

Bank Collapse and Depression

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The recurrent banking panics of the 19th century and the Great Depression of the 1930s are widely viewed as failures of our economic system. A simple version of Samuelson's overlapping generations model is used to generate such failures of Walrasian equilibrium. The spontaneous "panics" generated involve a collapse of bank credit, causing in turn a drop in investment demand. The model suggests that both the recent technological advances in the intermediation industry and the current move towards deregulation of that industry are ominous developments.

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By John Bryant

The recurrent banking panics of the 19th century and the Great Depression of the 1930s are clear examples of failure of our economic system. However, to this day, economics has failed to produce a satisfactory explanation for these events.^{1/} This failure is disquieting, as we would like to know, for example, why we have not experienced similar events in the postwar period, and whether we are now "due," as some fear.

Although no satisfactory explanation for banking panics and depression has emerged, existing theory can give us guidance in searching for one. Indeed, it is argued in this paper that an explanation for these anomalous events is immediately at hand, an explanation which has simply been overlooked.

The natural place to look for an explanation for failure of our economic system is known failures in the economic model of Walrasian equilibrium. Twenty years ago Paul Samuelson introduced a failure of Walrasian equilibrium in his pure consumption-loans model [15]. He showed that with overlapping generations of finite-lived individuals in a model with no last period, the Walrasian equilibrium need not be Pareto optimal. Moreover, he introduced the concept of a negative net worth entity, the "social contrivance" of fiat (unbacked) money, the use of which makes everyone better off and yields Pareto optimality. We can, then, model recurrent banking panics and depression as recurrent and once-and-for-all collapse of a fiat money system, respectively. In Appendix III it is demonstrated that such collapse of a fiat money system can generate reduced production and employment.

^{1/}See, for example, [12]. Such events are far from unique to U.S. monetary history; see, for example, [11] pp. 402-411.

There are, however, several problems with modeling banking panics and depression as collapses of a fiat money system. First, one must determine what events precipitate a collapse of a fiat money system and why. The collapse of a negative net worth entity causes a net loss, and therefore is something economic agents seek to avoid. Second, fiat money models typically have the property that with reinstatement of a fiat money system, the economy revives instantly in full bloom. The introduction of a negative net worth entity generates excess profits, and is entered into with alacrity. However, during the Great Depression deposit insurance and additional bank regulations were introduced, actions which should have reinstated banks' role as providers of fiat money. Unfortunately, the economy did not spring back to health as a result. Lastly, very generally, fiat money is a solution to the capital overaccumulation problem of the competitive economy (see [16] and Appendix III). In models more elaborate than Samuelson's, fiat money has value because its existence keeps the economy from accumulating too much capital. This suggests that the collapse of a fiat money system is bad because it causes a period of overaccumulation of capital. Whether or not one is a Keynesian, it surely is wrong to view the banking panics and Great Depression as periods of high demand for investment!

The above remarks suggest that one look for a model with the "social contrivance" of a positive net worth entity that solves a capital underaccumulation problem. Is there such a model? Indeed there is. Cass and Yaari [10, p. 363], in an elaboration of Samuelson's model, briefly introduce just such a positive net worth entity.^{2/} Not surprisingly, the possibility of such an entity arises in a model of overlapping generations of finite-lived individuals with no

^{2/} Phelps and Pollak [13] demonstrate the possibility of capital underaccumulation when individuals are "imperfectly altruistic." In Samuelson's model, individuals are totally unaltruistic, and it is more parsimonious to stay in the tradition of independent utility functions. For further discussion of Samuelson's model see [2], [4], [9], and [18].

first period. And this entity has just the symmetric properties one would expect. Because it is a positive net worth entity, economic agents gain from its collapse, they lose from initiating it, and if constrained to reinstitute it following a collapse, they do so to the smallest extent possible. Lastly, collapse of the positive net worth entity causes a drop in the demand for investment.

All the above facts stem from a basic observation on our positive net worth entity. In a model with fiat money, given that otherwise there will be no fiat money in the future, it is Pareto improving to introduce fiat money and maintain it for all time. Symmetrically, in a model with our positive net worth entity, it is Pareto superior that there will have always been this entity than that it will have never existed. But one cannot introduce a social contrivance at a point in time and guarantee that it has always existed!

Now we turn to a simple model with the positive net worth "social contrivance." Naturally, to get simplicity one must trade off realism. Therefore we finish the paper with an interpretation of the model which, hopefully, clarifies its implications for the real world, and with supporting appendices.

