Banking Under the Gold Standard: An Analysis of Liquidity Management in the Leading Financial Centers
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THE ISSUES

THIS paper analyzes the portfolio management policies of the major banks in New York, London, and Paris over nearly two decades during the prime years of the gold standard. These years provide unique evidence on the relationship between the policies of central banks and the behavior of commercial banks. Under the gold standard the world's financial centers were, to a degree at least, unified by the free movement of money and credit across international borders. Even so, each financial center was characterized by a different history and a different institutional environment, and as a result, the respective banking firms developed different approaches to portfolio management. In short, although strong pressures existed to enforce conformity in behavior, a foundation existed upon which distinct managerial decision rules were constructed.

In New York banks operated without the benefit of support from a central bank. They faced periods of stress with their own resources or the resources mustered through cooperative action.[1] By contrast, in Paris banks relied on the Bank of France, which was always well stocked with specie and willing to support commercial banks in time of need. Indeed, on occasion the Bank of France helped out in New

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1 To some extent the banks in New York City acted as a central bank for the rest of the country, and the U.S. Treasury also performed central banking functions. On the Treasury as central bank see Esther Rogoff Taus, *Central Banking Functions of the U.S. Treasury, 1789-1941* (New York, 1943). For a discussion of cooperative activities of American commercial banks see Fritz Redlich, *The Molding of American Banking: Men and Ideas* (New York, 1968 reprint), Vol. II, ch. xx.

York and London as well.[2] Apparently the Bank of England did not move with the decisiveness of the Bank of France.

Because London was the center of the gold standard world, the policy of the Bank of England naturally requires further attention. In the years after 1890 Bank Rate policy reached its pinnacle.[3] The Bank attempted to protect its reserve by resorting frequently to increases in its discount rate, a policy that allegedly had two effects. Initially, gold flowed into London because interest rates were higher there than elsewhere. When the Bank of France followed suit, as it usually did, this effect would subside. The tight credit policy would then lead to a general decline in world economic activity, however, that, in turn, would produce an abatement of the pressure on the Bank of England's reserve.[4] Reliance on frequent changes in Bank Rate thus permitted the Bank of England to operate with a smaller base of gold reserves than other central banks.

The policy was not without its critics. Many argued that a larger reserve, hence fewer changes in the discount rate, would have been better for the economic system as a whole, and commercial banks in particular, if not for the Bank.[5] The demand that the Bank of England hold greater reserves can be traced to Bagehot's *Lombard Street.* Bagehot hammered away at the theme that the Bank was the sole holder of the gold reserve in England and was the focal point of the world market for gold. It was therefore imperative, in Bagehot's view, that the Bank hold a large reserve in order to avert panic and cushion the system against sudden large drains of gold.[6]

[2] The international character of the Bank of France's support function has been pointed out by a number of writers. See J. S. G. Wilson, *French Banking Structure and Credit Policy* (Cambridge, Mass., 1957), pp. 277-278; Robert J. Lemoine, "The Banking System of France," in *Foreign Banking Systems*, ed. H. Parker Willis and B. H. Beckhart (New York, 1929), pp. 558-563; Andre Liesse, *Evolution of Credit and Banks in France,* U.S. Senate Document No. 522 (Washington, 1909), pp. 187-192. Of course, while the accumulation of specie facilitated stabilization policies, the blessing was not unmixed. Specie reserves of the Bank of France supported a money supply of 15.4 billion francs (40 percent of which was also specie) in 1900, a ratio of 1:4.8. The corresponding ratio in England was 1:23.5. As has been pointed out elsewhere for an earlier time, this surely implied greater real resource costs for France. See Rondo Cameron, "France (1800-1870)," in Rondo Cameron *et al.*, *Banking in the Early Stages of Industrialization* (New York and London, 1967), pp. 115-121, 128.

[3] R. S. Sayers, *Central Banking After Bagehot* (London, 1957), ch. ii.

[4] R. G. Hawtrey, *A Century of Bank Rate* (London, 1938), passim.

[5] C. A. E. Goodhart, *The Business of Banking, 1891-1914* (London, 1972), pp. 101-102.

[6] Walter Bagehot, *Lombard Street* (Homewood, Illinois, 1962 reprint). (*Lombard Street* was originally published in 1873.)

That the Bank did not adopt Bagehot's suggestion was due, perhaps, to the fact that the Bank of England was a successful profit-making business as well as a central bank.

All of this means that in Great Britain as in the United States, though possibly to a lesser extent, the responsibility for preserving the soundness of the financial system and, by implication, the gold standard itself, fell on the great commercial banks in the center of financial activity. In France the major commercial banks were shielded from monetary disturbances by the reserve of the Bank of France. The question is whether this umbrella provided a safe haven for aggressive, innovative portfolio management on the part of the Paris banks, or merely resulted in a complacent attitude with respect to portfolio management.

