

Risk Premia in Banking and the Macroeconomy*

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Abstract

This paper discusses the relationship between premia for macroeconomic risk in banking, aggregate behavior, and banking crises. We consider a competitive banking system embedded in an overlapping generation model subject to repeated macroeconomic shocks. We highlight how risk premia decline when bank equity decreases and identify potential vicious circles that may lead to banking crises.

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1 Introduction

Severe banking crises can cause substantial damage to an economy. Most studies have shown that the costs of banking crises in terms of GDP losses may become very high, see e.g., Caprio & Klingebiel (1997), Lindgren, Garcia & Saal (1996), Caprio & Honohan (1999), or Peter (1999). Why such crises occur and how they can be prevented has therefore occupied policy-makers and researchers around the world.

Complementary to the more traditional microeconomic literature, this paper provides a dynamic macroeconomic perspective on the causes of banking crises and the need for regulation in banking systems. We discuss an overlapping generations model, in which financial intermediaries solve agency problems between saving agents and investing entrepreneurs by economizing on transaction costs in financial contracting. In each period, the productivity of entrepreneurs is subject to macroeconomic shocks. Banks can freely enter or exit, which determines the risk premium that banks require for bearing macroeconomic risks. In the absence of intermediation costs, the risk premium is equal to the spread between loan and deposit rates. The economic system is connected over time through intertemporal savings decisions and through transfer of bank ownership and thus bank capital across generations.

We identify dynamic vicious circles that can lead to the default of the banking system. These circles occur despite the fact that banks earn fair premia for macroeconomic risks. An initial downward spiral starts when negative macroeconomic shocks cause a substantial decline in bank capital. Consequently risk premia decline, since the leverage of banks increases and limited liability allows banks to earn sufficient returns on equity, even with small premia for macroeconomic risks. Declining risk premia then increase the risk of a further decline of bank capital, which would entail a further reduction of risk premia. At the limit when bank capital approaches zero, the risk premium vanishes. Overall, an initial negative macroeconomic shock can lead to a downward spiral of bank capital, which results in a default of the banking system.

In extensions of the model further feedback effects can be identified, which operate through wages, savings, and deposits. A negative macroeconomic shock lowers the marginal product of labor and hence wages decline, which, in turn, lowers the supply of deposits. Such a decline increases the average quality of borrowers and lowers the leverage of banks, thereby causing higher risk premia. This tends to counteract the decline of bank capital. However, if banks need to refinance themselves during the fruition time of investment, it may either be impossible to satisfy liquidity needs, or aggregate investment will drop substantially, increasing the likelihood of a default of

the banking system.

The results of this paper suggest that a competitive banking system subject to repeated macroeconomic shocks has great difficulties in protecting itself against defaults. This may justify banking regulation that interferes when bank capital is declining too much or tries to remove macroeconomic risk from the balance sheet of banks.¹

The paper is organized as follows. In the next section we provide a brief account of two approaches to model banking crises. Then we present the model. In Section 4 we introduce financial intermediation and risk premia. In Section 5 we identify bank capital crises. In Section 6 we discuss dynamic feedbacks operating through wages and deposits. Section 7 concludes.

2 Two Approaches to Banking Crises

The literature offers two perspectives on how banking crises can occur. Firstly, a wealth of research has concentrated on bank runs. At the origin of this is the work of Diamond (1984). Recent contributions by Chen (1999) and by Allen & Gale (2004) show how banking panics occur when depositors perceive that the returns on bank assets are low. Runs may be inefficient, as in Chen, or first-best efficient, as in Allen and Gale.