The Model

The model is one without production, employment, or investment of any kind. It is a pure exchange model. Time is discrete and without beginning or end. $N > 0$ individuals are born each period, and they live two periods. An individual born in period t is of the t^{th} generation. There is a single transferable but nonstorable consumption good. Each individual is endowed with $L > 0$ units of this consumption good in her second period of life, but is endowed with nothing in her first period of life. Let C_1 and C_2 be an individual's consumption of the consumption good in her two periods of life. Every individual has the same utility function $U(C_1, C_2) = \sqrt{C_1} + \sqrt{C_2}$.

As the model stands, there is no possibility of exchange. Everyone simply consumes L in her second period of life and gets \sqrt{L} as utility. Notice, however, that if every old person hands over half her endowment to a young person, then everyone consumes $L/2$ in each period of life and gets $2\sqrt{L/2} = \sqrt{2}\sqrt{L} > \sqrt{L}$ as utility. Because there is no first old person, no one is hurt in this scheme. But suppose that individuals of generation t suddenly decide to hand over no goods. Previous generations still get $C_1 = L/2, C_2 = L/2$. However, generation t gets $C_1 = L/2, C_2 = L$. Generation $t+1$ gets $C_1 = 0, C_2 = L$. Clearly, generation $t+1$ will not start the string of gifts again, because all it can do thereby is lose second-period consumption.^{3/} So all future generations get $C_1 = 0, C_2 = L$. These observations explain the existence and properties of our positive net worth "social contrivance."

Our "social contrivance" of a positive net worth entity allows us to converge to the $C_1 = L/2, C_2 = L/2$ allocation. Let us suggestively call this entity the "banking system." The banking system behaves as follows. Each period it takes delivery from the old on promises for goods issued when they were young. Then the banks sell these goods to the current young competitively for promises to deliver goods in the following period. The net worth of the banking system is the value of the promises of future delivery which it holds.

Let P_t be the units of goods which a young person of generation t gets for the promise of one unit of goods next period. Each individual is a price taker and takes P_t as given. Let b_t be the units of goods promised by a typical individual of generation t . Let us generalize our model just a bit, and assume

^{3/}Notice, however, that $\partial U[0,L]/\partial C_2 = 1/2\sqrt{L} < \partial U[0,L]/\partial C_1 = \infty$. If generation $t+1$ cares at all about generation $t+2$ (except lexicographically), they have motive for a social decision to restart the string of gifts. In Phelps and Pollak [13] terms, if individuals are imperfectly altruistic in any degree, they desire restarting. See [6].

that every individual of generation t is endowed with $L_t > 0$ when old. Then the problem of the young individual of generation t is:

$$\max_{b_t} \sqrt{P_t b_t} + \sqrt{L_t - b_t}.$$

This is solved uniquely by b_t satisfying

$$(1) \quad P_t/b_t = 1/(L_t - b_t).$$

While the individual views herself as choosing b_t given P_t , the actual amount of goods purchased, $NP_t b_t$, is determined by the promises to deliver issued by generation $t-1$. Therefore, in equilibrium, the price P_t is determined by $NP_t b_t = Nb_{t-1}$. Plugging this equilibrium condition into (1) and rearranging yields:

$$(2) \quad \frac{b_t}{b_{t-1}} = \left(\frac{L_t - b_t}{b_t} \right).$$

Expression (2) is very suggestive. It has the following immediate implications for $b_{t-1} > 0$.

$$(3) \quad b_t > b_{t-1} \text{ if and only if } b_t < \frac{1}{2} L_t$$

$$(4) \quad b_t < b_{t-1} \text{ if and only if } b_t > \frac{1}{2} L_t$$

$$(5) \quad b_t = b_{t-1} \text{ if and only if } b_t = \frac{1}{2} L_t.$$

Suppose as assumed earlier that $L_t = L$ for all t . Then (2)-(5) imply that a nonzero sequence $\{b_t\}$ is either monotonically increasing with limit $L/2$, monotonically decreasing with limit $L/2$, or constant at $L/2$.

Expression (2) is a quadratic in b_t which has positive root

$$(6) \quad b_t = \frac{1}{2} \left[\sqrt{(b_{t-1})^2 + 4L_t b_{t-1} - b_{t-1}} \right].$$

Notice from (6) that $b_{t-1} = 0$ implies $b_t = 0$; that if $b_{t-1} > 0$, b_t is increasing in L_t ; and b_t is increasing in b_{t-1} . Moreover, if the sequence $\{L_t\}$ is increasing without bound, then a nonzero sequence $\{b_t\}$ is also increasing without bound.