An index of bank liquidity preference, the mean proportion of liquid assets held in bank portfolios in New York, London, and Paris, is presented in Table 1. The denominator of the ratio is total portfolio

TABLE 1
LIQUIDITY RATIOS IN THE FINANCIAL CENTERS
1890-1907

Year	*New York*	*London*	*Paris*
1890	12.59	n.a.	7.50
1891	10.39	n.a.	8.45
1892	10.36	12.38	8.26
1893	19.58	12.66	8.13
1894	16.77	12.35	8.72
1895	7.50	12.46	10.20
1896	10.99	12.13	8.47
1897	8.78	12.61	7.78
1898	6.80	12.88	8.64
1899	7.66	12.77	7.64
1900	8.45	13.94	8.14
1901	10.53	14.32	7.99
1902	11.04	15.13	7.18
1903	9.12	14.82	6.50
1904	8.60	14.71	6.59
1905	n.a.	14.67	7.73
1906	n.a.	14.13	6.69
1907	n.a.	13.45	6.25

Source: See the Appendix for sources and computational procedures.

assets (total assets less banking house, real estate and sundry assets). The numerator is usable liquid assets (net of required reserves in New York). There are important disparities among these ratios. The London ratio is always higher than the Paris ratio and generally higher than the New York ratio. Thus, the table provides a prima facie case that the Bank of England's policy imposed a cost on the London banks and that the Paris banks developed aggressive liquidity minimizing policies with the support of the Bank of France. Of course such crude comparisons prove little. The London ratio might have been higher for a variety of reasons having little to do with the reliance of the Bank of England on Bank Rate. Likewise, the low Paris ratios do not necessarily speak well of the portfolio management policies of the Paris bankers. To investigate fully the implications of the differing liquidity ratios, we develop in the following section a model of bank portfolio management for the three systems.

THE MODEL

The approach adopted in this paper is a descendant of one used earlier by us to examine the behavior of commercial banks in the United States before the Civil War.[7] Underlying this approach is the assumption that liquidity preferences are generated by similar motives in all economic units, and that these motives may be related to a range of specific, quantifiable economic variables in a model of portfolio management.

A commercial bank, like other economic agents, holds liquid assets to bridge temporary gaps between inflows and outflows of funds (its transactions demand for liquid assets) and to stabilize the expected return on its portfolio (its portfolio demand for liquid assets). To use a different language, liquid assets are the bank's control variable which it adjusts in response to various inherited and stochastic elements of its environment. The reserve position depends mainly on the potential variability in the bank's sources of funds and is familiar in both the theory of the demand for money and banking theory.[8] The portfolio position depends on the returns and risks of asset selection facing the bank and likewise is substantiated in the theory of the demand for money and banking theory.[9]

[7] Roger H. Hinderliter and Hugh Rockoff, "The Management of Reserves by Antebellum Banks in Eastern Financial Centers," *Explorations in Economic History,* 11 (Fall 1973), 37-53.

[8] Contributions to banking theory along these lines include Daniel Orr and W. G. Mellon, "Stochastic Reserve Losses and Expansion of Bank Credit," *American Economic Review,* 51 (September 1961), 614-23, and George R. Morrison, *Liquidity Preferences of Commercial Banks* (Chicago, 1966).

[9] Applications to commercial bank behavior may be found in Edward J. Kane and Burton G. Malkiel, "Bank Portfolio Allocation, Deposit Variability, and the Availability Doctrine," *Quarterly Journal of Economics,* 79 (February 1965), 113-133, and Oliver D. Hart and Dwight M. Jaffee, "On the Application of Portfolio Theory

The balance sheet identity imposes an important constraint on any financial model. Clearly the transactions position and the portfolio position described above cannot be treated as if they were independent since liabilities increase *pari pasu* with assets.[10] To take this constraint into account we construct our model within the framework of the following simplified balance sheet:

A = Assets	L = Liabilities
R = Liquid Assets	D = Total Deposits
E = Earning Assets	C = Capital Funds Available for Portfolio Selection

We treat capital as just another source of loanable funds, rather than as a distinctly different sort of balance sheet item.

The transactions motive for holding liquid assets suggests that banks faced with variable deposits will hold a proportion, say K_1, of their liabilities in liquid form even in the absence of portfolio balance considerations. The portfolio motive suggests that even if there were no variability in deposits, banks would hold some proportion of their assets, say K_2, in liquid form. The liability proportion and the asset proportion are not independently determined, however, and the total liquidity position of banks is less than the sum of $K_1 + K_2$. An additional dollar held for transactions purposes will also satisfy, to some extent, pressures from the portfolio side, and vice-versa. To incorporate this non-additivity we suggest the following initial equation:

$$R = K_1L + K_2A + K_3LA \tag{1}$$

The proportion K_3 is the interaction coefficient between the reserve position and the portfolio position and is negative. The multiplicative term (LA) is the simplest rendering of the interaction. Thus, if one considers an increase in liabilities, the equation implies that reserves increase by $K_1 + K_3A$ rather than by K_1 alone, where K_3 is negative, reflecting the reciprocal effect of the additional reserves held for

to Depository Financial Intermediaries," *Review of Economic Studies*, 41 (January 1974), 129-147.

