Why Do Banks Promise to Pay Par on Demand?

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Abstract

We survey the theories on why banks promise to pay par on demand and examine historical evidence on the conditions under which banks have promised to pay the par value of deposits and banknotes on demand when holding only fractional reserves.

The theoretical literature can be broadly divided into three strands: liquidity provision; asymmetric information; and regulatory restrictions. One strand of the literature argues that banks offer to pay par on demand in order to provide liquidity insurance services to consumers who are uncertain about their future time preferences and who have investment opportunities inconsistent with some of their preferred consumption paths. A common assumption needed in most of these papers is that demand deposits cannot be traded, which suggests regulatory restrictions that prevent banks and active markets coexisting. A second strand of the literature argues that banks offer to pay at par as a way to protect uninformed depositors, who would otherwise be disadvantaged relative to better informed individuals if equity contracts were employed instead. The
deposit is then on demand to make its value not contingent on states that are not verifiable by the depositor. In this sense, demand deposit contracts are a discipline device in this setup because the promise to pay par on demand helps to limit the riskiness of banks’ activities. The third strand of the literature argues that banks promise to pay par on demand because of legal restrictions which prohibit other securities from playing the same role as demand deposits.

We conclude that there are sharp predictions by the relevant theories. We assume that it is not zero cost to make a promise to redeem a liability at par value on demand. If so, then the antecedent conditions in the theories are possible explanations of the reasons for the banks promising to pay par on demand. If the explanation based on customers’ demand for liquidity is correct, payment of deposits at par will be promised when banks hold assets that are illiquid in the short run. If the asymmetric-information explanation based on the difficulty of valuing assets is correct, the marketability of banks’ assets determines whether banks promise to pay par. If the legal restrictions explanation of par redemption is correct, banks will not promise to pay par if they are not required to do so.

After the survey of the theoretical literature, we examine the history of banking in several countries in different eras: fourth century Athens, medieval Italy, the Netherlands, Great Britain, the United States and Japan. We have some preliminary conclusions for Athens in antiquity and medieval Italy.

The evidence from antiquity is informative because it is far in time from contemporary practice, even though the evidence is too uncertain to be compelling by itself. Nonetheless, from the viewpoint of the legal restrictions theory, this period is troubling because there is no evidence that banks were required to pay par on demand and there is evidence that they did so. At least for some of their deposits, such a contract was optimal and that optimality is consistent with the asymmetric explanation and probably the liquidity explanation for banks’ promise to pay par on demand.
It is clear that, as early as 1100 A.D., banks in Italy accepted deposits payable on demand and it is clear that they were not required to do so, since they also accepted deposits that could be redeemed only with notice, e.g. fifteen days (de Roover 1974). Hence, legal restrictions appear to be irrelevant. The evidence indicates that the loans made were not the sort that would have a transparent value to depositors, so deposits being payable on demand is consistent with the asymmetric information theory. On the other hand, these banks also accepted deposits redeemable only with notice and these deposits were claims on the same asset pool as were the demand deposits. There is a clear difference in the maturity of the demand deposits and loans such as for foreign exchange, which is consistent with the liquidity theory.

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**INTRODUCTION**

Banks promise to pay the par value of certain liabilities on demand in terms of other assets. This has been a long-standing practice even though it is trivially obvious that, due to gamblers’ ruin, no bank can expect to honor this promise forever with less than 100 percent reserves. Just as significantly, no bank customer can expect it to be honored always either. As time goes to infinity, the probability of violation of this
contract goes to one under rather general assumptions. In addition, the consequences – bank runs – in the United States were not trivial. Given that these things are so, why do banks promise what they cannot deliver forever in the first place?

One possibility is that legal requirements result in this promise and such promises would not occur in a free market. Indeed, some have argued that banks would not make such a promise without legal restrictions.

There are two things to recall in thinking about this agreement between bankers and their customers. The first is that so-called “suspensions of cash payments” were essentially breaches of contract and that breaches of contract, although generally not the most likely outcome, are not particularly uncommon outcomes of contractual agreements either. Indeed, bankruptcy is one way of dealing with breaches of promises to make payments.

The second thing is that banking did not develop in a vacuum and it would be ludicrous to look for banking with no legal system in place. Payment at par on demand is a contract and the enforcement of contracts requires a system of enforcement. A legal system is one such system of enforcement. More, no contract fully specifies the outcome under every possible state of the world. There is neither enough ink nor enough time to fully specify outcomes in a contract under all contingencies – a point due to Coase. Hence, there is little point in looking for historical information about the development of agreements between banks and their customers in a legal vacuum. Some legal specification of the effects of default on the customer and the banker is to be expected. This specification can be part of the common law in countries with this tradition, part of the positive laws enacted by the state or part of rules enforced in some fashion.

It is necessary to have a definition of banking and of “deposits” or bank money to proceed. For the purposes of this paper, a bank is a firm that: 1. accepts “deposits” of assets and issues liabilities in exchange that can be transferred from one person to
another; and 2. redeems these liabilities on demand for at least the amount deposited while holding fractional reserves of the assets deposited. We make no claim that this definition is the best one possible or is as clear as it could be, but it seems to serve our purposes in a way that spans many centuries. Note that, unlike Usher (1934) for example, this definition does not require that banks make loans. Such a definition would beg an important issue – whether making loans is an important part of the explanation of the deposit contract. The requirement that the deposits be transferable does require sufficient generality of transactions that clearing within the firm or clearance across firms, or the issuance of circulating notes is a necessary condition for being a bank. We do not require that deposits be used as a means of payment away from the bank. Many legal systems required that the relevant parties to a transfer of funds appear in person. Given U.S. history, it may seem odd that deposit banking preceded banknotes by a long period, but the development of banknotes in Western Europe had to await the legal development of negotiability (Usher 1934, pp. 284-88; Rogers 1995). Usher dates the first law that allows the bearer of an order for funds to sue in his own name from the 1500s in the Low Countries; Rogers suggests after 1600. In either case, these dates are after the development of most aspects of banking in Western Europe and it would be anachronistic to require that all historical banks either issued banknotes or that they accepted payment orders drawn to specific individuals or to the bearer.

When and where do we observe promises to pay par on demand, or not, and what are likely reasons for this promise? First, we survey the theoretical literature to summarize the relevant theories, their differences and their predictions. It is possible that banks promise to pay par on demand because depositors want this contractual agreement. There are at least two possible reasons for this desire. At many times and places, banks have held largely nonmarketable assets; hence, customers cannot easily assess the assets’ market values. Under these circumstances, deposit values
varying with the value of banks’ assets may not be a feasible market equilibrium and redemption on demand can keep the bank from dissipating the depositors’ wealth by exploiting superior information. Alternatively, depositors may demand a constant par value because this makes their deposit balances more predictable, thereby increasing the liquidity of deposits compared to assets that have a longer maturity (Diamond and Dybvig 1983). An alternative explanation is that banks promise to pay par because they are required to do so (Wallace 1983).