We have assumed that each generation honors its promises to deliver goods. But suppose generation t fails to do so. It, of course, is better off. Generation $t+1$ is worse off, but it cannot be said that generation t broke a promise to generation $t+1$, because generation $t+1$ was not alive when any promises were issued. Perhaps it can be said that generation t has broken its promise to generation $t-1$. But generation $t-1$ does not care whether the promise is broken! No individual in his individual capacity has a claim against individuals of generation t ! The banking system is, indeed, a social contrivance.

We have named our positive net worth entity "banking system." Clearly, to maintain the net worth, the banking system must be regulated.^{4/} If the regulation is perfect, we get our solution. Instead, let us suppose that the regulation is imperfect. Specifically, let us assume that at the cost of K units of second-period consumption an individual can avoid meeting $\alpha \cdot 100$, $1 \geq \alpha > 0$, percent of her promised delivery. An individual of generation t exercises this option if the benefit of avoidance exceeds the cost as indicated in equation (7).

$$(7) \quad \alpha b_t - K > 0.$$

When the individual exercises her option to avoid delivery, she extracts a portion of the net worth of the banking system. We call this event a "banking panic," as all individuals do so at the same time.

Now let us examine the behavior of our model with imperfect regulation. First, assume, once again, that $L_t = L$ for all t . Then $\{b_t\}$ approaches $L/2$

^{4/}If banks are privately owned, bankers have the same motivation to extract the net worth as do the other members of their generation.

monotonically. Let us assume $\{b_t\}$ approaches $L/2$ from below. Then for any $K < L/2$ and any $\alpha > 2K/L$ there will come a time when this condition (7) is met.^{5/} If the fixed cost of avoidance is not high enough, and the percentage of indebtedness avoidable is too high, a banking panic inevitably results. Indeed, with $\alpha < 1$, this occurs repeatedly. With each banking panic b is reduced below $(1-\alpha)L/2$, but then climbs smoothly back towards $L/2$. If $\alpha = 1$, there is one terminating banking panic, and b remains at zero thereafter. Second, assume that $\{L_t\}$ is increasing without bound. Then $\{b_t\}$ also is increasing without bound. Therefore, for any $\alpha > 0$, $K > 0$, there will come a time when the individual exercises the partial delivery option.

Interpretation of the Model

As long as one accepts the interpretation of the net positive worth entity as the banking system and the mass choice of the partial delivery option as panic, then we clearly have a model of recurrent and a once-and-for-all banking panic. We also promised an explanation of decreased investment demand. Naturally, one would also want an explanation for reduced production and employment. As the model has no production, no labor, and no capital, it clearly requires some imaginative interpretation to generate such explanations. We provide below a brief interpretation addressing these matters.

First, let us consider the banking panic. It is, of course, not at all a stretch of the imagination that banks play a role in facilitating borrowing and lending. Nor is it a stretch of the imagination that they are regulated positive net worth entities. However, the imperfection of regulation may seem unlikely in this simple model. Nor can it be claimed that a coherent model of the process of

^{5/} $\alpha b_t - K = (2K/L)b_t - K + (\alpha - 2K/L)b_t \rightarrow (\alpha - 2K/L)L/2 > 0$ as $t \rightarrow \infty$.

regulation is presented here or elsewhere. Indeed our imposing ad hoc imperfection can only indicate possibilities. The ultimate goal is a coherent model of regulation in which the regulation is generated endogenously.^{6/} However, intuitively it does seem very possible that in reality actual regulation is not perfect. In the first place, the regulation of financial institutions may not have been purposefully designed to protect net worth. Moreover, the world is much more complex than our model, making appropriate regulation less obvious. Also, according to our model, all market participants, both regulated banker (lender) and borrowers, have motive to circumvent the regulation, to make the regulator's job difficult. They may, for example, overstate the value of a bank's portfolio of loans by understating the associated risk. We do not live in a world in which the role of regulation is well understood, and in which perfect regulation is both feasible and costless.