[10] It is, of course, not necessary to treat the reserve position and the portfolio position as separate decision-making variables. Whether it is desirable to do so has not yet been agreed upon by monetary theorists. Kane and Malkiel, "Portfolio Allocation," pp. 130-133, incorporate deposit variability into the portfolio position.

portfolio purposes. Likewise, if one considers an increase in assets, the equation implies that reserves increase by $K_2 + K_3L$, reflecting the reciprocal effect of the additional reserves held for transactions purposes.

Using the balance sheet identity between L and A and dividing through by A, equation (1) can be rewritten as:

$$R/A = K_1 + K_2 + K_3A \qquad (2)$$

The proportion K_1 we view as the sum of a stable component and a flexible component. The stable component is the core of a bank's transactions position, and may be identified with the reserve a bank must hold against extraordinary drains of the sort that occur in financial panics. Since the impact of panics is unpredictable the stable components will be of similar magnitude for all banks within a system. While this ratio may change gradually as, for example, central bank policies change, here it is assumed to be constant. The flexible component of K_1 may be identified with normal period variability in the total amount of funds available. Some sources of funds are more volatile than others, and each bank has a unique distribution over alternative sources. A bank which has a large proportion of liabilities with a large variance will have a larger transactions demand.

In applying the concept of a flexible transactions proportion we calculated a variable called LMIX for each bank in each year. We first examined the historical variability of each item on the liability side of the balance sheets. It was intuitively clear that in each system the items divided sharply into low variance and high variance items. LMIX was then defined as the ratio of low variance to high variance items. It might have been possible to calculate additional variables based on finer breakdowns of the liability side of the balance sheets but this would have destroyed the inter-system comparability of the estimating equations.

A further interesting question concerning transactions holdings is whether economies of scale are present. More precisely, will large banks have a smaller K_1 than small banks with the same liability variability characteristics? Modern theories of the transactions demand for money indicate they should behave in this manner.[11] Although the empirical evidence on this is inconclusive, recent ap-

[11] William J. Baumol, "The Transactions Demand for Cash: An Inventory Theoretic Approach," *Quarterly Journal of Economics*, 66 (Nov. 1952), 545-556.

plications to commercial banks find rather substantial economies of scale.[12]

In summary, theoretical considerations suggest that K_1 may be related to the composition of liabilities and to total assets as follows:

$$K_1 = \overline{K_1} + f(\text{LMIX}, A) \qquad (3)$$

where

$$\overline{K_1} = \text{the stable component of } K_1$$

and

$$\partial K_1/\partial \text{LMIX} < 0; \; \partial K_1/\partial A < 0$$

Behind the portfolio proportion K_2 is a theory of portfolio selection which suggests that bank managers derive positive utility from increases in return and negative utility from increases in risk. If bank managers with such utility functions are faced with increases in the riskiness of their earning assets they react by increasing their liquidity holdings. To predict variation in the liquidity ratio introduced through the portfolio position, we must be able to measure the relative risk and return characteristics of the earning assets of the banks. This problem can be usefully tackled in two parts. First, banks may be viewed as committed to a long-run or permanent level of riskiness in their earning asset portfolios. Such a commitment might arise because of pressure from outside forces, namely, the bank's loan customers.

The extent to which a bank's earning asset portfolio was dominated by risky loans can be measured by the ratio of dividends to earning assets. This is because in a competitive capital market (and this seems a reasonable assumption in our case) riskier assets produce a correspondingly higher return. Thus we expected that banks for which this ratio (designated DIVD) was relatively high would compensate for the greater risk by increasing their proportion of liquid assets.

The second facet of the portfolio component of the liquidity ratio concerns the relationship between liquid assets, *per se*, and very high quality (low risk) earning assets (such as consols in the case of London banks). Part of the task of balancing risk and return may

[12] A brief summary of the evidence is presented in David E. Laidler, *The Demand for Money: Theories and Evidence* (Scranton, Pa., 1969), pp. 106-107. A recent bank study is James R. Barth and James T. Bennett, "Deposit Variability and Commercial Bank Cash Holdings," *Review of Economics and Statistics*, 57 (May 1975), 238-241.

be accomplished by adjusting the quality mix of earning assets, that is, by adding to secondary reserves. Banks which choose this route need not duplicate the feat by holding as large a portfolio of liquid assets as otherwise would be indicated by their long-run risk and return trade-off. Hence, the higher the proportion of relatively high quality assets in the earning asset portfolio, the lower the proportion of liquid assets in the total portfolio.