We conclude that the theories can be interpreted as making predictions about the institutions that will promise to pay par on demand. We assume that it is not zero cost to make a promise to redeem a liability at par value on demand. If so, then the antecedent conditions in the theories are possible explanations of the reasons for the banks promising to pay par on demand. If the explanation based on asymmetric information about assets is correct, the marketability of banks’ assets determines whether banks promise to pay par. If the explanation based on customers’ demand for liquidity is correct, payment of deposits at par will be promised even though banks hold assets that are insufficient to redeem the liabilities with payment promised at par. If the legal restrictions explanation of par redemption is correct, banks will not promise to pay par if they are not required to do so.1

After the survey of the theoretical literature, we examine the history of banking in several countries in different eras: fourth century Athens; medieval Italy; Japan; and the United States. This examination focuses on promises to pay par on demand in early banking institutions and the types of assets that the banks held at the time. We have picked these cases to mitigate the sequential dependence of observations. Ancient Rome is derivative of Ancient Athens in many ways. Western European banking development partly reflects experience in Italy, to the point that Lombard

1Wallace (1996) does not mention legal restrictions in his analysis of narrow banking and dismissal of the importance of asymmetric information instead of Diamond and Dybvig’s model.
Street in London has a name based on the Lombardy bankers who set up business there. The United States is considered because free banking on the U.S. frontier has some novel aspects. We examine banking in Japan because it appears to be the country outside Western Europe with the largest literature in English on its banking history. The relatively recent development of money market funds are considered because they have some novel and interesting aspects. Truly independent observations would require examining banking on different planets before intergalactic travel – an impossibility today. We think that, while not independent, the observations in this paper are not completely dependent.

Table 1 summarizes the evidence concerning banking this different times and places. Most obviously, the legal restrictions theory fares poorly. The assets held by free banks were traded on the New York Stock Exchange, so their assets were almost as readily redeemed for cash as were the banks’ deposits. In this case, the explanation of deposits being redeemable on demand is not contradicted because it is unknown whether the banks would have redeemed their notes on demand without being required to do so: they were required to redeem banknotes on demand. Interestingly, both the liquidity explanation and the explanation based on asymmetric information fare equally well for historical banking, but neither appears to be consistent with money market funds.

THEORETICAL EXPLANATIONS FOR THE USE OF DEMAND DEPOSITS

Deposit contracting has been a long standing practice. However, as already mentioned in the introduction, this right to demand withdrawal of claims at any point in time leaves banks vulnerable to bank runs. If these runs at a particular bank spread across banks in the same region or country they may generate a banking panic or domino effect. These financial crises have important economic consequences. Examples of financial crises in the history of the financial systems were the Great Depression
(1929 to 1933) which had a significant impact on the banking system of the U.S. or the more recent crises in emerging countries.²

In general, a bank that takes in short term deposits and invests the proceeds in long term loans exposes itself to many risks: the above mentioned risk that depositors withdraw their funds, the risk that depositors ask for higher interest rates, the risk that borrowers default and that the assets that are used as collateral may be worthless. These risks are correlated with each other and are driven by underlying common macroeconomic factors (see Hellwig 1998).

Given the above observations, it is interesting to understand why banks continue to pay the par value of deposits on demand when they hold only fractional reserves.

The theoretical research on banking has given three types of explanations for the use of such deposit clauses: provision of liquidity, asymmetric information and legal restrictions. The most relevant papers that support each of these views are summarized in the sections that follow.

**Liquidity provision**

One possible explanation for the use of demand deposit contracts is associated with the liquidity insurance service provided by financial intermediaries. Diamond and Dybvig (1983) (hereafter DD), who formalized some of the ideas introduced by Bryant (1980), made a significant contribution by introducing into the model the demand for liquidity and the transformation service provided by banks. They demonstrated that demand deposit contracts, which enable the transformation of illiquid assets into more liquid liabilities, provide a rationale both for the existence of banks and for their vulnerability to runs.

²From 1930 to 1933 the number of bank failures in the US averaged over 2000 per year (Mishkin 1995.) Lindgren, Garcia and Saal (1996) find that 73 per cent of the IMF’s member countries suffered banking crises between 1980 and 1996.
In the simplest formulation, there is a continuum of ex ante identical agents who are risk averse and uncertain about their future time preferences or liquidity needs. These individuals are born with one unit of the good at \( T = 0 \) and no additional endowment in the subsequent periods. They are subject at \( T = 1 \) to privately observed risk, with probability \( p_1 \) of being type 1 (early diers) who derive utility only from consumption in the first period and probability \( 1 - p_1 \) of being type 2 (late diers) who derive utility only from consumption in the second period.\(^3\) There is an investment technology such that a unit investment at \( T = 0 \) yields one unit at \( T = 1 \) and \( R > 1 \) units at \( T = 2 \). In autarky, early diers liquidate their investment at \( T = 1 \) and consume one unit late diers maintain the technology and receive \( R > 1 \) at \( T = 2 \).

DD’s model shows how a financial intermediary can improve ex ante welfare by offering consumers a deposit contract. Suppose that banks operate in a competitive environment; hence, the optimal contract is the one that maximizes the expected utility of the agents subject to a zero profit constraint. This deposit contract provides, for each unit deposited in the intermediary at \( T = 0 \), the option of withdrawing either \( c_1^* \) at \( T = 1 \) or \( c_2^* \) at \( T = 2 \). The intermediary maximizes the ex ante expected utility of agents, \( p_1c_1 + (1 - p_1)c_2 \) subject to resource constraints \( p_1c_1 = L \) and \( (1 - p_1)c_2 = (1 - L)R \), where \( L \) is the amount to be liquidated at date 1. DD show that if the representative agent’s relative risk aversion coefficient is greater than one, the optimal insurance contract satisfies \( 1 < c_1^* < c_2^* < R \), where \( c_2^* = \frac{(1 - f)c_1^*}{1 - f} \) and \( f \) is the proportion of individuals who withdraw in the first period.\(^4\) This contract promises investors a higher payoff for early consumption and a lower payoff for late consumption compared to autarky. Early diers are insured against being early diers in the sense that they receive some of the benefits available from the long term

\(^3\) Although they can privately store the good from \( T = 1 \) to \( T = 2 \).

\(^4\) To pay first period withdrawals, the bank liquidates \( L = p_1c_1^* \) of the investment in the long term technology. If only type 1 depositors withdraw at \( T = 1 \), \( f = p_1 \).
technology.

In trying to implement this optimal allocation, however, the intermediary is subject to a coordination problem because being an early dier is private information and the intermediary therefore cannot guarantee that only type 1 agents withdraw at $T = 1$; in fact, type 2 agents’ withdrawal decisions are strategic and depend on what other agents do. If enough type 2 agents withdraw at $T = 1$, the second period payoff is less than $c_1^*$ and everyone withdraws at $T = 1$, which effectively is a bank run.

In the original Diamond and Dybvig model, there are two Pareto-ordered Nash equilibria: a Pareto dominant equilibrium that achieves socially optimal risk sharing which has only type 1 agents withdrawing at $T = 1$, $f = p_1$, and a second Pareto dominated equilibrium in which all agents withdraw at $T = 1$ and can be interpreted as a bank run. Finally, the model shows that there are several measures to prevent the bank run equilibrium.\(^5\)

In a very simple framework, this seminal contribution captures three important features of real world financial intermediaries, as Gorton and Winton (2002) among others point out. First, individuals are uncertain about their future time preferences, which gives rise to a demand for liquidity. Second, projects are irreversible, or at least costly to restart once stopped. Third, the type of the consumer is private information relative to the financial intermediary.\(^6\) This model implicitly assumes a sequential

\(^5\)In the case in which there is no aggregate uncertainty, a suspension of convertibility policy in which withdrawals up to $p_1$ are allowed would implement the good Nash equilibrium. This policy removes the incentives of type 2 depositors to withdraw early, as independently on what other agents do, they always obtain a higher payoff if they wait until the second period than if they withdraw. However, if there is aggregate uncertainty, this measure may not be so effective, depending on the realized $p_1$. In this case, they advocate for Federal Deposit Insurance (guaranteed by governmental funds) as the effective mechanism that would implement the Pareto dominant equilibrium.

\(^6\)In the model, informational asymmetries are essential in order to explain the superiority of banks over financial markets in the provision of liquidity insurance services. The state of the economy, that is given by the number of individuals who face liquidity needs, is not publicly observable and
service constraint, that is, depositors are treated on a first-come, first-served basis. This last assumption motivates the papers by Wallace (1988, 1990) and has important implications for the discussion that follows.

