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by

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0. Introduction

Financial markets, financial aggregates and interest rates have all experienced marked changes and fluctuations in recent years. Many of these changes have received considerable attention in the literature. It is the purpose of this paper, however, to draw attention to one major change that has largely escaped attention, namely, the changes in the terms of new, short-term (less than one year initial maturity) commercial and industrial loans made by commercial banks. This is the single largest category of loans made by these banks, accounting for 84% of the total loans made by banks in the week February 6-10, 1984. Thus, whenever one talks of bank lending one is in effect talking about short-term commercial and industrial loans. Consequently, any change in the terms of these loans represents a major change in the behavior of banks and, because of the role such loans play in corporate financing, a major change in the behavior of industrial and commercial businesses.

Apart from their empirical importance the changes in the terms of bank lending described below are of interest to economists engaged in contract theory. A major criticism of contract theory has been its lack of empirically testable propositions. In the case of bank loan contracts, however, we have time series available within which major changes in contracts have occurred thus providing a unique opportnuity to test theories of contract design.

The changes in the terms of bank lending are described in the following section. Section 2 contains an econometric investigation of the data and some tests of contract theoretic predictions. The last section contains some concluding comments.

Table 1

Changes in the Terms of Bank Lending, 1977-1983

	Weighted (by value) Average Maturity of Loans (months)		Proportion of Loans Using Floating Interest Rates	
	Large Loans ($\geq$ \$1m.)	Small Loans (< \$1m.)	Large Loans ($\geq$ \$1m.)	Small Loans (< \$1m.)
Largest 48 banks ("large banks")	3.2 → 0.7	3.2 → 4.0	68% → 28%	60% → 77%
Other banks ("small banks")	3.3 → 1.8	3.1 → 4.1	61% → 38%	29% → 49%

1. The Changes in the Terms

The terms of bank loans that we shall concentrate on are the initial maturity of the loans and whether they carry a floating or fixed interest rate. In order to grasp the complexity of the changes that have taken place it is important to disaggregate the loans by lender and by size. Two groups of banks are distinguished in the data,[1] namely, the 48 largest banks in terms of assets and the rest. We will refer to these groups as "large" and "small" banks respectively, although the latter group contains some banks with assets of over $2 billion. Similarly, we will distinguish in this section between "large" loans (greater than or equal to $1 million) and "small" loans (less than $1 million).

The magnitude of the changes that have occurred over the period 1977-1983 can be seen in Table 1.[2] Clearly the major changes were those for large loans made by both categories of banks. At both groups of banks the maturity of new, large loans fell over 50% during the last seven years. Indeed, for the large banks the fall was more than two-thirds, from 3.2 months to 0.7 months. At the same time, the proportion of new loans issued with a floating rate dropped, from 68% to 28% at the large banks and from 61% to 38% at the small banks. Thus, at a time when interest rate volatility rose substantially,[3] the proportion of fixed