In applying the concept of the portfolio proportion we defined a variable AMIX as the ratio of high quality to low quality earning assets. In each case the high quality asset was government bonds. It is obvious that the security of government bonds would cause bankers to view them in a different light from privately issued securities, and this presumption appears frequently in descriptions of banker attitudes. In London, however, attitudes toward consols apparently changed during the gold standard period and this shift is explored in the section on estimates. In addition certain technical difficulties described in the Appendix presented themselves in applying this concept to the French data.

In summary, theoretical considerations suggest that K_2 may be expressed as follows:

$$K_2 = g(\text{DIVD}, \text{AMIX}, \text{A}) \tag{4}$$

and

$$\partial K_2/\partial \text{DIVD} > 0; \ \partial K_2/\partial \text{AMIX} < 0; \ \partial K_2/\partial \text{A} > 0$$

The wealth variable, A, is introduced in the portfolio equation to allow for increasing relative risk aversion, a desirable property in certain utility functions that might be attributed to bank managers.[13]

It is clearly possible that even after all structural differences among banks are taken into consideration bank behavior may differ from bank to bank because of differences in the character of leadership or because of long standing management traditions. In some cases this can be taken into account only by introducing dummy variables for individual banks (IBC's). If differences in management philosophy, however, were systematically related to some measurable variable then the effect can be taken into account without difficulty. One hypothesis, derived from Marshall, is that firms go through a kind of life cycle analogous to human beings: aggressive when young

[13] Kenneth J. Arrow, "The Theory of Risk Aversion," *Essays in the Theory of Risk Bearing* (Chicago, 1971), pp. 96-98.

and increasingly conservative in old age. This hypothesis was tested by adding the age of the bank (AGE) as an independent variable.[14] The coefficient on this variable will also shed some light on references that are sometimes made to the "maturity" of the European banking systems vis-à-vis New York.

It is also possible that individual bank liquidity ratios were effected by general changes in the financial environment. If, for example, the volume of transactions increased, or the public gained confidence in the banking system, bank liquidity ratios might have been adjusted. In order to take these possibilities into account we have used a dummy variable for periods of economic expansion (EXPT) as defined by the National Bureau of Economic Research. This choice allowed us to test for cyclical movements without specifying a particular channel of influence. Moreover, the use of this dummy variable permits us to test one interpretation of the familiar hypothesis that banks acted to worsen the business cycle, expanding during the general business expansion and contracting during recessions.

Assuming linearity, the model to be estimated becomes:

$$R/A = \beta_0 + \beta_1\,\text{LMIX} + \beta_2\,\text{AMIX} + \beta_3\,\text{DIVD} + \beta_4\,\text{AGE} + \beta_5\,\text{IBC} + \beta_6\,\text{EXPT} + \beta_7\,A \tag{5}$$

Equation (5) may be regarded as a reduced form equation in which the variables on the right hand side are the shift parameters in the underlying demand equation. Both the demand and supply equations would contain the rate of interest which then disappears in the reduced form equation as a result of substitution into the equilibrium condition. The estimated coefficients will be dominated by influences from the demand side if the interest elasticity of the supply of reserves greatly exceeds that of the demand for reserves for all financial centers.[15] This seems a reasonable assumption for the gold standard period.

[14] We would have preferred to use the age of the management tradition influencing current policy rather than simply the chronological age of the bank. A bank like Lloyd's, for example, which was founded in 1765 as a rural bank, might have passed through several distinct regimes from our perspective, only the last of which is relevant. As a practical matter, however, we generally were forced to identify the founding of the relevant management tradition with the founding of the bank. The one exception was the Comptoir d'Escompte, which was reorganized in 1889, the date we use, after it had failed. It had first been organized some four decades previously. The reorganization provided an objective basis for assigning a younger "age" to the bank.

[15] The supply of liquid assets is available to each bank in the financial center and is altered vis-à-vis areas outside the center through changes in the market rate of

Since equation (5) is to be estimated from pooled cross-section and time series data for each financial center, the coefficients may be afflicted with econometric problems normally associated with either approach. One method of handling this problem is to assign dummy variables for each cross-section and each time series point. Apart from being very expensive in terms of using up degrees of freedom, the coefficients of these dummies have no ready interpretation. Our technique of including selected individual bank dummies (IBC's) will, we hope, eliminate potential cross-section bias and the specification of a dummy variable for periods of economic expansion will account for any time series bias imparted by the business cycle.

THE SAMPLE

We attempted to collect balance sheets and other data for every important bank in New York, London, and Paris during the heyday of the gold standard. To a considerable extent this was possible. The sample includes all of the commercial banks in Paris, all of the large joint stock banks in London except those which did not publish their balance sheets or did so in an unsuitable form, and all of the national banks in New York with total assets in excess of twenty-five million dollars.