Despite the importance of this pioneering contribution, there have been several important criticisms. Jacklin (1987) shows that the optimal deposit contract can also be achieved by trading equity. Instead of investing with the intermediary, Jacklin assumes that agents invest their unit of endowment in stock in a firm, which promises a dividend stream of \( L \) units at \( T = 1 \) and \( (1 - L)R \) units at \( T = 2 \), where \( L = p_1c^*_1 \).

A market for ex-dividend shares opens at date 1. Type 1 agents want to trade their ex-dividend shares, \( (1 - L)R \), for additional consumption, \( L \), in period 1. Type 2 agents are indifferent between consuming in either period so they would trade as long as the price of ex-dividend shares, \( I \), is less than \( (1 - L)R \). Consumption for each type 1 individual is then \( c_1 = L + \frac{(1-L)R}{p_1} \) and similarly consumption for a type 2 agent is \( c_2 = LI + R(1 - L) \). Market clearing implies that the the equilibrium price is \( 1 < I = \frac{(1-L)Rp_2}{L(1-p_1)} < R \). This implies that \( c_1 = \frac{L}{p_1} = c^*_1 \) and \( c_2 = \frac{(1-L)R}{1-p_1} = \frac{(1-p_1c^*_1)R}{1-p_1} \), consumption levels identical to those promised by the deposit contract. This result rules out a positive role for a bank or any other financial intermediary in the economy because financial markets and well functioning financial intermediaries are perfect substitutes. Arguably a bank is worse than a financial market because a financial market does not have a possibility of the bad equilibrium of a bank run.\(^7\)

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\(^7\)Recent criticisms of the DD model by Green and Lin (1999, 2000) analyze why banking evolved with uninsured demand deposits. They examine the significance of the simple deposit contract and find that it is critical: confining agents to this type of contract is, in fact, the driving force behind the bank run equilibrium of the model. Green and Lin show that when agents in the Diamond and Dybvig model are allowed to use a broad class of banking contracts, the bank run equilibrium disappears, even in the presence of a sequential service constraint. Their results suggest
In a later paper, Jacklin (1993) extends the DD framework to analyze why banking evolved with uninsured demand deposits. Jacklin does this by comparing demand deposits and equity contracts when there is aggregate uncertainty and some depositors have imperfect information about the banks’ assets. First, there is aggregate uncertainty regarding the proportion of type 1 agents in the population. The fraction $\tilde{t}$ of type 1 depositors can take a value $t_1$ with probability $r$ and $t_2$ with probability $1 - r$. Second, the bank invests in a risky asset that yields a random return $\tilde{R}$. This variable can also take a high value $R_h$ with probability $q$ and a low one $R_l$ with probability $1 - q$. A subset of type 2 depositors $t_2 - t_1$ receives perfect information about the future value of the bank’s assets. The two random variables can have a nonzero correlation with $\alpha_{ij}$ defined as the probability of $t = t_i$ and $R = R_j (i = 1, 2$ and $j = l, h)$ occurring. The paper first considers one source of uncertainty at a time. If there is only aggregate uncertainty about the total number of type 1 agents in the population, it would possible to construct a dividend function $L(t)$ and a price of ex-dividend shares $I(t)$ that would fully reveal the value of $t$ and the social optimum is the market equilibrium. The same result applies if there is a risky technology and no aggregate uncertainty. In these two situations, equity contracts and demand deposit contracts with deposit insurance are equivalent risk sharing instruments. The basic contribution of the paper is to show that unless there is both aggregate uncertainty and bank assets are risky with depositors asymmetrically informed about bank asset quality, then demand deposits and equity contracts can be equivalent risk sharing instruments.

Jacklin’s analysis indicates that the use of demand deposit contracts by banks that the banking system might not be inherently unstable and that economists need to attempt to understand the economic and legal environment that produces the simple deposit contract in the real world. However, in a later paper, Peck and Shell (2003) show that even when banks can write more sophisticated contracts, bank runs are still possible.
requires an explanation encompassing more than just a need for liquidity transformation. Banking evolved with demand deposit contracts because they included a form of protection to uninformed depositors, who would have otherwise been disadvantaged relative to better informed depositors had equity contracts been used instead. The basic message is that \textit{liquidity should be provided using equity contracts when there is little or no potential for asymmetries for information concerning bank asset quality.}  

Hellwig (1994) considers a model similar to DD’s but with a stochastic technology from $T = 1$ to $T = 2$ that can be interpreted as technology-induced interest rate risk. His results show that in this extended framework there would still be no role for a bank.  

In common with DD, the above papers assume that individuals have corner preferences, deriving utility from consumption in either period one or period two. As Jacklin (1987) noted, if individuals exhibit more general preferences, then banks and equity contracts are not equivalent risk sharing instruments. In a framework with no aggregate uncertainty and a risk-free technology, demand deposits provide greater risk sharing than equity shares. This important result depends on the assumption that demand deposits cannot be traded. In particular, Jacklin argues that the financial intermediary described in the previous models can only exist if trading restrictions limit consumers to demand deposit contracts of the DD type.

This highlights the importance of the sequential service constraint and its interpretation.

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8 A very similar result is obtained by Gorton and Pennachi (1990), see subsection on bank liabilities as a medium of exchange, and is also consistent with the asymmetric information view, which is summarized in the next subsection.

9 Samartín (2001) shows that if individuals have more general preferences then demand deposits perform better than equity contracts, provided interest rates are low.

10 Jacklin and Bhattacharya (1988) (see also Alonso 1996) also considered the relative degree of risk sharing provided by traded and non traded contracts in a framework in which bank assets are risky, and individuals (with smooth preferences) are informed about bank asset quality. The basic result is that deposit contracts tend to be better for financing low risk assets.
Wallace (1988, 1990) explicitly incorporates a sequential service constraint in the DD model. This sequential service feature of the deposit contract is motivated by the fact that agents are isolated from each other. Agents demand liquid assets because they are impatient to spend when they have no access to asset markets in which they can sell any asset at its usual price. An important implication of these models is that some form of isolation of agents is needed in order to motivate illiquid banking arrangements. Otherwise, individuals would in general want to participate in a one period credit market which is shown to be inconsistent with illiquid banking.

Haubrich and King (1990) explore the role of financial intermediaries in a framework in which individuals have interior preferences – represented by a CES utility function – and are subject to privately observed income shocks. Production opportunities are characterized by a short term liquid investment technology and a long term illiquid one. Their main conclusion is similar to Jacklin (1987), namely that “demand deposits uniquely provide insurance only if there are restrictions on financial side exchanges, which may be interpreted as exclusivity provisions or regulations on security markets. If these restrictions cannot be implemented, then our environment does not rationalize banks, other institutions can achieve the same real allocations and welfare levels ” (Haubrich and King 1990, p. 362).

Further work in this area has been extended to examine the role of demand deposits when there exists a securities market where agents can meet and trade (Diamond 1997, von Thadden 1998).

Von Thadden (1998) presents a continuous-time version of the DD model in which depositors can continuously adjust their portfolios. There is a continuum of ex ante identical households $a$ in $[0, 1]$ endowed with one unit of the good at $T = 0$, as in DD, but they live from $T = 0$ to $T = 1$ with $T$ in the interval $[0, 1]$. Each household is subject to an exogenous random shock of having to consume at time $T_a$ ($0 < T_a \leq 1$). Each agent has access to the same constant returns to scale technology through which
any amount $x \geq 0$ invested at time $\tau$ yields $xR(t - \tau)$ units if liquidated at time $t$.\textsuperscript{11} In this setting, demand deposits cannot attain the first best allocation. The inability to trade demand deposits in financial markets severely limits liquidity provision by banks. Incentive-compatible deposit contracts are second best mechanisms to provide liquidity. At the optimum, liquidity provision is negatively correlated with the degree of irreversibility of the investment opportunity. In particular, if the investment is completely reversible, the only incentive compatible contract is the autarky allocation.