A second type of bank crisis can be termed '*bank capital crisis*'. It is the focus of this paper. In a bank capital crisis a series of negative macroeconomic shocks leads to a decline of bank capital. This may trigger a downward spiral in bank capital since premia for macroeconomic risks tend to decline along with declining capital. As soon as banks are no longer able to repay their depositors, the banking system has insufficient capital to carry out intermediation services for future generations and defaults. This is called a bank capital crisis. The model presented in this paper allows for bank capital crisis. Bank runs cannot occur, since deposit contracts last for one period only and there is no maturity mismatch between deposits and loans. An important task in the future will be to combine bank runs and bank capital crises.

A major assumption underlying our model is that banking crises are caused by macroeconomic downturns. Gorton (1988) and subsequent work by González-Hermosillo, Pazarbaşıoğlu, and Billings (1997), Kaminsky & Reinhart (1999) and Demirgüç-Kunt and Detragiache (1998) suggest that banking crises tend to erupt when the macroeconomic environment is weak, particularly when output growth is low. These empirical

¹A more detailed discussion of the policy measures designed to counteract these vicious circles is given in Gersbach & Wenzelburger (2001).

facts are consistent with our modeling assumption that negative output shocks may cause a default of the banking system.

Our macroeconomic perspective is complementary to that of Blum & Hellwig (1995), who have shown that strict capital adequacy rules may reinforce macroeconomic fluctuations. In our model, the dynamic feedback between competition of banks and financial fragility is responsible for the vulnerability of a competitive banking system to repeated macroeconomic shocks. Our approach belongs to the tradition of aggregate models with financial intermediation initiated by Williamson (1987) and Uhlig (1995). The innovative aspect is a model in which the banking system is subject to repeated macroeconomic shocks and in which free exit and entry determines premia for macroeconomic risks.

3 The Model

We use an overlapping generations model with financial intermediation, in which agents live for two periods. Time is infinite in the forward direction and divided into discrete periods indexed by t . There is one physical good that can be used for consumption or investment. Each generation consists of a continuum of agents with two-period lives, indexed by $[0, 1]$. Each individual of each generation receives an endowment e of goods when young and none when old. The endowment may be the output from short-term production with inelastically supplied labor. Generations are divided into two classes. A fraction η of the individuals are potential entrepreneurs, the rest $1 - \eta$ of the population are consumers. Potential entrepreneurs and consumers differ in that only the former have access to investment projects.

Consumers are endowed with preferences on consumption in the two periods of their lives. Let $u(c_t^1, c_t^2)$ be a standard intertemporal utility function of a consumer, with c_t^1, c_t^2 denoting youthful and old-age consumption respectively of a consumer born in period t .² Given an endowment e when young and a deposit interest rate r^d , each young household saves the amount $s(r^d)$.

Each entrepreneur has access to a production project that converts period- t goods into period- $t + 1$ goods. For simplicity, we assume that potential entrepreneurs are risk-neutral and consume only when old. $e + I$ are the funds required for an investment project. An entrepreneur must borrow I units of the goods in order to undertake

²In view of the applications, it is straightforward to replace the OG structure by infinitely living agents who optimize myopically.

the investment project. The entrepreneurs are heterogeneous and indexed by a quality parameter i which is uniformly distributed on $[0, \eta]$. If an entrepreneur of type i obtains additional resources I and decides to invest, his investment returns in the next period amount to

$$f_i(q, e + I) = q(1 + i)f(e + I),$$

where f denotes a standard atemporal neoclassical production function. The parameter $q \in \mathbb{R}_+$ is subject to exogenous stochastic noise governed by an iid process on a compact interval $[q, \bar{q}]$.