Despite the comprehensiveness of the sample, however, certain problems remain. In New York, due in part to the way the National Banking Act was interpreted, a unit banking system prevailed. In

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interest. Within each center, individual banks may acquire as much of the supply as they want by foregoing interest earnings. Thus, although the market rate of interest enters both the supply function and the demand functions, the reduced form will be dominated by demand variables on the assumptions given. The reduced form substitution may be demonstrated as follows:

$$R^S = \alpha i$$
$$R^D = (\beta_0 + \beta_1 \text{LMIX} + \beta_2 \text{AMIX} + \beta_3 \text{DIVD} + \beta_4 \text{AGE} + \beta_5 \text{IBC} + \beta_6 \text{EXPT} + \beta_7 A + \beta_8 i) A$$
$$R^S = R^D = R$$

where R^S = Supply of reserves; R^D = Demand for reserves; i = Market rate of interest.

Substituting into the equilibrium condition and rearranging terms gives:

$$R\left(1 - \frac{\beta_8 A}{\alpha}\right) = (\beta_0 + \beta_1 \text{LMIX} + \beta_2 \text{AMIX} + \beta_3 \text{DIVD} + \beta_4 \text{AGE} + \beta_5 \text{IBC} + \beta_6 \text{EXPT} + \beta_7 A) A$$

Now as α increases relative to β_8, β_8/α approaches zero and the above expression becomes equivalent to equation (5).

London and Paris, on the other hand, branch systems were used. This dichotomy raised two problems. In New York a number of the national banks were neighborhood banks, hardly comparable to the banks in the financial centers which were our major interest. We attempted to eliminate the neighborhood banks with the size restriction mentioned above. The problem in London and Paris is that the surviving balance sheets contain aggregates of branches inside and outside the financial centers. If branches outside the centers had distinct portfolio structures, then our ability to make comparisons among three systems with different degrees of outside branching is clearly weakened. Unfortunately, we know of no practical way to correct for this potential bias.

The level of aggregation in the balance sheets varied from city to city. For the banks in New York it was possible to get relatively detailed breakdowns of assets and liabilities. On the other hand, for London the balance sheets listed larger aggregates. The exact items covered, the sources of the data, and the way items were combined to form the variables in equation (5) are described in the Appendix. The London series starts in 1892, two years after New York and Paris, because that was the first year in which the London banks published their balance sheets. The series for New York ends in 1904 because after that year the Comptroller consolidated the balance sheets extensively. The banks included in the sample (many of which are still important) are listed in Table 2.

THE ESTIMATES

Table 3 presents least-squares estimates of the coefficients of equation (5). As noted, peculiarities of individual banks such as the Banque de Paris et des Pays-Bas are accounted for by specifying dummy variables (IBC's) as defined in the table.[16] On the whole, the estimated equations adhere to the outline of liquidity management set forth in the second section. The coefficient of multiple

[16] The dummy variables measuring individual bank characteristics were assigned *a priori* to quantify what seemed to be obvious distinctions within the three systems. Thus, for example, a dummy was assigned to the Crédit Lyonnais because of its vast size and to Lloyds because of its rapid growth through merger. The justification for introducing the variable for the London and Westminster Bank and the Union Bank of London, however, was primarily empirical. One rationalization discovered after the fact is that their conservatism may have been a reflection of substantially higher ratios of callable capital to paid-up capital. Greater liquidity may have been needed to reassure stockholders that management would not exercise its option to call additional capital.

TABLE 2
BANKS INCLUDED IN THE SAMPLE[a]

	New York	
1.	First New York City Bank	(1863)
2.	Fourth New York City Bank	(1864)
3.	American Exchange Bank	(1838)
4.	Bank of New York	(1791)
5.	Chase National	(1877)
6.	Chemical National	(1824)
7.	Citizens Central National	(1851)
8.	Hanover National	(1851)
9.	Importers & Traders National	(1855)
10.	Mechanics National Bank	(1810)
11.	Merchants National Bank	(1805)
12.	National Bank of Commerce	(1839)
13.	National City	(1812)
14.	National Park	(1856)
15.	Seaboard National	(1883)
	London	
1.	London & Westminster	(1834)
2.	London & Southwestern	(1862)
3.	National Provincial	(1826)
4.	Union Bank of London	(1839)
5.	London & County	(1836)
6.	Williams Deacon	(1836)
7.	Parr's	(1782)
8.	Capital & Counties	(1843)
9.	Lloyds	(1765)
10.	London & Midland	(1891)
	Paris	
1.	Crédit Lyonnais	(1863)
2.	Société Générale pour favoriser le developpement du commerce et de l'industrie en France	(1864)
3.	Comptoir National d'Escompte de Paris	(1889)[b]
4.	Société Générale de Crédit industrial et commercial	(1859)
5.	Banque de Paris et des Pays-Bas	(1872)

[a] Charter dates in parentheses.
[b] This is the date of the bank's reorganization following a bankruptcy.

determination ranges from a high of .566 in Paris to .207 in New York. The equation is always significant at the .01 level.