Diamond (1997) presents a model in which there is limited participation in a secondary market. As in DD, there are three dates and a continuum of identical risk averse consumers endowed with one unit of the consumption good at $t = 0$ who have uncertain corner preferences at $T = 0$ with the resolution of the uncertainty at $T = 1$. A fraction of type 2 depositors, called type 2A depositors, are active in the secondary market for assets at $T = 1$ and the remaining agents – type 2B – do not participate in the secondary market. A depositor can be of type $i$ with probability $p_i$ where $i = 1, 2A, 2B$. The intermediary has two investment technologies: a short term technology that generates $L \leq 1$ units one period ahead for each unit invested, and a long term one that generates a return $R > L$ in period 2 for each unit invested at $T = 0$. If an agent invests in the financial market, the amount invested in one period assets will be greater or equal to $p_1$, the date 1 price of a unit claim on date 2 consumption is less than or equal to $L/R$ and type 1 consumption $(c_{11})$ is less than or equal to $L$.\textsuperscript{12} If an agent invests in the financial intermediary, there is cross-subsidization across types if the $CRRRA > 1$ because type 1 consumption is higher than the short term asset return $(c_{11} > L)$ and type 2B consumption is less than the long term asset return $(c_{22B} < R)$, and the banking system creates more liquidity than secondary

\textsuperscript{11} Investment and liquidation are assumed to be costless. Also, the technology has the irreversibility feature: a sequence of short term investments is strictly inferior to a long term one.

\textsuperscript{12} With limited participation, all the above conditions are satisfied as strict inequalities, and with full participation as equalities.
markets. If $CRRA \leq 1$, then banks increase the liquidity of the market but provide no more liquidity than the market as they set $c_{11} = L$ and $c_{22A} = c_{22B} = R$. The paper delivers the DD result when $p_{2A} = 0$ (no participation) and the Jacklin result when $p_{2B} = 0$ (full participation).\textsuperscript{13}

\textsuperscript{13}Allen and Gale (1997) analyze a different type of intertemporal smoothing role of financial intermediaries in a standard overlapping generations model with two assets, a risky asset that pays a return $\tilde{R}$ at each date and a safe asset which is represented by a storage technology (other attempts to extend the DD framework to an overlapping generation context are Qi 1994, Bhattacharya and Padilla 1996 or Fulghieri and Rovelli 1998. These models do not, however, consider intertemporal smoothing). The random return is assumed to be i.i.d and nonnegative with a positive and finite expectation and variance. In this context, an economy with incomplete financial markets and no intermediaries yields underinvestment in the safe asset. On the other hand, in an economy with financial intermediaries and no financial markets, returns can be smoothed (and the nondiversifiable risk can be eliminated) by accumulating reserves of the safe asset. In this way, there is an ex ante Pareto improvement compared to the previous case. If both financial markets and intermediaries exist, then intermediaries do not provide any improvement over that obtained by investors in financial markets. Holmstrom and Tirole (1998) analyze a different type of liquidity that arises in a framework in which moral hazard limits the effectiveness of transactions between firms with excess liquidity and firms that need liquidity. In this framework, a bank that provides contingent liquidity to those that want it dominates a decentralized market. Kashyap, Rajan and Stein (2002) also focus on the bank as a creator of liquidity. They state that banks engage in two distinct types of activities, deposit-taking and lending. In particular, these institutions issue a product that may enable them to distinguish themselves from other lenders such as insurers or finance companies: loan commitments or credit lines. They idea they develop is that credit lines and demand deposits can then be seen as two different manifestations of the same function: provision of liquidity on demand. There is a complementarity between the two above mentioned sources of withdrawal risk, as they are not perfectly correlated. Once this fact is recognized, it is easy to argue that there may be important synergies in offering both products, namely, the sharing of holding liquid assets. The paper develops a theoretical and empirical case for this particular synergy. Similarly, McAndrews and Roberds (1999) analize an extreme version of this complementary (a strictly offsetting nature of payments). However, in their model, the advantage conferred by the complementary is related to the banks’
In summary, this strand of literature argues that banks offer to pay par on demand in order to provide liquidity insurance services to individuals who are uncertain about their future time preferences in a framework in which investment opportunities are inconsistent with the possible consumption paths of consumers. These depositors demand liquid assets because they are impatient to spend if they have no access to financial markets in which they can sell any asset at its usual price. These papers try to capture the idea that consumers are isolated from each other and they cannot coordinate to go to a security market at the same time and trade. As Wallace (1988) pointed out, the sequential service is an outcome of this isolation assumption. If the trading restriction assumption is dropped from these analyses, the role of banks is severely limited (Jacklin 1987). A common assumption needed in most of these papers is that demand deposits cannot be traded, which implies there are regulatory restrictions that impede banks and active markets to coexist.

It could be argued that if the explanation based on customers’ demand for liquidity is correct, payment of deposits at par will be promised even though banks hold assets that are illiquid in the short run.

**Asymmetric information**

A second type of explanation for the use of demand deposits is provided by Calomiris and Khan (1991) – liquid deposits keep the bank’s portfolio choice in line with depositors’ preferences. Their model has three dates, and the bank has access to an investment technology in which, for each unit invested at $T = 0$, there is a random payoff $\tilde{R}$ at $T = 2$. This variable can take a high value $R_h$ with probability $q$ and a low one $R_l$ with probability $1 - q$. At the final date, and immediately before repayment, the bank can abscond with the funds, reducing the realization of $\tilde{R}$ by $A$. Depositors are risk neutral and can receive an imperfect signal about the realization of $\tilde{R}$ superior ability to enforce debt contracts.
by paying a cost $K$. In this asymmetric information framework, uninsured demand deposit contracts discipline bank managers. Deposit contracts serve this role due to the combination of two characteristics: the “on demand clause” and the sequential service constraint. The demandable nature of the contract motivates some depositors to monitor the bank, while the sequential service constraint discourages free riding by depositors on the monitoring of others.

In a latter paper, Jean-Baptiste (1999) also argues that demand deposits can be incentive mechanisms that induce bankers to make efficient monitoring decisions. The model is close in spirit to the previous one.\footnote{However, as the author points out, this latter model differs from the previous one in several ways: Calomiris and Khan’s argument is independent on whether the bank has one single depositor or a large number of small depositors. Also, the explanation of the sequential service constraint is not completely satisfactory. The free-rider problem could be solved just by introducing a well-defined priority structure in the liability of banks.} There are three dates, the bank has access to an investment technology and can engage in monitoring activities at a cost $K > 0$. If monitoring is effective, which occurs with a certain probability, the technology generates a value $R_h$. Otherwise, the value obtained is $R_l$. Depositors are risk neutral and receive an imperfect, homogenous signal at date 1 about bank quality. In this asymmetric information framework, high monitoring costs result in an equilibrium with equity or long term debt that is inefficient because it does not induce banks to monitor. On the other hand, a demand deposit contract can yield a Pareto superior equilibrium despite the positive probability of inefficient liquidation.\footnote{The results of the paper also suggest that intermediaries that specialize in financing assets for which information is readily available and monitoring costs are low, can themselves be financed with either equity or long-term debt. This conclusion is related with the work of Jacklin (1993) and Gorton and Pennachi (1990).} In this paper, the sequential service constraint is a commitment technology that adds credibility to the threat of liquidation.
Flannery (1994) reaches a similar conclusion: Banks specialize in financing non-marketable, informationally intensive assets and can readily change the composition of their portfolio, which creates a larger moral hazard problem than for non-banking firms. Creditors can form a noisy assessment of bank risk, which implies fair market prices for bank debt and equity. In this setting, short-term debt is employed to control asset substitution moral hazard because changes in bank risk will be promptly reflected in financing costs.