Entrepreneurs are price takers and operate under limited liability. Under the assumption that they will not be credit-rationed at banks, all entrepreneurs applying for a loan contract randomly choose a bank that offers intermediation services. Given a loan interest rate r^c , the expected profit of an investing entrepreneur i is

$$\Pi(i, r^c) := \int_{\mathbb{R}_+} \max\{(1 + i)q f(e + I) - I(1 + r^c), 0\} \mu(dq), \quad (1)$$

where μ denotes the probability distribution of the shocks. Note that $\Pi(i, r^c)$ is monotonically increasing in quality levels i and decreasing in loan rates r^c . To obtain a loan contract of size I , entrepreneurs are required to invest all of their equity e . They face a binary decision problem, such that a risk-neutral entrepreneur with quality parameter $i \in [0, \eta]$ will invest if

$$\Pi(i, r^c) \geq e(1 + r^d). \quad (2)$$

4 Financial Intermediation

At the heart of this paper is the question to what extent a perfectly competitive banking system with free entry and exit is vulnerable to banking crises. Suppose to this end that there are n ($n > 1$) identical banks, indexed by $j = 1, \dots, n$, owned by entrepreneurs. Banks finance entrepreneurs and maximize profits accruing to current shareholders. Transfer of bank ownership to the next generation occurs through bequests. We assume that the number of banks is large and that the banking industry is perfectly competitive, i.e., banks take deposit and loan rates as given. Moreover, banks freely decide whether or not to offer their intermediation services.

Each bank j can sign deposit contracts $D(r^d)$, where $1 + r^d$ is the repayment offered for 1 unit of resources. Loan contracts of bank j are denoted by $C(r^c)$, while $1 + r^c$ is the repayment required from entrepreneurs for 1 unit of funds. All deposits and loan

contracts last for one period. Banks act as delegated monitors, since depositors can neither observe the quality of investment projects, nor are aware of whether entrepreneurs invest or consume their funds. It is assumed that banks are able to secure both the investment of entrepreneurs who have obtained a loan and the liquidation value in the case of default. There are various ways to formulate moral hazard and monitoring technologies justifying this assumption. Detailed justifications for the current model set-up are provided in Gersbach & Uhlig (2004) and Gersbach & Wenzelburger (2001). We see from (2) that banks do not have to fear low-quality entrepreneurs applying for loans, as they are always better off with saving endowments.

4.1 Sequence of Events

We introduce intermediation that takes place within each period. The time-line of actions in the economy within a typical period t is as follows:

1. Old entrepreneurs pay back with limited liability. The current level of bank capital is determined. Positive bank capital is distributed among shareholders according to payout rules.
2. Given r^d and r^c , banks decide whether to exit and to save their equity. Banks that stay in business offer their intermediation services.
3. Consumers and entrepreneurs decide which contracts to accept. Resources are exchanged and banks pay back old depositors.
4. Young entrepreneurs produce subject to a macroeconomic shock.

In order to simplify the exposition, we set the costs of intermediation at zero.³ We make the following assumptions regarding the behavior of banks. Banks operate under limited liability. Depositors randomly choose a bank that offers its intermediation services in order to save. Similarly, entrepreneurs applying for a loan contract choose banks randomly. Throughout the paper we assume that aggregate uncertainty is canceled out when depositors and entrepreneurs randomly choose banks, that is, each active bank obtains the same amount of deposits and loans.⁴

Loans are constrained by the amount of deposits obtained. If entrepreneurs applying for loans are rejected, they will randomly choose a bank and save their endowment.

³Such costs would include the monitoring expenses of banks. If intermediation costs per loan were fixed, the spread $r^c - r^d$ in equilibrium would increase accordingly for all of our results.

⁴The exact construction of individual randomness ensuring that this statement holds can be found in Alos-Ferrer (1999).

4.2 Temporary Equilibria

In order to derive the intermediation equilibrium, we assume that savings are never sufficient to fund all entrepreneurs, so that

$$S(r^d) = (1 - \eta) s(r^d) < \eta I \quad \text{for all } r^d \geq 0.$$

Let d denote the current capital base of the banking system. An individual bank has an amount of equity of $d_j = \frac{d}{n}$. As all banks are assumed to be identical we will formulate the equilibrium conditions for the whole banking system and hence focus directly on the evolution of the aggregate bank capital d .