Looking at the lead equations (A.1, B.1, and C.1) for each center, it is clear that all banks react as predicted with respect to the composition of their loanable funds; the larger the proportion of relatively stable funds in the total mix, the smaller the liquidity ratio. Likewise, AMIX and DIVD, the variables introduced to capture variation in the portfolio position, carry the correct signs. While LMIX is uniformly significant at the five percent level, AMIX gains only the twenty

TABLE 3
ESTIMATES OF THE MODEL[a]

	Financial Centers						
	A. *New York* (*1889-1904*)[b]		B. *London* (*1892-1909*)[c]			C. *Paris* (*1890-1907*)[d]	
Variable	A.1	A.2	B.1	B.2	B.3	C.1	C.2
Constant	11.940	11.940	15.925	15.925	16.277	11.826	11.826
	(5.974)	(5.974)	(22.373)	(22.373)	(23.381)	(5.978)	(5.979)
LMIX	−.488		−.208			−.158	
	(4.929)		(5.513)			(3.236)	
WLMIX		−.027		−0.021	−.022		−.032
		(4.929)		(5.513)	(5.855)		(3.236)
AMIX	−.134		−.065			−.500	
	(1.444)		(3.049)			(1.975)	
WAMIX		−.034		−.015	−.015		−.076
		(1.444)		(3.049)	(3.072)		(1.975)
SWAMIX					.015		
					(3.528)		
DIVD	.461	.461	.028	.028	.031	3.046	3.046
	(1.169)	(1.169)	(.985)	(.985)	(1.134)	(4.968)	(4.968)
AGE	.033	.033	−.004	−.004	−.005	.001	.001
	(3.094)	(3.094)	(1.294)	(1.294)	(1.494)	(.127)	(.127)
IBC1	2.742	2.742	−.073	−.073	.091	−9.178	−9.178
	(2.443)	(2.443)	(.124)	(.124)	(.160)	(5.431)	(5.431)
IBC2			.528	.528	.203	−1.587	−1.587
			(1.495)	(1.495)	(.573)	(1.836)	(1.836)
IBC3			2.273	2.273	2.467		
			(5.044)	(5.044)	(5.611)		
EXPT	−.044	−.044	−.053	−.053	−.127	.516	.516
	(.491)	(.491)	(.202)	(.202)	(.499)	(1.395)	(1.395)

TABLE 3 (*Continued*)

	Financial Centers						
	A. *New York (1889-1904)*[b]		B. *London (1892-1909)*[c]			C. *Paris (1890-1907)*[d]	
A	−.045	−.045	.028	.028	.015	−.001	−.001
	(2.187)	(2.187)	(3.070)	(3.070)	(1.526)	(2.117)	(2.117)
R^2	.207	.207	.326	.326	.373	.566	.566
	[10.158]	[10.158]	[9.153]	[9.153]	[10.036]	[13.199]	[13.199]

[a] Nominal variables in millions. Ratios scaled × 100. t statistics in parentheses; F statistics in brackets.

[b] *New York*
IBC1 = 1 if bank associated with J. P. Morgan interests.
(First New York, Fourth New York, American Exchange, Chase, Chemical Hanover, Importers and Traders, Commerce, City and Park).
EXPT = 1 if 1889, 1891-1892, 1894-1895, 1897-1898, 1901-1902.
Weight on LMIX = 1.834.
Weight on AMIX = 3.990.

[c] *London*
IBC1 = 1 if bank a high-merger bank (Lloyds).
IBC2 = 1 if bank a low-merger bank (absorbing 0, 1 or 2 other banks).
IBC3 = 1 if London and Westminster or Union bank of London.
EXPT = 1 if 1896-1900, 1902-1903, 1905-1907, 1909.
Weight on LMIX = 9.736.
Weight on AMIX = 4.330.

[d] *Paris*
IBC1 = 1 if Banque de Paris et des Pays-Bas.
IBC2 = 1 if Crédit Lyonnais.
EXPT = 1 if 1890, 1895-1899, 1902, 1905-1906.
Weight on LMIX = 4.863.
Weight on AMIX = 6.550.

Source: See Appendix.

percent level in the New York sample, and DIVD lacks even this marginal significance in both New York and London.[17]

In order to answer questions posed in the first section concerning the nature of banker attitudes in the three centers, comparison of coefficients across centers is useful. The results in equations A.1, B.1, and C.1 suggest that a unit change in LMIX brings forth the largest change in liquidity ratios in New York, while a unit change in AMIX or DIVD elicits the greatest response in Paris.

The ordering of the coefficients on LMIX and AMIX may, however, reflect underlying differences in the relative stability of the sources of funds and the relative riskiness of investment opportunities in the individual centers. In both cases, market factors seem to have played a role. A movement of funds from stable to unstable sources imposed greater costs on the London banks, while a movement of earning assets from high quality to low quality securities implied greater risk to the Paris banks.