In our banking panic a whole generation is made better off by circumventing regulation. This does not seem an accurate characterization of the Great Depression, for example. When interpreting a simple model, it is often unwise to take its implications too literally, and this is one of those occasions. The essence of what the model is capturing is that for each transaction taken separately, all the participants have motive to circumvent the regulation. More generally, most or all individuals may be better off if regulation cannot be circumvented, but individuals in each of their transactions have motive to circumvent the regulation. All individuals want a viable banking system, but each banker must be competitive in offering deals, and each bank customer tries to get the best deal she can. In Appendix I we briefly sketch a model of spatial separation having such properties (see [17] for a discussion of models of spatial separation).

^{6/} [6] takes a small step in this direction.

Usually one associates banking panics with runs on deposits rather than with the massive loan defaults of our model. Appendix II presents a version of our model in which an anticipation of massive loan defaults generates a run on deposits. Moreover, it is demonstrated that bank liabilities taking the form of deposits (rather than shares in the portfolio of loans) renders the model unstable. Appendix III includes a model with banking panics which do not involve loan defaults.

Now we turn to production, employment, and investment. The model is easily modified to have endowments of labor and a production technology. Moreover, input of labor today producing goods tomorrow can be interpreted as the result of a technology involving capital. Very generally, capital is a means of using today's labor to produce goods more efficiently tomorrow. This is what our $(0, L)$ endowment pattern is capturing, the trade-off of labor today for goods tomorrow available to those who enter the economy. In such a production model, the banking panic can indeed produce reduced production, reduced employment, and reduced demand for capital (see Appendix III). Moreover, an increasing $\{L_t\}$ sequence can be interpreted as an advancing economy, an economy using higher and higher technology. Very generally, an advancing economy is one which produces a more and more favorable rate of exchange of labor today for goods tomorrow.

This paper was motivated by the question of why we have not had a banking panic in the postwar period, and if we are now "due." We finish the paper by using our analysis to provide a disquieting answer. Stricter regulation, a higher K and lower α in our model, can put off a collapse, perhaps indefinitely. The stricter banking regulation imposed in the 1930s can explain why we have had a respite from banking panics. However, we also saw in our model that unless the new regulation is perfect, an ever-advancing economy will eventually reach the "panic stage." And our economy certainly has advanced since the 1930s! Moreover, recently there have been two disquieting developments. We have both the

application of advanced technology to financial markets, presumably providing more efficient means to circumvent regulation, and a move towards deregulation of the financial markets. It is worth noting in this regard that the continued existence of deposit insurance may provide no solace. Deposit insurance protects depositors, but, depending upon how the insurer's obligation is to be met, it does not necessarily protect the net worth of banks (see [3])! Lastly, we note that our model indicates that the more advanced the society, the more potentially disastrous a banking panic is. The worst case is that we lose the entire advantage of being an advanced economy. Naturally, one need not take this worst case seriously to be disquieted by recent events.

Appendix I: The Appalachian Trail

The Appalachian Trail begins in Maine and "ends in Georgia." That is to say, it ends nowhere. Each day N infinitely-lived individuals start on the Trail in Maine. All along the Trail, a day's walk apart, are campgrounds. Each campground has two campsites, a and b. Each site has room for N individuals. They are allocated on a first come, first serve basis. Each individual must spend two nights at a campground to recover. On day t , $L_t > 0$ consumption goods are provided to each individual at every site b by one of the campground's rangers. Nothing is provided to site a. The consumption goods cannot be transported between campgrounds, but can be transported between sites at a campground. Another ranger also regulates a "bank." Each individual at a site (a) bids for the handouts from site (b) with promises of handouts next period. The ranger enforces promises. However, at the cost of a bullet hole destroying \bar{b} goods, a camper can outrun the ranger.

Consider an individual of generation t . Let his consumption of the consumption good at sites a and b, respectively, in campground j be C_j^a, C_j^b . Then, for any i, j with $i > j$, and for any compact constraint set $T \subset \mathbb{R}_+^4$, he chooses $C_j^a, C_j^b, C_i^a, C_i^b$ in T to maximize the function

$$U_t(C_j^a, C_j^b, C_i^a, C_i^b; i, j) = \sqrt{C_j^a} + \sqrt{C_j^b} + \sqrt{C_i^a} + \sqrt{C_i^b}.$$

On the Appalachian Trail banking panics make everyone worse off.