There are two boundary values for d . Let $S_{\max} := \max\{S(r^d) : r^d \geq 0\}$ denote maximal aggregate savings and set $\bar{d} := \eta I - S_{\max} > 0$ as an upper bound for the capital bases. If $d > \bar{d}$, we assume that banks pay excess reserves to bank owners according to pay-out rules. On the other hand, if $d \leq 0$, then the capital base of the banking system has vanished, causing a default of the system.

For these reasons, the intermediation problem arises only when $d \in (0, \bar{d}]$. For each $d \in (0, \bar{d}]$ and each $r^d \geq 0$ there exists a unique *critical entrepreneur* $i_G \in [0, \eta]$, given by

$$i_G = i_G(d, r^d) := \frac{\eta I - S(r^d) - d}{e + I}, \quad (3)$$

such that savings are balanced by investments, that is,

$$S(r^d) + e i_G(d, r^d) + d = [\eta - i_G(d, r^d)] I, \quad d \in (0, \bar{d}]. \quad (4)$$

Let $d \in (0, \bar{d}]$ be the current level of bank capital at the beginning of an arbitrary period. Banks raise funds $S(r^d) + e i_G(d, r^d)$ that have to be paid back with interest at the end of the subsequent period. In a competitive equilibrium, these funds will have to satisfy (4).

Banks lend $[\eta - i_G]I$ to firms and will receive payments $P = P(i_G, q, r^c)$ at the end of the period, given by

$$P(i_G, q, r^c) = \int_{i_G}^{\eta} \min\left\{(1+i)q f(e+I), I(1+r^c)\right\} di, \quad (5)$$

where $i_G = i_G(d, r^d)$. Given a pair of interest rates r^d, r^c , profits of the banking system are given by a function $G(\cdot, q, r^d, r^c) : (0, \bar{d}] \rightarrow \mathbb{R}$, defined by

$$G(d, q, r^d, r^c) = P(i_G(d, r^d), q, r^c) - [S(r^d) + e i_G(d, r^d)] (1 + r^d), \quad (6)$$

such that for each shock q and each $r^c, r^d \geq 0$, $G(d, q, r^d, r^c)$ is the capital base of the banking system at the end of the period.

Suppose $d > 0$. A temporary equilibrium with financial intermediation in a particular period is a pair of interest rates (r_*^d, r_*^c) such that

- (i) no bank exits and no bank enters the market;
- (ii) firms take optimal investment and saving decisions;
- (iii) loan demand equals loan supply.

Writing

$$G^+(d, q, r^d, r^c) = \max\{G(d, q, r^d, r^c), 0\},$$

the expected profit of banks for interest rates r^c, r^d that operate under limited liability is $\mathbb{E}[G^+(d, q, r^d, r^c)]$. More formally, a temporary equilibrium with financial intermediation is defined as follows:

Definition 1

Let $d \in (0, \bar{d}]$ denote the capital base of the banking system operating under limited liability. A temporary equilibrium with financial intermediation (TEFI) is a pair of interest rates (r_*^d, r_*^c) such that the following conditions hold:

$$\mathbb{E}[G^+(d, \cdot, r_*^d, r_*^c)] = d(1 + r_*^d) \tag{7}$$

$$\Pi(i_G(d, r_*^d), r_*^c) = e(1 + r_*^d) \tag{8}$$

$$S(r_*^d) + e i_G(d, r_*^d) + d = [\eta - i_G(d, r_*^d)] I \tag{9}$$

Condition (7) is the no-exit and no-entry condition for banks. Of course, the condition has to be applied to an individual bank. As the condition for an individual bank is obtained by dividing both sides in equation (7) through the number of banks, it is convenient to work directly with the aggregate condition as we will do throughout the paper.