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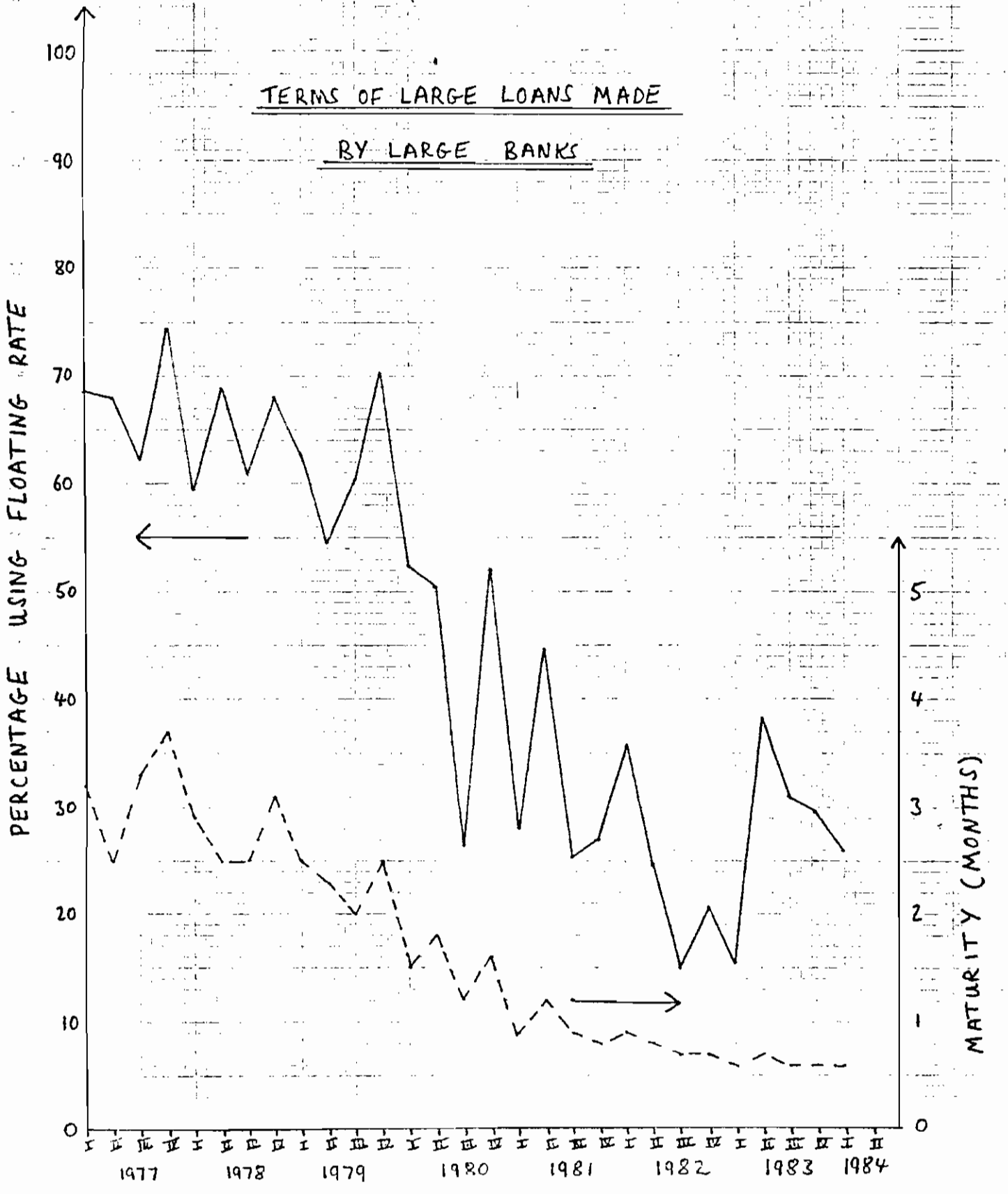
[1] The data come from the "Survey of the Terms of Bank Lending," Statistical Release E2 (G14 prior to 1979) issued quarterly by the Board of Governors of the Federal Reserve System since 1977. The survey covers the terms of loans made during one week in each quarter.

[2] Note that Table 1 refers to the terms of new loans made during the survey week and not the terms of the stock of loans outstanding. Movements in these latter will have the same sign as the former but a smaller magnitude.

[3] The variance of the first differences of the weekly average 90-day T-bill rate rose from 0.514 in 1977.I - 1979.III to 5.075 in 1979.IV - 1984.I.