Appendix II: Borrowing, Lending, and Deposits

In period t , $N_t > 0$ two-period-lived identical individuals (borrowers) are born, each endowed with L units of the consumption good in her second period of life, but endowed with nothing in her first period of life. At the same time $n > 0$ two-period-lived identical individuals (lenders) are born, each endowed with L units of the consumption good in her first period of life, but endowed with nothing in her second period of life. The positive net worth entity, the banking system, of the main text exists. Every individual has the same utility function $U(C_1, C_2) = \sqrt{C_1} + \sqrt{C_2}$. The N_t borrowers solve the same problem as the individuals in the main text. Let l_t be the units of goods promised to a typical lender of generation t . Then the problem of the young lender of generation t is:

$$\max_{l_t} \sqrt{L - P_t l_t} + \sqrt{l_t}.$$

This is uniquely solved by $l_t = \left[\frac{1}{P_t(1+P_t)} \right] L$. Let us define $Z_t = N_t b_t - n l_t$. Z_t is the aggregate net worth of the banking system. The equilibrium condition is $P_t Z_t = Z_{t-1}$. Plugging in the expressions for optimal b_t and l_t and rearranging yields:

$$(2)' \quad \frac{Z_t}{Z_{t-1}} = \frac{N_t L - Z_t}{Z_t + L n Z_t / Z_{t-1}}$$

which should be compared with expression (2) of the main text. Using the same analysis as in the main text we conclude that $Z_t \geq Z_{t-1}$ implies $Z_t \leq (N_t - n)L/2$. Moreover, if $N_t = N > n$ for all t , then $\{Z_t\} > 0$ is converging monotonically to $(N-n)L/2$. In the limit the lenders just "net out," and we are reduced to our original problem. Lastly, (2)' is a quadratic in Z_t , which always has a positive root for $Z_{t-1} > 0$.

Suppose, however, that lenders are only allowed to make deposits, that they face a gross rate of return of one by external constraint.^{1/} Moreover, the banking system is constrained to issue all deposits demanded. Then $l_t = L/2$. Borrowers still face a gross rate of return of $\frac{1}{P_t}$. Let $Y_t = Z_t + nL/2 = N_t b_t$. The equilibrium condition now is $P_t Y_t = Y_{t-1}$. Substituting in the expression for optimal b_t and $l_t = L/2$ and rearranging yields

$$(2)'' \quad \frac{Y_t}{Y_{t-1}} = \frac{N_t L - Y_t}{Y_t}$$

which is equation (2) of the main text with Y_t replacing b_t and $N_t L$ replacing L_t . For $N_t = N > n$ the system converges to $Y_t = NL/2$ or $Z_t = [N-n]L/2$ as above (the path is different, of course).

However, while (2)'' is a quadratic in Y_t which always has a positive root for $Y_{t-1} > 0$, this root need not imply that $Z_t = Y_t - nL/2 > 0$!

Let $Y_{t-1} = \bar{N} L/2$. Then for $N_t \leq \frac{1}{2}[1+n/\bar{N}]n$, $Z_t \leq 0$. As Z_t is the net worth of the banking system, $Z_t \geq 0$ is required for feasibility, and $Z_t > 0$ is required for the banking system to remain in existence. If $Z_t < 0$, the banking system cannot pay off on all its deposits, which seems a reasonable description of a run on deposits. The restriction that bank liabilities be deposits has rendered the system unstable, a low realization of N_t causes a bank run and collapse of the banking system. Repeated bank runs can occur if the banks are not required to totally liquidate themselves to meet depositors' claims.

^{1/} [3] presents a model generating deposits endogenously.

Appendix III: Production, Employment, and Investment

$N > 0$ identical individuals are born each period, and they live two periods. In her first period an individual is endowed with L units of nontransferable leisure, while in the second she is endowed with nothing. There is a technology available to the individual to transform leisure hours into a capital good (K) 1-1 this period. This "one horse shay" capital good is exhausted in the subsequent period to produce, by itself, $(1+r)$, $r > 0$, units of transferable but nonstorable consumption good. The consumption good cannot be used to produce the capital good. In the first period of life the consumption good and leisure are perfect substitutes in the utility function of the individual where one hour of leisure equals one unit of consumption good.^{1/} The banking system of the main text exists. Let C_1 and C_2 be an individual's consumption of the consumption good and leisure in her two periods of life. Every individual has the same utility function $U(C_1, C_2) = \sqrt{C_1} + \sqrt{C_2}$.

The problem of the young individual of generation t is:

$$\max_{K_t, b_t} \sqrt{L - K_t + P_t b_t} + \sqrt{(1+r)K_t - b_t}$$

subject to: $K_t \leq L$.