Condition (8) states that all entrepreneurs $i \geq i_G(d, r_*^d)$ invest, while all entrepreneurs $i < i_G(d, r_*^d)$ save. The spread $r_*^c - r_*^d$ represents what the banks obtain for bearing macroeconomic risks. For the sake of completeness, the definition of TEFI includes (9), stating that aggregate demand for loans $[\eta - i_G(d, r_*^d)] I$ is balanced by loan supply on the left hand side of equation (9).

Condition (9) determines the critical investing entrepreneur $i_G(d, r_*^d)$ independently of equilibrium loan interest rates. Assuming that aggregate saving $S(r^d)$ is increasing in

r^d , we see that i_G is decreasing in d and r^d . In both cases more resources are available, which encourages entrepreneurs with lower quality levels to invest. This is the case despite the fact that saving endowment becomes more attractive for increasing deposit interest rates r^d .

4.3 Existence of Temporary Equilibria and Risk Premia

Let us briefly discuss the existence of temporary equilibria and identify the role of the risk premia.

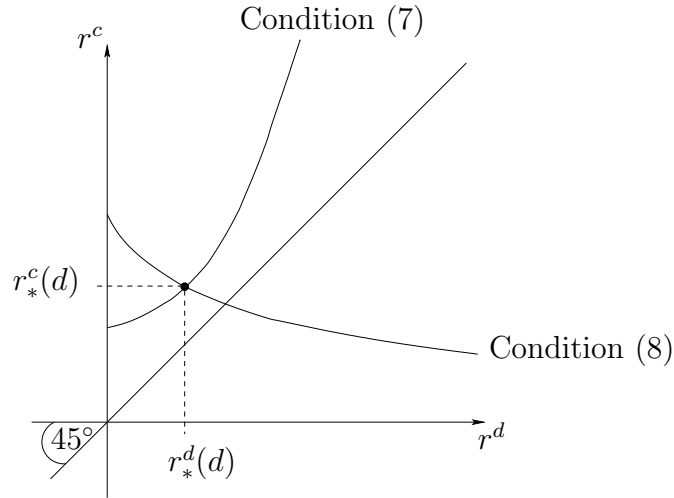


Figure 1: Existence and uniqueness of a TEFI for a given $d \in (0, \bar{d}]$.

The existence of a TEFI is illustrated in Figure 1. For an arbitrary capital base $d \in (0, \bar{d}]$, the figure depicts two curves. One of them describes all pairs of interest rates satisfying the no-entry condition (7), the other one all pairs of interest rates satisfying the indifference condition (8). A TEFI is characterized by the intersection point of these two curves. TEFIs exist since savings and loan supply increase with the deposit interest rate, while the demand for loans depends negatively on the loan interest rate. In equilibrium, the spread $r_*^c - r_*^d$ is the premium for the macroeconomic risk. By setting an appropriate spread $r_*^c - r_*^d$ banks earn returns on equity that are just high enough to ensure that there is no incentive to exit or to enter. As indicated in the figure, it is intuitively clear that risk premia must be positive. This fact along with a formal existence and uniqueness proof is rigorously established in Gersbach & Wenzelburger (2004).

5 Declining Bank Capital

The dynamic behavior of the economy is described by the evolution of capital in the banking system. Let $d_t \in (0, \bar{d}]$ denote the capital base of the banking system at the beginning of some period t , where we allow the banking system to start with an arbitrary level $d_0 \in (0, \bar{d}]$. At the beginning of period t , banks raise funds $S(r_*^d(d_t)) + e i_G(d_t, r_*^d(d_t))$ that have to be paid back with interest at the end of that period. Writing $i_*(d_t) := i_G(d_t, r_*^d(d_t))$ for the critical entrepreneur in a competitive equilibrium, these funds must satisfy

$$S(r_*^d(d_t)) + e i_*(d_t) + d_t = I[\eta - i_*(d_t)], \quad d_t \in (0, \bar{d}]. \quad (10)$$

