flexibility of bank regulators from the World Bank Group dataset "Banking Regulation and Supervision". The index of operational independence is based on the following four survey questions: Are supervisors legally liable for their actions (yes=0, no=1)? Is auditor's report given to supervisory agency (yes=1, no=0)? Can supervisors meet external auditors to discuss report without bank approval (yes=1, no=0)? Are off-balance sheet items disclosed to supervisors (yes=1, no=0)? The index of supervisory flexibility is the sum of responses to the following two survey questions: Must infraction of any prudential regulation found by a supervisor be reported (yes=0, no=1)? Are there any mandatory actions in these cases (yes=0, no=1)? The raw data are from the World Bank dataset of "Bank Regulation and Supervision". We use the first principal component of this index in statistical analysis.

Index of the Ex Ante Banking Regulations: constructed as the sum of the indices of ex ante regulatory requirements on ownership structure, initial capital stringency and acquisition or investment. The index of requirements on ownership structure is the sum of responses to the following four questions: Is there a maximum percentage of capital that can be owned by a single owner (yes=1, no=0)? Can related parties own capital in a bank (yes=0, no=1)? Is there regulatory restrictiveness of ownership by nonfinancial firms of banks (unrestricted=1, permitted=2, restricted=3, prohibited=4)? Can non-bank financial firms own shares in banks (yes=0, no=1)? The index of requirements on initial capital stringency is based on the following five survey questions: Is information on source of funds for capital required (yes=1, no=0)? Are the sources of funds to be used as capital verified by authorities (yes=1, no=0)? Are law enforcement authorities consulted (yes=1, no=0)? Can assets other than cash/government securities be used to increase capital (yes=0, no=1)? Can borrowed funds be used (yes=0, no=1)? The index of requirements on bank acquisition or investment is based on the following question: Is there regulatory restrictiveness of bank ownership of nonfinancial firms (unrestricted=1, permitted=2, restricted=3, prohibited=4)? The data are from the World Bank dataset of "Bank Regulation and Supervision". We use the first principal component of this index in statistical analysis.

Index of the Ongoing Banking Regulations: constructed as the sum of the indices of capital stringency, credit risk management, and corrective measures. The index of capital stringency sums the responses to the following six questions: Is bank capital measure risk-weighted in line with the Basle guidelines (yes=1, no=0)? Does the ratio vary with a bank's credit risk (yes=1, no=0)? Does the ratio vary with market risk (yes=1, no=0)? Before minimum capital adequacy is determined, is market value of loan losses deducted from capital (yes=1, no=0)? Before minimum capital adequacy is determined, are unrealized securities losses deducted from capital (yes=1, no=0)? Before minimum capital adequacy is determined, are unrealized foreign exchange losses deducted from capital (yes=1, no=0)? The index of credit risk management is constructed on the basis of the following survey questions: Are there guidelines for asset diversification (yes=1, no=0)? Are banks prohibited from making loans abroad (yes=1, no=0)? Is there a formal definition of "non-performing loan" (yes=1, no=0)?

If one loan is non-performing, are other loans of a multiple-loan customer classified as non-performing (yes=1, no=0)? The index of corrective measures sums up the responses to the following five survey questions: Can supervisors force banks to change internal organizational structure (yes=1, no=0)? Can the supervisory agency suspend director's decision to distribute dividends (yes=1, no=0)? Can the supervisory agency suspend director's decision to distribute bonuses (yes=1, no=0)? Can the supervisory agency suspend director's decision to distribute management fees (yes=1, no=0)? The data are from the World Bank dataset of "Bank Regulation and Supervision". We use the first principal component of this index in statistical analysis.

Overall Budget Balance/GDP: the percentage of overall budget balance in GDP, average over 1985-97. Data are expressed in percentage terms and are from the World Bank dataset of World Development Indicators CD ROM.

Log of GDP per capita: Logarithm of GDP per capita in constant US dollars, average over the period 1970-95. The data are from World Bank data set of World Development Indicators CD ROM.

Legal origins: The legal origin or legal tradition of the company law or commercial law of each country is identified. There are five categories of legal origins: (1) English common law legal origin; (2) French civil law legal origin; (3) German civil law legal origin; (4) Scandinavian civil law legal origin; and (5) Socialist legal origin. The data are from La Porta et al, 1999.