Most recently, Gorton and Huang (2002a, 2002b) also have a model with asymmetric information and demand deposits are an incentive device. They introduce a new ingredient – the industrial organization of the banking system – which is an important determinant of the propensity of the industry to experience banking panics.\(^{16}\)

In summary, this strand of literature argues that banks offer to pay at par as a way to protect uninformed depositors who would be disadvantaged relative to better informed individuals with equity contracts. The deposit is then on demand because its value is not state contingent. In this sense, demand deposit contracts are a discipline device. Bank deposits promise to pay par on demand in order to control the risk taking activities of banks.

This literature suggest that the difficulty of valuing assets and consequent marketability of banks' assets determines whether banks promise to pay at par.

**Legal restrictions**

A third explanation of why banks promise to pay par on demand is provided by the legal restrictions theory (Wallace 1983 and references contained therein) which attempts to explain the coexistence of alternative assets, some of which yield significantly higher yields or returns than others. As Wallace (1983) points out, an

\(^{16}\)Qi (1998) and Diamond and Rajan (2001a, 2001b, 2003) also study the disciplinary effects of liquid deposits in models that abstract from asymmetric information.
example of these paradoxical pattern of returns among assets is the coexistence of U.S. currency and default-free interest bearing securities (such as U.S. savings bonds and Treasury bills). If both deposits and Treasury securities are perfect substitutes, no agent would hold non-interest bearing currency instead of Treasury bills. This coexistence can only be explained by the fact that there must be legal restrictions on the latter securities, which prevent them from playing the same role in transactions as the former ones. Absent legal restrictions, if both assets were allowed to coexist without any legal restrictions, the prediction is that either nominal interest rates go to zero or government currency becomes worthless.\textsuperscript{17}

In summary, Wallace argues that banks promise to pay par on demand because of legal restrictions which prohibit other securities from playing the same role as demand deposits. If the legal restriction explanation of par redemption is correct, banks will not promise to pay par if they are not required to do so.\textsuperscript{18}

**Bank liabilities as a medium of exchange**

Other models have been built based on the observation that bank liabilities function as a medium of exchange (e.g. Freeman 1996a, 1996b, Green 1997, Williamson 1992 and McAndrews and Roberds 1999). In general, these papers consider a framework

\textsuperscript{17}White (1987) argues that a counterexample to the above theory can be found in the Scottish free banking system from 1716-1844 in which non-interest yielding currency and interest-bearing securities coexisted. He provides a critique to the above assertion by suggesting that the liquidity services or nonpecuniary yield associated with currency are important in addition the pecuniary return and risk. He argues that if technological and computation costs are appropriately considered, interest might not be worth collecting on at least smaller denominations of currency. Hence, non-interest bearing currency would still survive in the absence of legal restrictions.

\textsuperscript{18}The legal restriction theory simply overlooks the costs involved in collecting interest on money. In this respect, the only cost they recognize is a cost to intermediation, which converts large interest bearing assets into smaller liabilities.
where agents are either spatially separated and so they cannot contract and trade with each other due to their inability to meet at a single location, or there are frictions such as a problem of contract enforcement or adverse selection.

In these models banks issue private money to facilitate their role in clearing transactions. One issue that arises is the pricing of these bank notes: if some agents are better informed about the probability of a bank failure, they may be able to gain when trading bank liabilities. An important characteristic of a medium of exchange may be that it entails little or no risk, that is, its value does not depend on the likelihood of the bank failing.

A very similar result is obtained by Gorton and Pennachi (1990) in a somewhat different framework in which individuals are risk neutral, and so the demand deposit insurance contract is not explicitly modelled. They argue that financial intermediaries create liquid deposits in response to uninformed depositors. They define a liquid security as one that entails no private information and model the proposition that trading in liquid securities (as deposit contracts) protects uninformed depositors from losses that they would otherwise suffer if they traded illiquid – information-sensitive – securities with informed individuals. Therefore, financial intermediaries’ debt should be used for transaction purposes.

However, it should be mentioned that demand deposit contracts are not the unique solution for creating liquid securities, and therefore protect uninformed agents. Other risk-free instruments, such as government bonds or high grade corporate debt may accomplish the same role.

Finally, a summary of the three strands of literature and its basic assumptions is provided in Appendix A.
EVIDENCE

This analysis implies that there are certain crucial questions to be asked in our summary of banking histories. Did one or more institutions accept deposits and promise to pay their par value on demand? If so, what was the organizational and legal setup? In particular, was there a legal requirement that the banks make nothing less than payment of amount deposited? In addition what assets did the banks hold? Was there a maturity mismatch between their assets and liabilities? Did a large fraction or all of the assets held by the banks have an idiosyncratic component that would be consistent with asymmetric information?

Athens, Fourth Century B.C.

Despite the difficulty of determining events millennia ago, certain aspects of banks’ operations in ancient Athens and Rome are both quite clear and quite pertinent for evaluating banking theories. Much is generally agreed upon by scholars, even though there is, of course, uncertainty about details and controversy about many things. We indicate where those disagreements affect our conclusions. The discussion in Andreau (1999) indicates that, other than the type of loans made, much of the analysis would carry over to ancient Rome.

There is sparse evidence on how important banks were in Athens’ economy in the fourth century B.C. (Thompson 1988, p. 829). The sources of much of the surviving evidence provides some indication of the reliability and possible biases in the information that is available. Millett’s analysis is based on the evidence from the Attic Orators’s speeches – “published versions of their commissioned speeches that are the essential source of evidence about Athenian credit relations.” (Millett 1991, p. 2); Cohen’s analysis is based is based on the evidence from court cases (Cohen
Banks were unincorporated enterprises that were moneychangers before becoming full-fledged banks. Banks were known as *trapezitai*, related to the root *trapeza* which means “table”, because of their origin as moneychangers at tables in marketplaces. Banks generally were sole proprietorships, with some possibly being partnerships. A banker was liable for deposits up to the value of all of the banker’s assets. There is no evidence of regulations that applied to banks’ operations other than the general set of laws applied to commercial activities. Bankers operated their businesses at tables in the marketplace. At these tables, bankers provided currency exchange, they accepted deposits of both money and other assets, and they made loans. Noncitizen residents probably were the most common bankers. While noncitizen traders may have been the most common depositors, they were not the only depositors.

The evidence seems to be clear that banks were liable for the initial value of all assets deposited with them. Deposits in banks could be transferred to others, but there were no banknotes or checks: instruments for the which underlying legal foundation had not been laid. Transfers could be effected only by physically going to the bank. Some comments about foreign traders suggest that the depositor did not have to be present to effect a transfer, but the recipient of the transfer apparently had to be present.

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19 The discussion in this section of the paper largely relies on Thompson (1979, 1983, 1988), Millett (1991) and Cohen (1992). The contentious issue in the literature is whether loans were for “productive” or “unproductive” purposes. If mapped into commercial and consumption loans, this discussion makes some sense even if the reason for the discussion – whether Athen’s economy was “primitive” – is irrelevant to our analysis. More generally, the issue is whether loans were impersonal transactions or loans generally were made to people with whom the banker had some personal relationship, with Cohen supporting impersonal transactions and Millett supporting personal transactions.