FIGURE 1

TERMS OF LARGE LOANS MADE BY LARGE BANKS

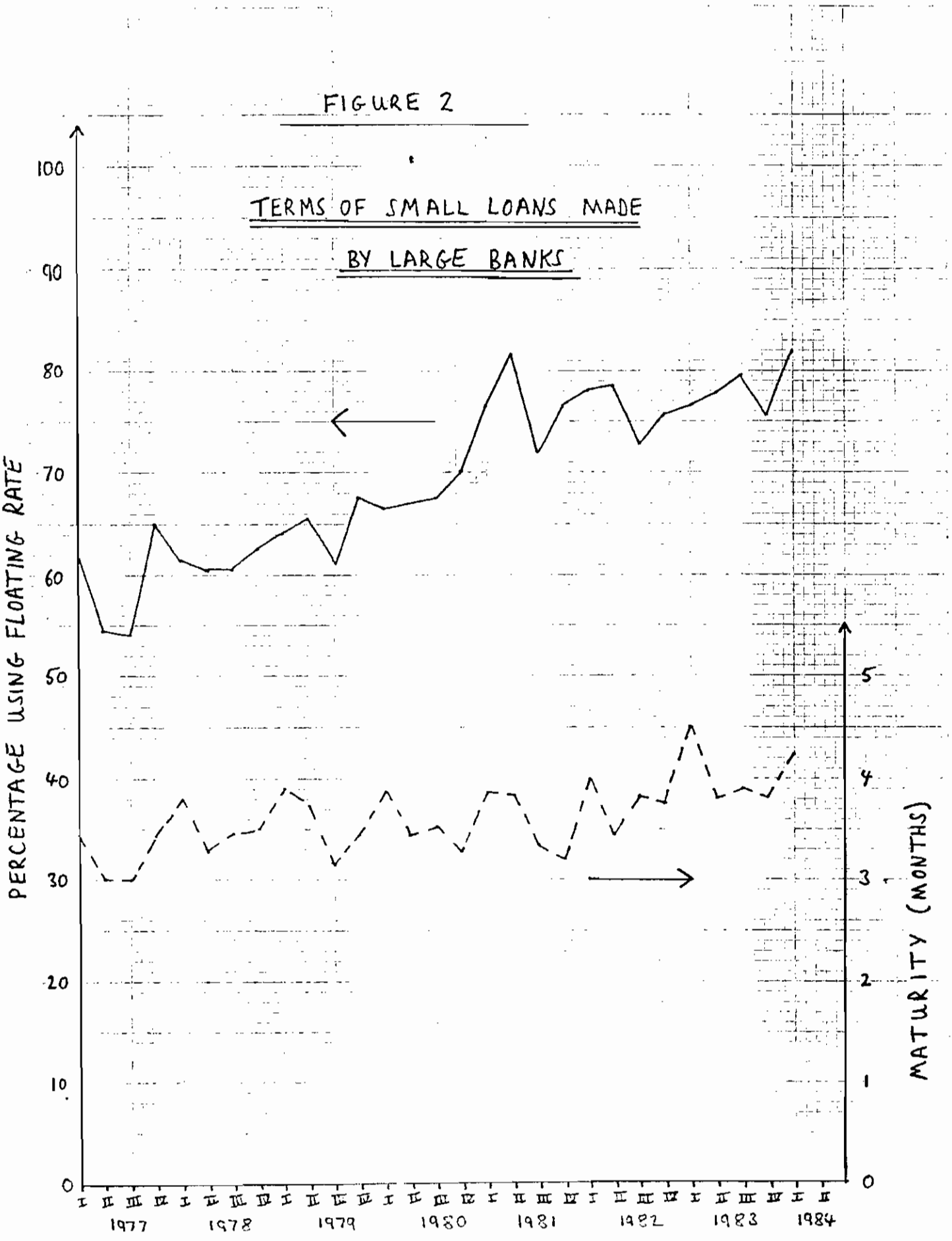


rate loans made by banks rose. The second striking feature of the table is the qualitative difference in behavior of the terms of the small loans. In contrast to the large loans, the maturity of small loans rose by about a third over the period, from approximately three to about four months. Similarly, the proportion of new small loans using floating rates moved in the opposite direction to that of the large loans rising slightly for the small loans at the small banks. Clearly, the forces at work that drove the maturity and use of floating rates down on large loans either had no impact or simultaneously drove these variables up on small loans.

One feature of the data that is somewhat masked in Table 1 is the difference in the behavior of the terms of lending at the large and small banks. This difference shows up clearly in Figures 1 and 2. Figure 1 shows the behavior of the terms of the large loans made by the large banks. These loans, though relatively few in number, dominate the short-term, commercial and industrial lending of the large banks, representing 95.8%, by value, of such lending in 1983.I - 1984.I. Effectively, then, lending by the large banks is almost entirely in the form of large loans. Notice that while the maturity of these large loans declined relatively smoothly and exponentially over the period, the use of floating rates fluctuated around 65% of the loans until the fourth quarter of 1979, at which point it dropped in the space of a year to a new constant trend of about 30%. The peculiarity of this behavior lies in the fact that both the maturity of a loan and whether it carries a floating rate are both endogenous outcomes of the bargaining between the banks and their customers and so one would not expect one to move smoothly over time and the other to