Religious Composition: the percentage of the population of each country that followed the three most widely spread religions in the world, i.e. Protestant, Catholic and Muslim. The numbers are in percentage terms. The data are from La Porta et al, 1999.

Latitude: The absolute value of the latitude of the country, scaled to take values between 0 and 1. The data are from La Porta et al, 1999.

Deposit Insurance Scheme Dummy: a dummy variable that takes value one when a country has deposit insurance scheme and zero if otherwise. The data are from the World Bank data set of "Bank Regulation and Supervision".

Gini Coefficient: average of the data from Barro-Lee dataset and those from *World Development Report* (1998/99 issue).

Summary Statistics

Variable Name	Number of Obs.	Mean	Standard Deviation	Minimum	Maximum
Index of Precondition for Banking Regulation	87	0.063	1.02	-2.46	5.58
Index of *Ex Ante* Banking Regulations	83	-0.052	1.10	-1.87	4.63
Index of Ongoing Banking Regulations	83	0.047	1.03	-2.18	2.02
Overall Budget Balance/ GDP (%)	95	-3.82	5.50	-42.25	10.84
French Legal Origin	95	0.33	0.47	0	1
German Legal Origin	95	0.053	0.22	0	1
Scandinavian Legal Origin	95	0.042	0.20	0	1
Socialist Legal Origin	95	0.22	0.42	0	1
Protestant Fraction (%)	95	15.11	23.64	0	96.6
Catholics Fraction (%)	95	32.27	35.75	0	97.3
Muslim Fraction (%)	95	16.19	30.71	0	99.9
Latitude	95	0.35	0.20	0.011	0.72
Gini Coefficient	103	38.19	8.97	20.50	62
Ethnolinguistic Fractionalization	78	0.26	0.26	0	0.86
Deposit Insurance Scheme Dummy	92	0.55	0.50	0	1

Pairwise Correlation

Variables: A – Index of Preconditions for Banking Regulation; B – Index of *Ex Ante* Banking Regulations; C – Index of Ongoing Banking Regulations; D – Overall Budget Balance/GDP; E – Deposit Insurance Scheme Dummy; F – Log of GDP per capita; G – French Legal Origin Dummy; H -- German Legal Origin Dummy; I – Scandinavian Legal Origin Dummy; J – Socialist Legal Origin Dummy; K – Protestant Fraction; L – Catholics Fraction; M – Muslim Fraction; N – Latitude.

	A	B	C	D	E	F	G	H	I	J	K	L	M
B	-0.070												
C	-0.041	-0.085											
D	0.16	0.060	0.14										
E	-0.054	-0.14	-0.023	0.022									
F	-0.035	-0.052	0.069	0.24	0.38								
G	-0.21	0.071	0.26	-0.044	0.11	-0.12							
H	-0.064	0.023	0.011	0.061	0.14	0.28	-0.11						
I	-0.074	0.067	-0.21	0.036	0.18	0.30	-0.14	-0.031					
J	-0.057	-0.042	-0.058	0.0066	0.078	-0.12	-0.40	-0.087	-0.073				
K	0.091	-0.050	-0.12	0.040	0.045	0.29	-0.25	0.021	0.52	-0.21			
L	-0.16	-0.16	0.26	0.077	0.26	0.19	0.39	0.041	-0.14	-0.18	-0.15		
M	0.038	0.16	-0.036	-0.046	-0.045	-0.23	0.18	-0.12	-0.10	-0.051	-0.35	-0.48	
N	0.059	-0.071	-0.012	0.091	0.47	0.50	-0.20	0.17	0.34	0.43	0.21	-0.11	-0.087