To take into account market differences in the variability of funds and investment risk, the basic equations were re-calibrated using weighted LMIX and AMIX variables. The weights on LMIX are the ratio of the coefficient of variation of unstable funds to the coefficient of variation of stable funds in each center. The ratio of coefficients of variation of rates of return on high quality and low quality assets are used as weights on AMIX.

The equation employing the weighted variables are equations A.2, B.2, and C.2 in Table 3. Now the results indicate a unit change in each of the three independent variables (WLMIX, WAMIX and DIVD) will bring about the greatest change in the liquidity ratio of the Paris banks. While the difference between the highest and lowest coefficients on LMIX is slight, suggesting that the market characteristics of deposit variability play a more important role in determining reserve positions than differing attitudes toward these characterstics, the difference in terms of AMIX is still substantial. A unit change in AMIX, after accounting for market differences, results in a change in the liquidity ratios of the banks of Paris twice as great as the corresponding change in New York and five times as great as the corresponding change in London.

[17] It is possible that the basic assumption concerning DIVD—that it was a fairly firm commitment to shareholders and hence implied a minimum risk exposure—was not fulfilled, especially by the London banks. The coefficient of variation of DIVD in London was 13 times as large as in New York and 42 times as large as in Paris.

A further problem in the interpretation of AMIX arises with respect to the London banks. The period covered by our analysis was apparently coincident with a fundamental re-thinking on the part of London bankers as to what constituted high quality secondary reserve assets. Consols (our definition of high quality assets) began to fall in price in the early 1900's and the self-liquidating bills of exchange became an increasingly important high quality asset in bank portfolios.[18] Unfortunately, bills cannot be separated from the mass of loans, discounts and advances.

To see if our model is capable of picking up this change in banking philosophy, the coefficient of WAMIX is allowed to shift after 1900. The revised equation, B.3 in Table 2, includes a shift parameter (the coefficient of SWAMIX) defined only over the years 1901-1909. The positive sign and significance of this coefficient clearly indicates a sharp change in the behavior of London banks. Indeed, equation B.3 implies essentially a zero adjustment to liquidity ratios from a unit change in AMIX after 1900.

An interesting but ambiguous feature of the results in Table 3 is the liquidity adjustments implied by the coefficient of A. Three separate forces are embodied in this coefficient. Two of these forces (interaction and economies of scale) suggest a negative sign; the other (increasing relative risk aversion) suggests a positive sign. In the New York and Paris equations the coefficient on A is negative throughout. In London, however, the coefficient is positive and significant.

Why do the positive forces operating through large size swamp the negative forces in the case of the London banks? One possibility is that economies of scale are experienced over a limited range. If this were true, however, the effect should be exhibited by the Crédit Lyonnais and perhaps the two or three largest banks in New York, and it is not. Two other possible explanations offer promise for further inquiry. First, British banks were probably more vulnerable to pressures on their loanable funds from the balance of payments, and the danger was greater for the larger banks. Economies of scale may thus have been inhibited by external vulnerability. Secondly, the Bank of England may have forced larger banks to bear the largest share of the burden of supporting financial markets, thus negating any economies of scale.

[18] Goodhart, *Business of Banking*, pp. 131-134.

A COUNTERFACTUAL ENQUIRY

The interaction between central banking policy and commercial bank portfolio management may be explored in greater depth by developing a set of counterfactual liquidity ratios from the coefficient estimates in Table 3. These counterfactuals are presented in Table 4.

TABLE 4
COUNTERFACTUAL ESTIMATES OF LIQUIDITY RATIOS

	Bank Managers		
Banking Systems	*New York*	*London*	*Paris*
New York	11.18	11.82	13.57
London	12.50	13.65	13.49
Paris	6.94	7.40	8.56

The table is constructed by projecting mean liquidity ratios. This is accomplished by applying mean values of variables to estimates of coefficients from Table 3. The left hand column designates the banking system, that is, the source of the means of the variables, and the system specific coefficients (constant terms, IBC's, AGE, and A). The top row of the table designates the responses of bank managers, represented by the coefficients on WLMIX, DIVD, WAMIX, and EXPT.[19] Together a row and column entry determine a single "mean" liquidity ratio.

The table is meant to answer counterfactual questions of the following sort: suppose the bankers of Paris were to replace the bankers of New York; on the whole, would the liquidity ratio be higher or lower in New York than it was before? Clearly, the ratios along the diagonal of Table 3 are the observed grand means from Table 1 and the off-diagonal ratios are the counterfectual grand means.

Some interesting conclusions can be drawn from an examination of the ratios. First, turning to the bank managers, it is clear that despite the appearance of aggressiveness in Table 1, the Paris bankers were actually rather conservative. Were they set to manage the New York or London banks they would have done so with high liquidity ratios. It is only in the relatively safe environment of Paris that their

19 We bring in the coefficient of EXPT as a behavioral parameter because of the obvious differences the signs imply for portfolio management over the cycle. The positive sign in the Paris equations suggest that the more cautious banks in France actually increased their liquidity holdings during expansion, that is, managed their portfolios in a countercyclical fashion.

appear to be similar, with the Londoners, perhaps, a shade more conservative. If these banks had operated under the stable environment provided by the Bank of France, they would have had lower liquidity ratios than the Paris banks.