FIGURE 2

TERMS OF SMALL LOANS MADE BY LARGE BANKS



behave discontinuously.[4] This is emphasized when we look at the large loans of the small banks in Figure 2. Although over the period as a whole the terms of these loans moved in much the same way as the corresponding loans at the large banks, the time paths of these movements are very different. Figure 2 shows that there were no trend changes in either the maturity or the use of floating rates at the small banks until the middle of 1981. Between the third quarter of 1981 and the first quarter of 1982 there was a sudden drop to a new level in both maturity and the use of floating rates. Notice that, unlike the case of the large banks, here the trends in the two variables move very closely together. Of course, this difference in the behavior of the terms of large loans at the two groups of banks is itself a puzzle given that both groups were subject to the same economic forces in terms of interest rates, deregulation, business cycle conditions and the like.[5]

In short, the data on the terms of lending poses two major questions beyond the obvious and basic one of why the terms changed: Given that all banks and borrowers faced similar interest rates and business conditions, why did the terms of new large and small loans move in opposite directions, and why did the change in the terms differ in size and timing between the large and the small banks?

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[4]The coincidence in timing between the step-like fall in the use of floating rates and the change in the Federal Reserve's operating procedures appears to be just a coincidence. The large loans of the small banks show no step at that time.

[5]To save space the behavior of the small new loans at the two groups of banks is omitted. At both the large and small banks the terms moved smoothly on trend over the period, showing none of the step-like jumps of the large loans.

Table 2

The Relationship Between Maturity and Floating Rates

Proportion of New Loans Using Floating Rates[1]

	Large Banks			Small Banks		
Loan Size	Small	Medium	Large	Small	Medium	Large[2]
Const.	35.5 (13.23)	48.8 (9.12)	19.7 (1.40)	36.5 (2.55)	28.0 (3.84)	39.5 (5.39)
Time	1.21 (16.70)	0.82 (10.10)	-0.15 (0.31)	0.93 (3.56)	0.49 (1.30)	-0.41 (2.21)
Average Maturity	2.86 (3.81)	2.82 (1.76)	16.72 (4.00)	-5.57 (1.12)	3.64 (1.01)	6.91 (3.84)
$\bar{R}^2$	0.939	0.851	0.840	0.348	0.404	0.750
F	217.1	81.0	74.6	8.5	10.5	29.0
ρ	0.13	0.07	0.0003	0.02	0.32	0.00

Notes: 1. t-statistics in parenthesis.
2. This regression includes a dummy for 1978.IV to account for the very extreme movement in the dependent variable. We suspect that this is a data error.

2. Trying to Explain the Changes

To many people the most striking aspect of Table 1 is the fact that, for large loans at least, the proportion of new loans which bore a floating rate dropped at a time when interest rate volatility rose. This seems perverse, as there is a presumption that such indexation should rise with the increased volatility of interest rates.[6] A common response to this puzzle is to explain it by noting the fall in maturity and arguing that as the incentive to index falls with the length of the contract then it is not surprising that the use of floating rates declined. At a theoretical level this "explanation" fails because we know from the work of Gray (1978) that contract length and indexation are both endogenous variables from the point of view of the banks and borrowers and so neither can be used to explain the other; the fall in loan maturity no more caused the fall in the use of floating rates than the latter's fall caused the former. Thus the very high correlations shown in Table 2 between maturity and the use of floating rates, at least in large banks, while they strongly support Gray's theory, do not indicate economic causation. Moreover, even if one accepted causation running from maturity to indexation one would still be left with the task of explaining why maturity changed and why it moved in opposite directions for large and small loans.

Explanations proper take one of two forms. The first relies on some institutional change either in the banking industry or elsewhere in the financial markets. At the time of the most rapid movements in terms

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[6] This intuition is very imprecise, as is shown in Bull and Karydakis (1984).

of lending, mid-1979 to mid-1982, the most striking institutional development in this area was the growth of the commercial paper market. In 1977 the volume of commercial paper outstanding was slightly under $15 billion, from which it rose to a peak of $40 billion (at 1977 prices) in the middle of 1982. For large corporations the commercial paper market is an alternative source of short-term funds to large bank loans and so as the debt instruments in the commercial paper market are fixed rate with an average maturity of about one month one would expect competing large bank loans to carry similar terms. Notice that to be an explanation of the changes in the terms of bank lending this observation has to be buttressed by either an assertion that the market for bank loans was not competitive prior to the advent of the commercial paper market or that a shift in the preferences of corporations towards short-term fixed rate debt occurred sometime after 1977. In this sense the appeal to the growth of the commercial paper market is an incomplete explanation. It is also incomplete in the sense that it cannot explain the change in terms of small loans.