The corresponding equilibrium interest rates are $r_*^c(d_t), r_*^d(d_t)$. For a given shock q_t , the new level of bank capital d_{t+1} is determined by

$$d_{t+1} = \min \{G_*(d_t, q_t), \bar{d}\}, \quad d_t \in (0, \bar{d}], \quad (11)$$

where the map G_* is defined as follows. Using the definition for the profit of the banking system (6), the function $G_*(\cdot, q) : (0, \bar{d}] \rightarrow (-\infty, \bar{d}]$ for each q is defined by

$$\begin{aligned} G_*(d, q) &:= G(d, q, r_*^d(d), r_*^c(d)) \\ &= P(i_*(d), q, r_*^c(d)) - [S(r_*^d(d)) + e i_*(d)] (1 + r_*^d(d)). \end{aligned}$$

Note that we account for the fact that excess capital above \bar{d} will be distributed among old entrepreneurs only. Thus possible dividend payments will neither affect savings nor investment decisions.

The map (11) is continuous in both arguments and describes a random difference equation. Since $\{q_t\}_{t \in \mathbb{N}}$ is an iid process, the sequence of bank capital levels $\{d_t\}_{t \in \mathbb{N}}$ generated by (11) is a Markov process. If $d_{t+1} \geq 0$, then all depositors have been repaid and d_{t+1} represents the capital level of the banking system at the beginning of period $t+1$. If $d_{t+1} < 0$, then the banks incur losses, and d_{t+1} is the amount of liabilities that could not be covered by loan repayments of entrepreneurs. In such a case, the banking system has negative equity and is bankrupt.

The first vicious circle arises from a dynamic feedback between risk premia and bank capital. Our main result is as follows:

Theorem 1

Suppose that for each $d \in (0, \bar{d})$ there is positive probability that no entrepreneur will go bankrupt. Then the risk premia will vanish with a vanishing capital base, that is,

$$\lim_{d \rightarrow 0} [r_*^c(d) - r_*^d(d)] = 0.$$

Theorem 1 has important implications.⁵ If a banking system has lost most of its capital, the risk premia decline, hence the risk of a further decline of bank capital increases. At the limit where bank capital approaches zero, the risk premium vanishes. In order to explain this result, we observe that for a low level of bank capital a positive risk premium implies a very large return on equity *ex post* for sufficiently favorable macroeconomic shocks since no entrepreneur will go bankrupt. As very adverse shocks may imply at most zero equity, a small risk premium is sufficient to generate the *ex ante* expected return on equity required by shareholders.

A consequence of Theorem 1 is that the probability of a default of the banking system is positive if the capital base is below a certain threshold, which will be denoted by d_{crit} . A level of bank capital below d_{crit} makes the banking system vulnerable to default in two ways. First, the buffer against defaults of entrepreneurs is small. Second, the risk premium is small, and even moderately adverse macroeconomic shocks may lead to a further decline in bank capital.

Moreover, the banking system will default in finite time with the probability of one. The argument is based upon the existence of a critical shock $q_{crit} > \underline{q}$ such that the capital base will decrease for shocks below q_{crit} , i.e.,

$$G_*(d, q) < d \quad \text{for all } d \in (0, \bar{d}], \quad q < q_{crit}.$$

Then a series of sufficiently numerous shocks $q_t, \dots, q_{t+\tau}$ below q_{crit} will lead to a chain of decreasing capital bases

$$d_{t+1} = G_*(d_t, q_t) > \dots > d_{t+1+\tau} = G_*(d_{t+\tau}, q_{t+\tau})$$

that will finally take on a value below zero, thus causing a default of the banking system. Gersbach & Wenzelburger (2004) show that the event of default occurs with probability one.

We summarize the underlying logic as follows. Repeated negative macroeconomic shocks lower the equity of banks until it ultimately lies below the critical level d_{crit} . Further negative macroeconomic shocks then lead to a downward spiral of bank capital. As equity declines, the risk premium decreases, which in turn increases the probability of further declines in bank capital. Over time, the banking system will default.