Table 1 Fiscal Capacity and Other Determinants in Banking Regulation

The regression estimated is: Government Regulation Strength Indices = $\alpha + \beta_1$ Overall Budget Balance/GDP + β_2 Alternative Determinants of Banking Regulation Strength + ε. The dependent variable, government regulation strength indices, has three different indices: index of pre-conditions for government direct regulation and supervision, index of *ex ante* requirements in government regulation, and index of on-going regulation and supervision. They serve as the dependent variable in three separate sets of regressions that are presented in Panels 1, 2 and 3 respectively. The major independent variable, overall budget balance/GDP, measures the fiscal capacity to rescue failing banks on short notice and thus the degree of vulnerability to the soft budget constraint of banks. The alternative determinants of banking regulation strength include some fundamental factors such as logarithm of GDP per capita (economic factor), French, German, Scandinavian, and Socialist legal origins (legal factors), Fractions of Protestant, Catholics and Muslim in population (cultural factors), and latitude (endowment factor). Regressions are estimated using Ordinary Least Squares. Robust standard errors are given in parentheses. Superscripts a, b, c and d indicate statistical significance at the 1%, 5%, 10% and 15% levels respectively. Detailed variable definitions and sources are given in the data appendix.

Panel 1

Dependent Variable: Index of Pre-conditions for government direct regulation and supervision

Overall Budget Balance/ GDP	0.029 [a]	0.033 [a]	0.033 [b]	0.033 [b]	0.033 [b]
	(0.0097)	(0.012)	(0.014)	(0.015)	(0.013)
Log of GDP per capita		-0.072	0.0055	0.022	-0.12
		(0.092)	(0.092)	(0.086)	(0.15)
French Legal Origin			-0.81 [a]	-0.74 [b]	-0.71 [a]
			(0.25)	(0.30)	(0.26)

German Legal Origin			-0.79 [d]	-0.76	-0.86 [c]
			(0.53)	(0.54)	(0.51)
Scandinavian Legal Origin			-0.96 [b]	-1.18 [b]	-1.62 [a]
			(0.37)	(0.57)	(0.54)
Socialist Legal Origin			-0.55 [c]	-0.59 [d]	-1.10 [c]
			(0.30)	(0.37)	(0.57)
Protestant Fraction				0.0029	0.0023
				(0.0086)	(0.0083)
Catholics Fraction				-0.0017	-0.0012
				(0.0043)	(0.0041)
Muslim Fraction				0.0034	0.0029
				(0.0045)	(0.0044)
Latitude					2.00 [c]
					(1.19)
Constant	0.18	0.76	0.63	0.43	0.97
	(0.12)	(0.79)	(0.86)	(1.00)	(1.21)
Number of Observations	87	87	87	87	87
Adjusted R^2	0.015	0.015	0.090	0.079	0.12

Panel 2

Dependent Variable: Index of *Ex ante* Requirements in Government Regulation

Overall Budget Balance/ GDP	0.088 [a]	0.091 [a]	0.10 [a]	0.11 [a]	0.11 [a]
	(0.032)	(0.034)	(0.037)	(0.036)	(0.039)
Log of GDP per capita		-0.083	-0.18 [c]	-0.091	-0.12
		(0.081)	(0.090)	(0.092)	(0.12)
French Legal Origin			0.42	0.53	0.55 [d]
			(0.32)	(0.34)	(0.36)
German Legal Origin			0.66	0.61	0.59
			(0.65)	(0.60)	(0.60)
Scandinavian Legal Origin			0.96	1.11	1.01
			(0.74)	(0.89)	(0.91)
Socialist Legal Origin			0.044	0.031	-0.066
			(0.30)	(0.32)	(0.40)
Protestant Fraction				-0.0072	-0.0072
				(0.0068)	(0.0070)
Catholics Fraction				-0.0079 [b]	-0.0078 [b]
				(0.0039)	(0.0039)
Muslim Fraction				0.0016	0.0016
				(0.0041)	(0.0042)
Latitude					0.42
					(1.02)
Constant	0.23	0.91	1.43 [c]	1.11 [d]	1.24
	(0.19)	(0.70)	(0.72)	(0.76)	(0.87)
Number of Observations	83	83	83	83	83
Adjusted R^2	0.056	0.058	0.057	0.091	0.080