20 Millett (1991, p. 206) says that this proposition has long been accepted. Cohen (1992, p. 145, fn. 146) asserts that there is evidence for noncitizens being bankers but presents no evidence that virtually all bankers were noncitizens.
Nonetheless, the order to make the transfer would be made in person.\textsuperscript{21}

In some cases, but not all, depositors were paid interest.\textsuperscript{22} The literature agrees that banks paid interest on deposits.\textsuperscript{23} There does not appear to be enough evidence to distinguish the circumstances under which deposits paid interest or did not pay interest. Perhaps no general rule would be very adequate, because the banks were essentially unregulated, and the number of observations seems to be quite small.

Bankers made quite risky loans. Millett (1991, pp. 206-17) claims, generally loans to noncitizens. In ancient Athens, these risky loans included real estate loans, consumption loans and commercial loans, perhaps maritime loans (Cohen 1992, pp. 36-40). Real estate loans were loans collateralized by real estate. Maritime loans are loans to provide funds for items included as cargo on ships in trade. There are perhaps a prime example of a loan with asymmetric information and certainly one with substantial risk. As a result, these loans generally were over-collateralized. These loans were quite risky because they were loans to provide funds for items included as cargo on passages. The safety of passage was in doubt, of course, and the risk of loss was magnified by common provisions of maritime loans – the loss of the cargo could mean that the borrower owed no interest or principal. If the cargo failed to generate sufficient revenue to pay off the loan, other collateral was at least sometimes available (Andreau 1999, pp. 54-56.) Even so, whether banks made maritime loans is controversial (Cohen 1992, pp. 121-83.)\textsuperscript{24} Unless tied to term deposits, maritime

\textsuperscript{21} There are some suggestions that banks provide payments at distant locations, although Millett (1991) and Cohen (1992, Chapter 5) disagree in the predictable way.

\textsuperscript{22} All of the sources agree on this point.

\textsuperscript{23} Thompson (1979, p. 228) and Millett (1991, pp. 203-306) argue that banks did not pay interest on deposits but only on “loans” to the bank. Unless some other contractual term besides interest is different, though, there is no real difference between a deposit in a bank and a loan to a bank, and there is no evidence of other differences in contractual terms.

\textsuperscript{24} Nonpayment in the case of loss of the collateral at sea is a common provision of loans on cargoes. This provision can be interpreted as a defining characteristic of maritime loans (Millett 1983, p. 36),
loans would be a dramatic maturity mismatch between loans and deposits, although there is no evidence to distinguish whether or not banks used their everyday deposits to finance maritime loans. The evidence indicates that banks solicited funds specifically to finance maritime loans in addition to using deposits, the banker’s own funds and participating in loan syndicates (Cohen 1992, p. 142). Nonetheless, at least sometimes bankers were involved in making loans to finance maritime trade, quite possibly on the basis of maritime loans.

In ancient Rome in the second century B.C., the loans made by banks were uncollateralized loans at auctions – both auctions due to pay debts and estate auctions. (Andreau 1999, pp. 39-40.) Deposits were legally distinguished between those which were to be returned intact – e.g., the actual coins deposited – which were sealed deposits and called “regular deposits” and non-sealed deposits (Andreau 1999, pp. 40-41). Some deposits paid interest; some not. While it is hard to imagine that a banker paid interest on sealed deposits, and more likely charged for the safekeeping, there seems to be no clear consensus (Andreau 1999, p. 42.) Short-term loans (Andreau 1999, p. 44.) There is no evidence that bankers made bottomry loans out of bank assets, although the evidence does indicate that they were involved in receiving payments and storing contracts and as “intermediaries” (Andreau 1999, p. 56.) By the second century BC, banks had at least some accounts at other banks and transfers were made from one bank to another but there is no evidence of institutions designed to facilitate such transfers (Andreau 1999, p. 58.)

We interpret the overall evidence as consistent with fractional reserve banking. Absent enough information to create balance sheets, it is not entirely definite whether banks generally had fractional reserves, but there is no evidence that bankers only made loans with their own capital, and it is hard to imagine how the bankers kept one hundred percent reserves and engaged in the other activities attributed to them. although we have not defined maritime loans this way.
Furthermore, there appears to be no evidence that banks holding fractional reserves would have been engaging in a fraudulent activity.

There is evidence that redemption at less than par was regarded as default and that banks had deposits that appear to have been redeemable on demand. There is not enough evidence to determine whether there were runs on individual banks. Is there any evidence of runs on most or all of the banks – a banking panic – which might ensue from banks promising to pay par on demand and which would provide further evidence of the arrangements themselves? Some have suggested that one or more banking panics occurred (Cohen 1992, pp. 215-24), although the evidence presented is not compelling. Given that at least some of the loans made were quite risky and the suggestive evidence of fractional reserves, the evidence also is consistent with such debt being an optimal contract because of state-verification issues.

Evidence from antiquity is informative because it is far in time from contemporary practice, even though the evidence from antiquity is too uncertain to be compelling by itself. Nonetheless, from the viewpoint of the legal restrictions theory, this period is troubling because there is no evidence that banks were required to pay par on demand and there is evidence that they did so. At least for some of their deposits, such a contract was optimal and that optimality is consistent with the asymmetric explanation and probably the liquidity explanation for banks’ promise to pay par on demand. We interpret the overall evidence as consistent with fractional reserve banking. Absent enough information to create balance sheets, it is not entirely definite whether banks generally had fractional reserves, but there is no evidence that bankers only made loans with their own capital, and it is hard to imagine how the bankers kept one hundred percent reserves and engaged in the other activities attributed to them. Furthermore, there appears to be no evidence that banks holding fractional reserves would have been engaging in a fraudulent activity.
Italy

Medieval banks in Italy and to a lesser degree Spain are the first banking systems after the fall of the Roman Empire about which we have any information. There are differing opinions, perhaps due to later research but as likely due to different judgements. In a summary of medieval banking published in 1943, Usher (1943, pp. 9-12) claims that banks’ obligation to redeem deposits at par on demand dates to Roman law, and under Roman law,

[a] depository was required to return the identical articles upon demand, unless there was some specific agreement to return an equivalent....

These agreements were treated by the classical jurists as real contracts; the obligation to repay was created by the receipts of money by the banker, but a formal promise was ordinarily given.

The earliest medieval laws on banking made one addition: they gave bankers’ books special status for establishing obligations and payments if the banker periodically swore that his books were faithful records of transactions.

There is little doubt that banks had not existed in any recognizable form from the fall of the Roman Empire about 500 A.D. until the eleventh century when they reappeared in Italy. On the other hand, it is plausible and the evidence is consistent with a supposition that the development of banks’ functions in Italy was determined more by opportunities than by legal doctrines developed in the earlier Roman Empire.25

There appear to be two stages of banking in this period. The first was banking operated by private individuals and the second was by firms organized and operated as agencies of city governments. From the standpoint of understanding what banks

25 Lopez’s discussion (1979, pp. 1-3) is consistent with this view.
promised and why, the first period is of more interest.\footnote{26}{The fact that governments operated banks after private banking may tell us something about banking.}

How did banking develop in Italy? Banks in Italy flourished during the commercial revolution from 1200 to 1500 and then went into decline with the cities of Italy. Money changers again were the firms from which banks generally developed.