Turning to the banking systems, the striking fact is that the London system appears to resemble New York more closely than it does Paris; that is, the London system under the Bank of England appears more ratio is low.[20] The London and New York bankers, on the other hand, similar to New York, which had no central bank, than to Paris, which did. The Bank of England appears to have been a rather weak reed for commercial banks to lean upon.

A CONCLUDING NOTE

The results of our investigation suggest important dissimilarities in the behavior of commercial banks and in the nature of the banking environment within which they worked. Further research into the details of these differences will no doubt provide rewarding information on the functioning of a key economic sector at a crucial time in the development of the Western economic systems. The overall impression of banking under the gold standard which emerges, however, is one of likeness rather than diversity. A model which is developed from general theoretical considerations seems a good representation of each of the banking systems. The generalization "a banker was a banker was a banker," while not exact, carries a good measure of truth.

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26 This conclusion is not altered significantly if Table 4 is calculated by excluding the Banque de Paris et des Pays-Bas, the investment bank, from the French sample.

APPENDIX

All data used in this paper were taken from the following sources: for New York, the annual *Report of the Comptroller of the Currency;* for London, the basic source of data was C. A. E. Goodhart, *The Business of Banking,* June data; these were supplemented by certain June data reported in October issues of the *Economist;* for Paris, *Statistics for Great Britain, Germany, and France: 1867-1909.* U.S. Senate Document No. 578 (Washington, 1910). Specific balance sheet items are given in Table A-1. Table A-2 indicates the way in which regression variables were constructed.

APPENDIX TABLE A-1
BALANCE SHEETS

New York	*London*	*Paris*
1. Discounts & Loans	1. Discounts & loans	1. Discounts & loans
2. U.S. bonds (net of bonds to secure circulation)	2. Govt. securities	2. Securities
3. Redemption fund	3. Other securities	3. Banking house, real estate & other assets
4. Other securities	4. Banking house, real estate & other assets	4. Cash (including cash on hand & at the Bank of France)
5. Banking house, real estate & other assets	5. Cash (including cash on hand & deposits at the Bank of England)	5. Reports
6. Due from U.S. Treasury	6. Money at call	6. Coupons matured
7. Clearing house exchanges (net of certified checks)		7. Syndicate interests
8. Specie		
9. Legal tender & fractional currency		
10. U.S. certificates of deposit		
11. Capital	7. Capital	8. Capital
12. Surplus & undivided profits	8. Surplus	9. Surplus
13. Due to national banks (net)	9. Deposits	10. Acceptances
14. Due to state banks (net)	10. Other liabilities	11. Deposits
15. Individual deposits (net of CIPC)		12. Current accounts
16. U.S. Govt. deposits		13. Other liabilities
17. Other liabilities		
18. Dividend rate	11. Dividend rate	14. Dividend rate

APPENDIX TABLE A-2
CONSTRUCTION OF THE VARIABLES[a]

Variable	*New York*	*London*	*Paris*
R/A[b]	[(3+6+7+8+9+10) −(25% × (13+14 +15+16))]−[(1 +2+3+4+6+7+8 +9+10)−(25% × (13+14+15+16))]	5÷(1+2+3 +5+6)	(4+6)−(1+2 +3+5+6+7)
LMIX	[11+12−(5-17)+13 + 16] ÷ (14 + 15)	[(7 + 8) − (4-10)] ÷9	10÷[8+9−(3−13) +11+12]
AMIC[c]	2−(1+4)	2÷(1+3+6)	(18% × 1)−(82% × 1+2+5+7)
DIVD	(18×11)÷(1+2+4)	(11×7) ÷(1+2+3+6)	(14×8)÷(1+2 +5+7)
A	(1+2+3+4+6+7+8 +9+10)−[25% × (13+14+15+16)]	(1+2+3+5+6)	(1+2+4+5+6+7)

[a] Numbers refer to balance sheet positions in Table A-1.

[b] After 1902, U.S. Government deposits were excluded from required reserve computation.

[c] High quality securities were defined as 18 percent of discounts in Paris as the result of a trial-and-error experiment. Unfortunately, no entry comparable to government securities is listed in the French balance sheets. Both "discounts" and "securities" contain government paper, but because of highly questionable accounting practices (cf. Margret G. Meyers, *Paris as a Financial Center* [New York, 1936], pp. 122-124), securities proved unsatisfactory as a source of high quality assets. The proportion of discounts selected was based on best-fit criteria in the regressions and compatibility with post-World War II breakdowns (cf. J. S. G. Wilson, *French Banking Structure and Credit Policy* [Cambridge, Mass., 1957], pp. 56-63).