Panel 3

Dependent Variable: Index of Ongoing Regulation and Supervision

Overall Budget Balance/ GDP	0.049 [b]	0.047 [c]	0.058 [b]	0.052 [c]	0.056 [b]
	(0.023)	(0.025)	(0.027)	(0.028)	(0.028)
Log of GDP per capita		0.038	0.053	0.014	-0.062
		(0.078)	(0.074)	(0.081)	(0.12)
French Legal Origin			0.69 [b]	0.57 [c]	0.61 [c]
			(0.27)	(0.33)	(0.33)
German Legal Origin			0.19	0.13	0.062
			(0.36)	(0.39)	(0.40)
Scandinavian Legal Origin			-1.17 [b]	-1.36 [b]	-1.59 [b]
			(0.54)	(0.63)	(0.74)
Socialist Legal Origin			0.069	0.082	-0.15
			(0.28)	(0.30)	(0.39)
Protestant Fraction				0.0064	0.0071
				(0.0064)	(0.0066)
Catholics Fraction				0.0057	0.0061
				(0.0048)	(0.0047)
Muslim Fraction				0.0021	0.0020
				(0.0049)	(0.0050)
Latitude					0.99
					(1.17)
Constant	0.22 [d]	-0.088	-0.39	-0.39	-0.10
	(0.15)	(0.64)	(0.59)	(0.61)	(0.68)
Number of Observations	83	83	83	83	83
Adjusted R^2	0.023	0.014	0.13	0.13	0.12

Table 2 Fiscal Capacity and Other Determinants in Banking Regulation
(TSLS Regressions)

This table contains two panels. Panel 1 conducts regressions explaining the overall budget balance, in which the supposedly endogenous variable, Overall Budget Balance/GDP, is regressed on the potential instrumental variable, the Gini coefficient. In Panel 2, the regression estimated is: Government Regulation Strength Indices = $\alpha + \beta_1$ Overall Budget Balance/GDP + β_2 Alternative Determinants of Banking Regulation Strength + ε. The dependent variable, government regulation strength indices, has three different indices: index of pre-conditions for government direct regulation and supervision (A), index of *ex ante* requirements in government regulation (B), and index of on-going regulation and supervision (C). They serve as the dependent variable in three separate sets of regressions. The major independent variable, overall budget balance/GDP, measures the fiscal capacity to rescue failing banks on short notice and thus the degree of vulnerability to the soft budget constraint of banks. The alternative determinants of banking regulation strength include some fundamental factors such as the logarithm of GDP per capita (economic factor), French, German, Scandinavian, and Socialist legal origins (legal factors), Fractions of Protestant, Catholics and Muslim in population (cultural factors), and latitude (endowment factor). The Overall Budget Balance/GDP is treated as the endogenous variable. The instrumental variable is the Gini Coefficient. Regressions are estimated using Two-Stage Least Squares. Robust standard errors are given in parentheses. Superscripts a, b, c and d indicate statistical significance at the 1%, 5%, 10% and 15% levels respectively. First-stage adjusted R^2, p-value of first stage F-test and p-value of Hausman test are reported. Detailed variable definitions and sources are given in the data appendix.

Panel A Explaining Overall Budget Balance/GDP

Gini Coefficient	-0.11 [c]
	(0.060)
Constant term	-0.031
	(1.77)
Number of Observations	67
Adjusted R^2	0.0092

Panel B IV Regressions

Dependent Variable	A	A	B	B	C	C
Overall Budget Balance/GDP	0.21 [c]	0.29 [b]	0.052 [d]	0.054	0.26 [c]	0.56 [a]
	(0.13)	(0.13)	(0.032)	(0.19)	(0.14)	(0.17)
Log of GDP per capita		-0.13		0.052		-0.060
		(0.10)		(0.16)		(0.15)
French Legal Origin		-0.76 [b]		0.037		0.30
		(0.29)		(0.35)		(0.40)
German Legal Origin		-0.78 [c]		0.61		-0.15
		(0.42)		(0.72)		(0.55)
Scandinavian Legal Origin		-1.84 [a]		1.33		-1.41 [c]
		(0.60)		(1.11)		(0.81)
Socialist Legal Origin		-0.90 [b]		0.30		-0.42
		(0.36)		(0.43)		(0.44)
Protestant Fraction		0.016 [b]		-0.0066		0.014
		(0.0069)		(0.0083)		(0.0095)
Catholics Fraction		0.0056		-0.0063		0.0089 [d]
		(0.0042)		(0.0053)		(0.0059)
Muslim Fraction		0.010 [b]		0.0064		0.0040
		(0.0042)		(0.0073)		(0.0069)
Latitude		1.40		-0.86		-0.16
		(0.99)		(1.13)		(1.36)
Constant	0.80 [d]	1.64 [b]	0.043	-0.0059	0.94 [c]	2.09 [c]
	(0.49)	(0.76)	(0.59)	(1.14)	(0.55)	(1.22)
# of Observations	61	61	59	59	58	58
First Stage Adjusted R^2	0.0092	0.034	0.0092	0.034	0.0092	0.034
p-value of First Stage F-test	0.075	0.052	0.075	0.052	0.075	0.052
p-value of Hausman test	0.28	0.35	0.84	0.75	0.20	0.30