Genoa in the twelfth century is the first known set of banks in this period with records available (Lopez 1979, p. 10), which in Genoa are notarial records. The banks had both demand and time deposits, and the funds in these banks were used to make local and international payments (de Roover 1974; Lopez 1979).\footnote{27}{An interesting side issue here is that the accounts were denominated in terms of a money of account, sometimes called “imaginary money.” Usher (1943, pp. 201-205) suggests that the general explanation for a money of account different than the circulating money was the reduction of what would be denominational chaos to simplicity for bookkeeping purposes. As Spufford indicates by various examples, the use of a money of account different than circulating money was an almost inevitable result of the large number of different denominations of coins that circulated. After considering a series of examples, Spufford (1988, pp. 411-14) concludes that “it may be taken as axiomatic that on closer inspection an historical explanation may be found for the existence of each money of account, and that such an historical explanation will indicate to which real coin the system continued to be attached.” In other words, the use of a different money of account provides no evidence of nonpar redemption.}

Public banks of deposit were established in Barcelona in 1401 and in Valencia in 1407. There were fiscal agents of the governments. The Bank of Venice, established in 1587, was an early public bank. The Bank of the Rialto (1587) and the Giro Bank (1619) were giro (that is, transfer) banks in Venice. The Bank of St. George engaged in a banking business from 1407 to 1445 and after 1586 (Usher 1934, p. 272.)
Bankers cleared against each other by keeping accounts with each other (de Roover 1974; Usher 1934, p. 279.)

It is clear that, as early as 1100 A.D., banks accepted deposits payable on demand and it is clear that they were not required to do so, since they also accepted deposits that could be redeemed only with notice, e.g. fifteen days (de Roover 1974). Hence, legal restrictions appear to be irrelevant. The evidence indicates that the loans made were not the sort that would have a transparent value to depositors, so deposits being payable on demand is consistent with the asymmetric information theory. On the other hand, these banks also accepted deposits redeemable only with notice and these deposits were claims on the same asset pool as were the demand deposits. There is a clear difference in the maturity of the demand deposits and loans such as for foreign exchange, which is consistent with the liquidity theory.

Japan

Japan has a very different development that is to some extent isolated from Western Europe in the Tokugawa period from 1603 to 1867-69. By decree in 1639, Japan was closed to most foreign trade and foreigners were restricted to a small part of Japan in the Tokugawa period. Japanese were forbidden to travel to other lands and communication was cut off. This period of “seclusion” ended with the arrival of Commodore Perry to force the beginning of trade with the United States in 1853.28

Many practices easily recognizable as banking developed in Japan in the Tokugawa period. In fact, Japan had a developed financial system in Osaka – the major commercial center – and Edo – the major administrative center, later renamed Tokyo – by the late 1600s. The available evidence indicates that lenders in the country evolved into financial intermediaries that accepted deposits and made loans by the 1800s. Prior to the Tokugawa period, lenders were not banks and instead generally lent their own

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funds, in most respect being similar to pawnshops.\textsuperscript{29} While the period after the end of the Tokugawa period in 1867 to 1868 is one of substantial development of banking in Japan, the institutions were in large part intentional copies of those in the United States and Germany.\textsuperscript{30}

Japan had a unified national coinage after the 1630s. The accounts of banks in Osaka – the major commercial center – were kept in silver and the accounts of banks in Edo were kept in gold. As a result, a well functioning market for exchanging gold and silver developed. The major coins used were gold and copper.\textsuperscript{31}

Firms in Osaka that accepted deposits and issued receipts that passed as money evolved from money-changers into banks by the latter half of the 1600s. These firms are known as ryogae.\textsuperscript{32} Wholesale merchants and financiers of local daimyo (local lords) were involved in loans related to their original businesses. The money changers, though, were directly involved in the original issues of notes, possibly as early as 1640

\textsuperscript{29} The Tokugawa period itself is interesting because it had some of the characteristics of a command economy well before the command economies of the twentieth century and was developing characteristics of a market economy over time (Crawcour 1989; Iwahashi 2004.)

\textsuperscript{30} Gay (2001) discusses the earlier incarnation of banks which operated analogously to pawnshops.


Soyeda (1896) and Tamaki (1995) are two general histories of Japanese banking that are primarily histories of banking after the Meiji restoration in 1868. Early chapters summarize banking in the Tokugawa period (Soyeda 1896, Ch. 1; Tamaki 1995, Ch. 1.)

Toby (2004) presents a very informative and readable account of the business activities of a country banker in the eighteenth and nineteenth centuries.

\textsuperscript{31} For this description of the Japanese monetary system, we have relied on Crawcour (1961) and Crawcour and Yamamura (1970.) As Crawcour notes (1961, p. 346, fn. 18), the use of a money of account that is seldom used in transactions and physical monies denominated differently is not substantially different than that in Europe (Spufford 1988, pp. 411-14.)

\textsuperscript{32} The ryo was a counting unit of gold coin.
to the 1660s, with deposit receipts circulating with interest not paid on deposits even though interest was charged on loans. These institutions, which were not corporations in the sense of English or American law, were numerous. In the 1850s, more than 1300 operated in Osaka and more than 750 operated in Edo.\footnote{33 Crawcour (1961) and Tamika (1995, Ch.1) are the primary references for this paragraph.}

Bankers issued both bills that paid interest and passed from hand to hand, being endorsed at each step, as well as notes that paid no interest and were not endorsed at each step. The evidence is clear that banks issued two particularly interesting instruments: the ryogae’s note and the depositor’s order.\footnote{34 Crawcour (1961) calls these instruments “deposit notes” and “withdrawal notes” instead of “ryogae’s notes” and “depositor’s notes” as in Tamaki (1995), but the descriptions of the characteristics are the same.} The ryogae’s note was a receipt for deposits promising to pay that amount on demand or, alternatively, with notice. A depositor could obtain these notes in desired denominations that passed from hand to hand. If the bank had insufficient funds upon attempted redemption, a holder’s only recourse was to the bank. The depositor’s order was a liability of the bank. Deposits also were the basis of “withdrawal notes” which were similar to checks except that they were negotiable. Each holder signed the withdrawal note when using it to pay for something until the note was returned to the bank. If the deposit account failed to have sufficient funds when returned to the bank, the holder’s recourse was to the previous holders, presumably sequentially. If the bank failed to honor the note because of its own difficulties, the only recourse was to the bank. These notes could be for more than value of deposit, but they might not be honored on demand. (Crawcour 1961, pp. 352-53; Soyeda 1896, pp. 412-13; Tamaki 1995, pp. 6-7.)

Banks held fractional reserves. While there is no clear evidence on the aggregate reserve ratio, some evidence suggests figures on the order of reserves one quarter of deposits. Late in the Tokugawa period, reserves only one-sixth or one-seventh are
A group of ten money changers in Osaka known as the “Ten Money Changers” exercised supervisory control over other bankers in Osaka, taking some of the functions of a central bank, although the government’s organization of a controlling group for a trade was used in other lines of business also. Reserves were held in other successively larger banks and used as clearing balances.  

The banks’ assets were loans to private agents, loans related to government remittances and direct loans to local governments. Some banks developed from wholesalers and provided book credit, later providing credit in the form of negotiable bills.

We have found no evidence that there was a legal requirement that banks redeem notes at par, and it is unlikely that there is any such evidence. The political system in the Tokugawa period included a shogun — military governor — of Japan in combination with subordinate territorial lords who ruled the country. The legal system was relatively undeveloped and civil law consisted of proclamations combined with customary law. With rare exceptions, civil disputes in the Tokugawa period were resolved by the disputants, possibly with outside, but not governmental, assistance.

**United States**

A first thought would be that banking in the United States is unlikely to be of much interest for this study because U.S. banking largely is a carryover of British

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35 Tamaki (1995, p. 6) suggests this figure for Osaka banks and Toby (2004) suggests this figure for a country banker with surviving records. Crawcour (1961, p. 356) suggests reserves for Osaka banks on the order of one-third deposits early in the Tokugawa period but possibly a ratio as low as one-sixth or one-seventh at the end of the period.