⁵Theorem 1 is formally proven in Gersbach & Wenzelburger (2004).

6 Extensions: Labor Market and Maturity

The present model can be extended in two ways in order to capture important further dynamic feedback effects from labor income, savings, and the supply of deposits. The first extension is to incorporate labor as an input factor for production and thereby to endogenize the endowment of individuals as wage income.

The essential extension of the model is outlined as follows. Both potential entrepreneurs and consumers supply one unit of labor inelastically when young and receive wage income w_{t-1} in period $t-1$. As before, consumers derive utility from consumption over two periods of life and save for old-age consumption. The aggregate savings function then depends both on the deposit rate and on the prevailing wage level. Aggregate savings of consumers in period $t-1$ take the form

$$s_{t-1} = S(w_{t-1}, r^d),$$

where r^d is some deposit rate.

Each entrepreneur has access to a production possibility in his second period of life and, as before, may either save or invest his funds. If he decides to invest, then his wage income obtained when young $e_t = w_{t-1}$ represents the equity available for production in t . As before, the investment project requires an additional I units of physical capital, which have to be borrowed from banks. These funds together with the equity will be invested and will provide the physical capital for production in period t . The output of an investing entrepreneur $i \in [0, \eta]$ in period t is then produced from capital $I + e_t$ and labor input l^i . Given a loan interest rate r^c and a wage rate w , the expected profit function (1) of an investing entrepreneur i has to be changed to

$$\Pi(i, r^c, w, l^i) := \int_{\mathbb{R}_+} \max\{(1+i)q f(e_t + I, l^i) - I(1+r^c) - wl^i, 0\} \mu(dq).$$

The notion of a temporary equilibrium given in Definition 1 will have to be extended by imposing a market clearing condition for the labor market.

An extension of the model as outlined above includes additional feedback effects that operate through wages, endowments, and deposits. Loosely speaking, it incorporates a banking sector into a Diamond-type growth model. Adverse macroeconomic shocks in period t will lead to low wages and low endowments and thus to low savings. Low endowments of entrepreneurs make loans more risky, thus entailing an increase in the downside risk for banks such that risk premia should increase as well. On the other hand, low savings decrease the leverage of banks and increase the average quality of

borrowers. The impact on risk premia is therefore ambiguous. It is an open issue whether or not the overall impact of the wage feedback creates a further vicious circle and increases the default risk of the banking system.

The second extension of the model needs to incorporate maturity transformation in the following sense. Suppose that, in addition to the above extension, entrepreneurs and consumers live for three periods. Then loans for entrepreneurs may be long-term, such that a production project converts period- t goods into period- $(t + 2)$ goods. In this case, banks are forced to refinance themselves during the fruition time of investments. Then a negative macroeconomic shock that lowers savings and the supply of deposits is much more likely to initiate a downward spiral. As refinancing requires replacing old depositors by younger ones, global resource constraints may either depress new investments as deposits from the young generation decline, or even violate aggregate liquidity constraints of the banking system. This may cause an immediate default of the banking system. In summary, feedbacks from wages and deposit supplies are likely to amplify adverse shocks and tend to increase the likelihood of a system-wide default.

7 Conclusion

The discussion in the present paper suggests that vulnerabilities of a banking system may build up over time, creating the danger of large-scale defaults of banks. Apart from potential policy implications, we hope that the current framework offers avenues for further research. Two main research tasks are apparent. The most important task in future research is to combine the type of banking crisis discussed in this paper with the wealth of research on bank runs. The design of such a grand model allowing for banks runs and bank capital crises is one of the main challenges in modeling banking in a macroeconomic context.

At another level, one might ask whether it is possible to improve the protection of banks from macroeconomic risks. The way in which securities and deposit and loan contracts might be designed so as to reduce macroeconomic risks on the balance sheets of banks appears to be one of the prominent research issues that we have attempted to highlight in this paper.

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