Table 3 Fiscal Capacity, Deposit Insurance and Other Determinants in Banking Regulation

The regression estimated is: Government Regulation Strength Indices = $\alpha + \beta_1$ Overall Budget Balance/GDP + β_2 Explicit Deposit Insurance Dummy Variable + β_3 Alternative Determinants of Banking Regulation Strength + ε. The dependent variable, government regulation strength indices, has three different indices: index of pre-conditions for government direct regulation and supervision (A), index of *ex ante* requirements in government regulation (B), and index of on-going regulation and supervision (C). They serve as the dependent variable in three separate sets of regressions. The major independent variable, overall budget balance/GDP, measures the fiscal capacity to rescue failing banks on short notice and thus the degree of vulnerability to the soft budget constraint of banks. Explicit deposit insurance dummy variable takes value one when there exists explicit deposit insurance in an economy, and zero otherwise. The alternative determinants of banking regulation strength include some fundamental determinants of banking regulation strength. They include logarithm of GDP per capita (economic factor), French, German, Scandinavian, and Socialist legal origins (legal factors), Fractions of Protestant, Catholics and Muslim in population (cultural factors), latitude (endowment factor). Regressions are estimated using Ordinary Least Squares. Robust standard errors are given in parentheses. Superscripts a, b, c and d indicate statistical significance at the 1%, 5%, 10% and 15% levels respectively. Detailed variable definitions and sources are given in the data appendix.

Dependent Variable	A	A	B	B	C	C
Overall Budget Balance/GDP	0.032 [a]	0.034 [b]	0.078 [b]	0.10 [b]	0.051 [b]	0.058 [b]
	(0.010)	(0.013)	(0.035)	(0.044)	(0.023)	(0.027)
Deposit Insurance Scheme Dummy	-0.043	-0.0023	-0.32	-0.22	-0.15	-0.34
	(0.23)	(0.20)	(0.25)	(0.27)	(0.22)	(0.24)
Log of GDP per capita		-0.097		-0.13		-0.050
		(0.14)		(0.13)		(0.12)
French Legal Origin		-0.67 [b]		0.53 [d]		0.64 [b]
		(0.27)		(0.36)		(0.32)

German Legal Origin		-0.45 (0.49)		0.43 (0.71)		0.20 (0.40)
Scandinavian Legal Origin		-1.38 [a] (0.51)		0.94 (0.93)		-1.34 [c] (0.74)
Socialist Legal Origin		-1.08 [c] (0.60)		-0.082 (0.42)		-0.19 (0.40)
Protestant Fraction		-0.00097 (0.0082)		-0.0054 (0.0072)		0.0049 (0.0068)
Catholics Fraction		-0.0027 (0.0042)		-0.0063 [c] (0.0037)		0.0070 [d] (0.0047)
Muslim Fraction		0.0014 (0.0046)		0.0025 (0.0045)		0.0018 (0.0051)
Latitude		1.79 (1.27)		0.71 (0.98)		1.27 (1.16)
Constant	0.21 (0.21)	0.94 (1.17)	0.38 [c] (0.20)	1.20 (0.92)	0.29 [c] (0.17)	-0.15 (0.70)
# of Observations	84	84	80	80	81	81
Adjusted R^2	0.0092	0.092	0.061	0.055	0.021	0.16