36 See Crawcour (1961, pp. 353-54), Soyeda (1896, p. 412) and Tamaki (1995, pp. 7-8.)


38 Glenn (2000, Ch. 9) discusses legal systems in Asia, primarily with an emphasis on China. Henderson (1968) and Oda (1999, Ch. 2) discuss the general framework of Tokugawa law.
institutions. Such a conclusion is quite wrong. Institutions do not appear to have been carried over from Great Britain without thought to the different circumstances, although it probably is fair to say that the common law carried over from Great Britain made those institutions the default ones. In fact, some states in the ante-bellum period prohibited banks altogether while others had quite different banking systems.

**Free Banking.**

Free banking systems in the 1840s in the United States invariably involved three things (Dwyer 1996). First, banks were required by law to redeem their notes at their face values. Secondly, banks held little besides government securities traded — called “government stocks” in this period — on the New York Stock Exchange. Hence, this banking system does not contradict the legal requirement explanation. At first glance, the requirement that banks redeem notes at par seems redundant from the viewpoint of the asymmetric information theory, but a sufficient explanation based on a small elaboration of the asymmetric information theory may be the nontrivial cost of acquiring information about securities’ values in this period and the positive value to a standard contract behind circulating notes.

**Money Market Funds.**

Removed in time and circumstances by 150 years, twentieth-century money market funds in the United States provide an interesting example of firms that seem to contradict all of the theories about why issuers of monetary liabilities redeemable on demand at par make that promise. Money market funds are redeemable by check on demand. Even so, money market funds are not required by law to redeem their

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39 The legal requirement of par redemption generally appears to have followed the restriction of payments at the end of the 1830s. Nonetheless, banks may have promised par redemption before this.
liabilities at anything other than market value (SEC 2003). On the other hand, money market funds have gone to substantial effort to avoid the par value of their liabilities falling below the initial value of a dollar.

In 2002 when interest rates on assets held by money market funds fell below expense rates, money market funds reduced the expenses charged to investors in the funds to avoid having the value of the funds “bust the buck” (Damato 2002a). As of 2003, only one money market fund is known to have fallen below the dollar redemption value, a money market fund called Community Bankers U.S. Government Money-Market Fund that failed in 1996 and paid 94 cents on the dollar.40 In short, only one failed money market fund has ever had a net asset value less than a dollar. While other money market funds have closed in circumstances that would be consistent with a net asset value less than a dollar, the parent firm has put in funds to make up the difference. Such behavior is, of course, consistent with the fund family maintaining its reputation and does not necessarily imply that the costs would have been borne by the money market fund itself.

Moreover, no continuing money market fund has ever had a net asset value less than a dollar. Perhaps they just hold sufficiently short-term assets that capital losses never have exceeded interest receipts? No. Stigum (1983, p. 676-77) suggests that the accounting treatment of funds’ gains and losses was initially up in the air, with the SEC letting funds use one of the various alternatives suggested by the funds.

More convincingly about funds bearing costs to keep a net asset value of a dollar, increases in market interest rates have at time been consistent with the net asset value falling below a dollar. Rather than recognize the capital loss though, money

40Some variable annuity accounts with money market sub-accounts fell below the par value of $1 due to annuity fees (Damato 2002b). This point is not in the original but is available at the end of the online version of the article by Damato in a section “Corrections and Amplifications” updated on November 8, 2002.
market funds recognize the loss over time by paying a lower interest rate. This implies that the money market funds’ interest rates are less than the interest rates on the money market instruments that they hold. These lower interest rates are associated with runoffs of investments in the funds by larger investors who have the option of holding money market instruments directly. Such predictable runoffs imply a loss to the other investors as some investors cash out at an artificially high value and losses to the management firm because they are managing a smaller asset base. In at least one case, Salomon Brothers purchased securities from a subsidiary institutional money market fund at inflated prices to prevent a progressive collapse due to withdrawals (Stigum 1983, pp. 676-79).41

Why does this matter? This matters because there is no doubt that deposits in money market funds are transferable by check; they are banks by our definition. There is no doubt that money market funds are not required to maintain a net asset value of a dollar, which means that the legal restriction theory is irrelevant. There also is no doubt that money market funds hold marketable assets with prices available at virtually zero cost, which means that the costly state-verification theory is irrelevant. Does this mean that the remaining theory – the liquidity provision explanation – is the correct one? Unfortunately for that theory, a maturity mismatch between assets and liabilities is crucial. While the assets held by money market funds are longer maturity than the liabilities, the assets held by money market funds that specialize in government securities are readily marketable at a moment’s notice.

CONCLUSION

Conclusion here.

41 Furthermore, there is one incident, and possibly more, in which money market funds contributed funds to non-affiliated firms. Have to find references.
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SUMMARY OF THE THEORETICAL LITERATURE

1. Liquidity provision

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<td>AU RA</td>
<td>Jacklin (1993)</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Main assumption: Trading restrictions

<table>
<thead>
<tr>
<th>ASSUMPTIONS</th>
<th>CORNER PREFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAU NRA</td>
<td>Diamond (1997) (limited participation)</td>
</tr>
<tr>
<td>NAU NRA Cont.time</td>
<td>Von Thadden (1998) (full participation)</td>
</tr>
</tbody>
</table>

Table 2. Main assumption: No trading restrictions

NAU: No Aggregate Uncertainty; NRA: No Risky Assets; AU: Aggregate Uncertainty; RA: Risky Assets; IRR: Interest Rate Risk; OLG: Overlapping Generations

Basic results:

• Corner preferences:

  Jacklin (1987) shows that in the DD context (corner preferences, NAU, NRA) demand deposits and equity contracts are equivalent risk sharing
instruments. Hellwig (1994) obtains the same result. With aggregate uncertainty and risky assets, Jacklin (1993) shows demand deposits perform better than equity. The basic point is that they not only provide liquidity insurance service but are issued to protect uninformed depositors. The same result is obtained in a different context in Gorton and Pennachi (1990) and in Jean-Baptiste (1999).

Allen and Gale (1997) show that financial intermediaries provide better intertemporal smoothing by offering a deposit contract. However, they cannot coexist with financial markets.

- Smooth preferences

If there is no aggregate uncertainty and no risky assets Jacklin (1987) and Haubrich and King (1990) show that demand deposits perform better than equity contracts. With no aggregate uncertainty and risky assets, demand deposits are better to finance low risk assets (Jacklin and Bhattacharya 1988 and Alonso 1996). With interest rate risk, demand deposits perform better if interest rates are low (Samartín 2001).

- If there is limited participation Diamond (1997), shows that financial intermediaries are able to provide more liquidity than financial markets (when depositors have \( CRR > 1 \)). With full participation, liquidity provision is negatively correlated with the degree of irreversibility of the long term technology (Von Thadden 1998).

2. Asymmetric information

3. Legal restrictions


Main assumption: Legal restrictions.
Table 1
Summary of Evidence

<table>
<thead>
<tr>
<th>Time and Area</th>
<th>Pay Par on Demand</th>
<th>Fractional Reserves</th>
<th>Negotiable</th>
<th>Assets not Liquid on Demand</th>
<th>Asymmetric Information</th>
<th>Legal Restriction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ancient Greece</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Medieval Italy</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Tokugaw Japan</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>U.S. free banking</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>U.S. money market funds</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

This table summarizes the characteristics of banking in the times and places examined. The theories are attempting to explain why the banks paid par on demand while holding fractional reserves; hence they are necessary for the episodes to be informative about the theories. negotiability – which means that the order to pay can be transferred to another – is a characteristic of notes that can exchanged or of bills of exchange, but not of checks as used in the United States today. “Asymmetric information” is a theoretical term based on what agents know, but is used as a summary column title to denote assets that do not have prices readily available on a reasonably continuous basis. “Legal restriction” summarizes whether the institutions were required by statutory law to redeem some deposits on demand at par.