If the constraint is not binding, it is clear that in equilibrium ($P_t b_t = b_{t-1}$) $P_t = \frac{1}{1+r}$. b_t grows at the rate r . The unconstrained maximum is solved by $K_t = \left(\frac{1+r}{2+r}\right)L + b_{t-1}$ (after substitution for the equilibrium condition). This satisfies the constraint for $b_{t-1} \leq \left[\frac{1}{2+r}\right]L$. In other words, for $b_{t-1} <$

^{1/}Alternatively, the individual can produce the consumption good from leisure 1-1 "at home," out of the economy, and leisure does not enter the utility function. This is a simple form of the nonconvexity of labor choice found in the "new-new" labor economics, see [1] and [7]. In this model there is "under-employment" rather than "unemployment." This I view as a technicality successfully addressed in the "new-new" labor economics.

$[\frac{1}{2+r}]L$ there is reduced production, reduced employment, and reduced demand for capital.

If the constraint is binding, $K_t = L$, the individual's problem becomes

$$\max_{b_t} \sqrt{P_t b_t} + \sqrt{(1+r)L - b_t}$$

which is identically the problem in the main text with $(1+r)L$ replacing L_t .

Now let us briefly consider fiat money and a version of the capital overaccumulation problem.^{2/} In the simple model without production or investment of the main text, the possibility of valued fiat money arises when individuals are endowed with the consumption good in their first period of life rather than in their second. Similarly, in the model of production, employment, and investment of this appendix, the possibility of valued fiat money arises when the individual has better current period production possibilities than next period production possibilities. Specifically, let us assume that $-1 < r < 0$. This implies $\{b_t\}$ is a sequence approaching zero. At $b_{t-1} = 0$, $K_t = \frac{1+r}{2+r}L$. This we refer to as the nonmonetary equilibrium. Next, let us assume that individuals can transform leisure into the consumption good 1-1 in their first period of life. Lastly, we assume that the "social contrivance" of fiat money exists. Individuals can transform leisure into the consumption good, and then exchange the consumption good for fiat money with the previous generation, and so on.

The value of fiat money to the individual depends upon her assumption of the value of fiat money to the next generation. For simplicity we consider only stationary equilibria, ones in which the value of money is the same for all generations, the noninflationary equilibria. There are two such equilibria, one

^{2/}In the capital overaccumulation problem of growth theory, in all but the optimal nonmonetary equilibrium there is unexploited profit opportunity in the issuance of fiat money [16]. In this model the unique nonmonetary equilibrium has unexploited profit opportunity in the issuance of fiat money, and there is an optimal valued fiat money equilibrium.

in which the value of fiat money is zero, the nonmonetary equilibrium, and one in which it is positive, the monetary equilibrium. In the monetary equilibrium as $r < 0$, $K = 0$, and valued fiat money has solved the problem of the accumulation of relatively unproductive capital (in this model, any capital is too much). Let m_t be the individual's real balances. Then the problem of the young individual of generation t is:

$$\max_{m_t} \sqrt{L - m_t} + \sqrt{m_t}$$

which is solved by $m_t = 1/2L > \left[\frac{1+r}{2+r}\right]L$. In the monetary equilibrium employment is higher than in the nonmonetary equilibrium. Notice also that the monetary equilibrium is devoid of dynamics, it does not depend upon initial conditions. We take a banking panic to be a surprise shift from the monetary to the nonmonetary equilibrium. A banking panic causes reduced production and employment, but increased demand for capital.

The question remains of why a banking panic would occur in the fiat money model, why there is a "jump" between equilibria. In [5] it is argued that only the nonmonetary equilibrium obtains unless a positive minimum value of fiat money is guaranteed, presumably by an authority to tax future generations.^{3/} A banking panic then occurs when paper that was thought to be guaranteed is discovered not to be guaranteed. With this interpretation, the Great Depression occurred when individuals discovered that the Federal Reserve System did not guarantee deposits. The question remains of why the U.S. economy did not immediately recover with the creation of the F.D.I.C. It is possible that the relatively undeveloped ($r < 0$) economies of the 19th century were subject to this kind of panic, while the advanced ($r > 0$) economies of the 20th century were subject to that of the main text.

^{3/} Notice that such a guarantee "knocks out" not only the nonmonetary equilibrium, but nonstationary monetary equilibria as well.

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