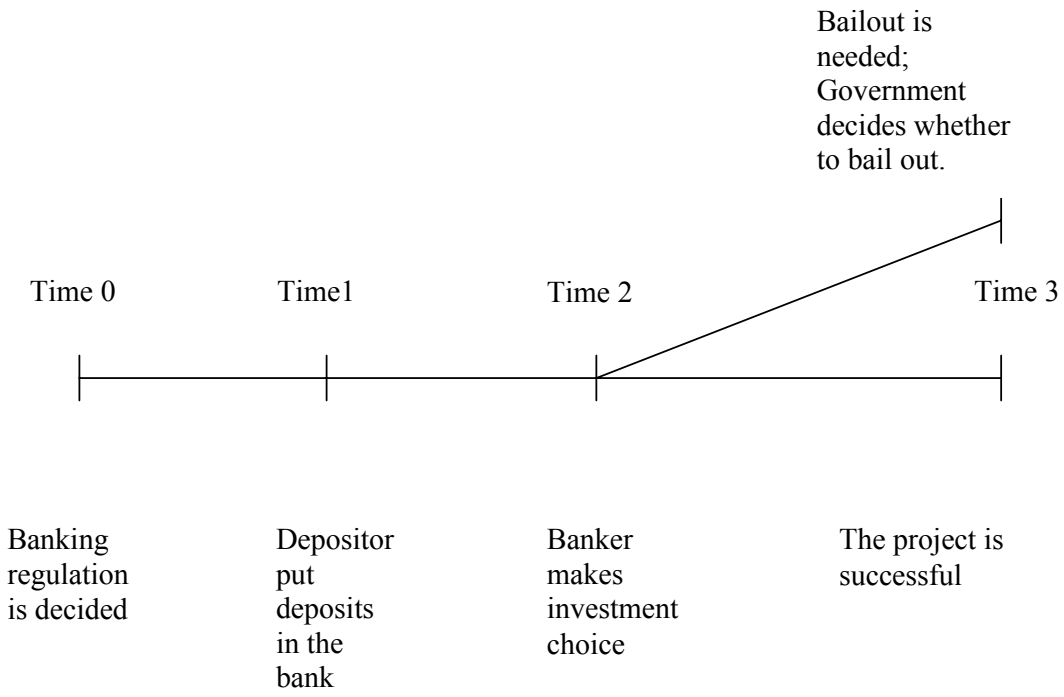

Figure 1: Timing of the Model

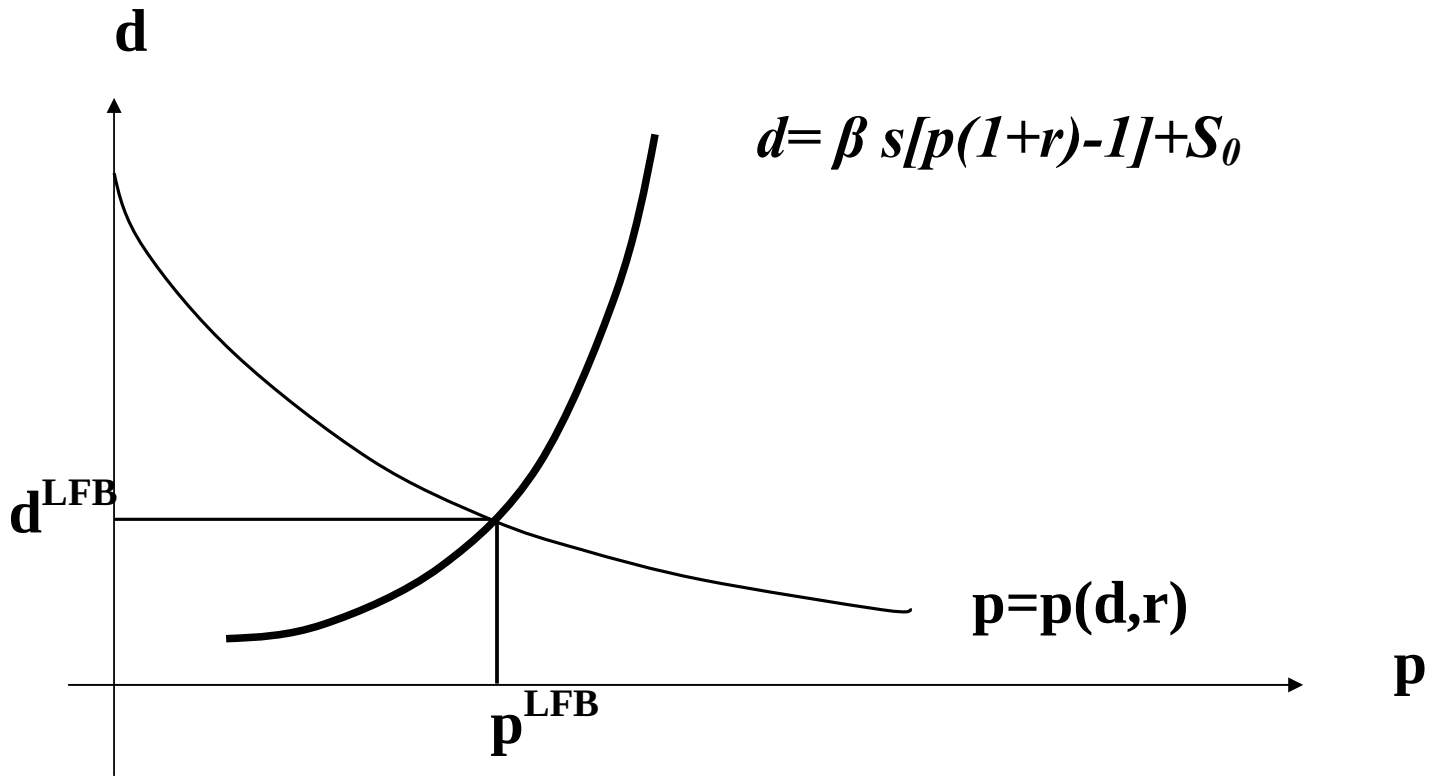

Figure 2: The Equilibrium of *Laissez Faire* Banking

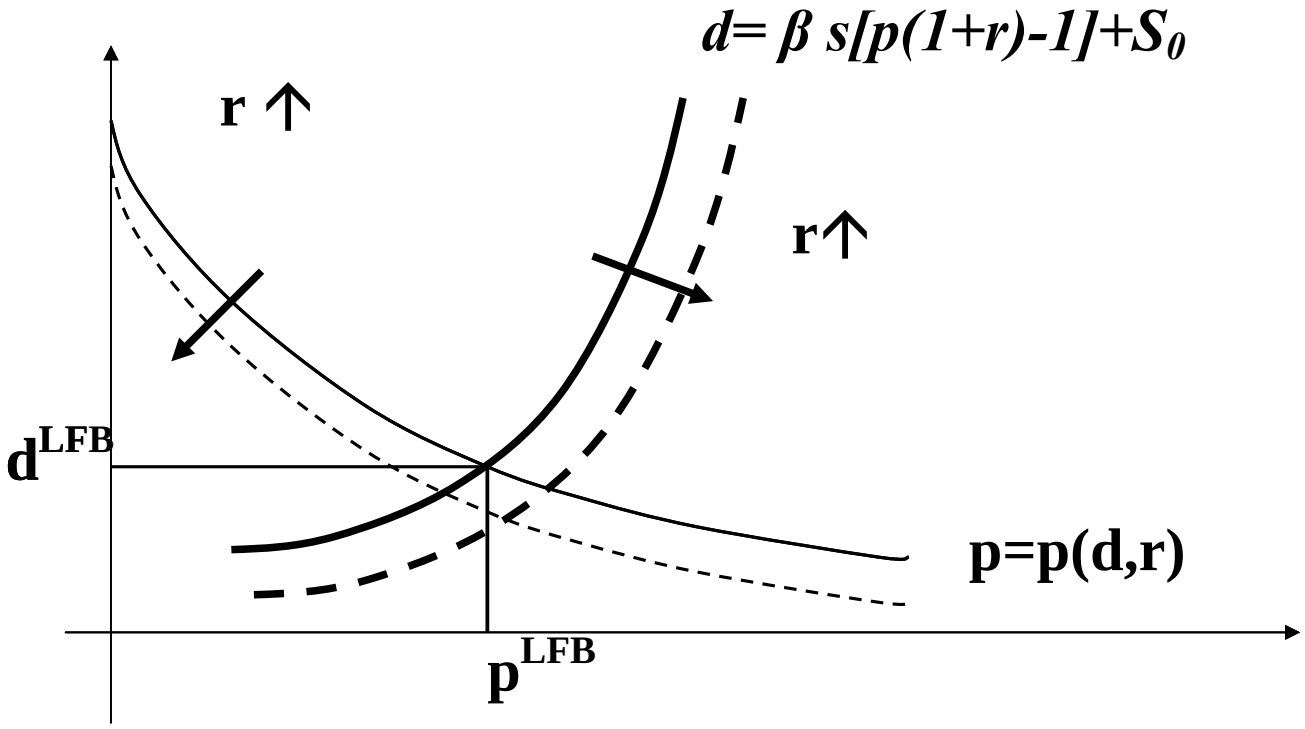

Figure 3: Comparative Statics of the *Laissez Faire* Equilibrium

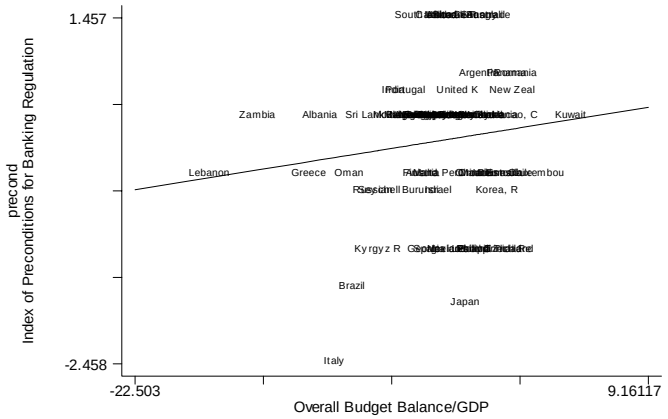

Figure 4 Index of Preconditions for Banking Regulation vs. Overall Budget Balance/GDP

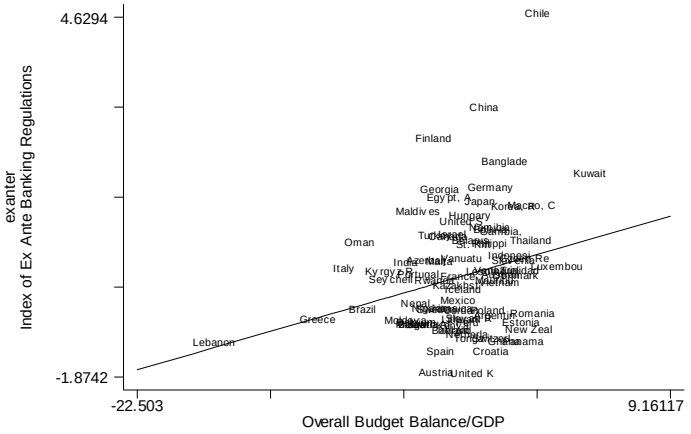

Figure 5 Index of *Ex Ante* Banking Regulations vs. Overall Budget Balance/GDP

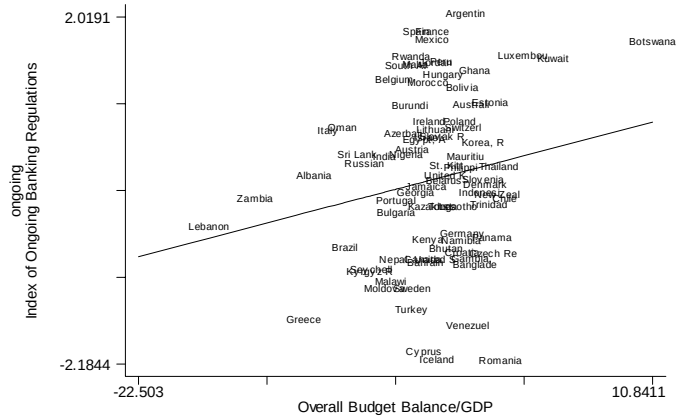

Figure 6 Index of Ongoing Banking Regulations vs. Overall Budget Balance/GDP