The second form of explanation uses contract theory. Jo Anna Gray (1978) analyzed the choice of contract length and whether or not to index a contract. In her model the choice of these terms hinged on the cost of contracting and the correlation between the variable to which the price is being indexed and the price to which the parties to the contract would, ignoring constraints, like to be able to index to. In the case at hand almost all floating rate loans have the loan rate tied to the Treasury Bill rate rather than the market loan rate, presumably because loans are not sold at public auction, which makes determination of what the market

loan rate is costly. The disadvantage with using the Gray model to explain the changes in the terms of bank lending is that the correlation between the Treasury Bill rate and the market loan rate moved in the same way for all banks and lenders and so the model cannot explain the diversity of behavior across sizes of banks and loans.

This problem with the use of the available theory can be overcome if we allow for the size of the loans to vary and treat the costs of contracting and indexing as independent of loan size. This was done in Bull and Karydakis (1984). In that paper it was shown , as well as the usual comparative statics, under reasonable parameter values for the length of loans and the costs of contracting that an increase in the real size of a loan would shorten the optimal length of the loan and reduce the incentive to choose a floating rate. The intuition behind this result is that raising the real size of a loan lowers the average fixed cost of negotiating the loan contract. Because fixed rate loans are optimally of shorter maturity than floating rate loans and so have to be renegotiated more often, the reduction in the average fixed costs of such renegotiations lowers the cost of fixed rate loans relative to floating rate loans. As the average real sizes of loan changed substantially for most categories of loans over the period this result holds out the possibility of explaining the changes observed in the market for bank loans. In particular, the average size (in 1977 prices) of large loans at large banks rose from $3.247 million in 1977 to $5.488 million in 1983, an increase of almost 70%. In contrast, the average real size of loans in the category $25,000 - $49,999 fell by 35% over the same period. Thus this theory predicts that the terms of large loans would change in

the opposite direction to those of small loans. Moreover, the change in the size of loans varied systematically across banks with the largest increases occurring at the large banks. For instance, at small banks average large loan size increased only 10% over the same period that saw a 70% increase at the large banks. Thus the theory can in principle explain why the change in terms differed across banks.

In the tables that follow this theory is tested empirically. We also investigate what was the statistical link between the changes in the terms of bank lending and the growth of the commercial paper market. First we must establish some notation. FRXXYY indicates the proportion of the new loans in the XX category issued by the YY banks that used floating rates where YY is either LB for large banks or SB for small banks and XX is either LL (large loans), ML (medium loans between $100,000 and $499,999) or SL (small loans[7] between $25,000 and $49,000). Similarly, MATXXYY refers to the average maturity of new loans in that category. CP is the real volume of commercial paper outstanding, R is the average daily 90-day Treasury Bill rate in the week of the survey of bank lending terms, and VAR is the variance of first differences of R during a twelve-week sample centered on the week of the survey. All of the regressions were run for the period 1977.I - 1984.I.

The regressions were all estimated OLS except where this gave autocorrelated residuals, in which cases a Cochrane-Orcutt procedure was used. The odd numbered regressions on both tables report the regressions containing the entire set of independent variables while the even

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[7]Note that this definition of small loans differs from that in the previous section.

Table 3

The Use of Floating Rates; 1977,I-1984,I

No.	Dependent Variable	Const.	Time	Size	Comm. Paper	T.bill Rate	Var	$\bar{R}^2$	F	ρ
1	FRLLLB	99.9	-0.39	-0.007	-1.23	0.99	9.05	0.857	34.6	0.0
		(12.03)	(1.02)	(2.17)	(2.75)	(1.29)	(0.71)			
2	FRLLLB	103.4		-0.009	-1.21	1.33				
		(17.29)		(3.98)	(3.05)	(2.05)		0.857	56.5	0.0
3	FRLLSB	41,6	-1.12	0.006	-0.31	2.64	-8.53			
		(5.72)	(3.87)	(4.38)	(0.86)	(3.80)	(0.74)	0.782	16.3	0.0
4	FRLLSB	44.9	-1.02	0.006	-0.42	2.34				
		(7.83)	(4.01)	(4.36)	(1.31)	(4.17)		0.737	20.6	0.0
5	FRMLLB	2.2	1.45	0.0003	0.12	0.24	2.38			
		(0.07)	(3.59)	(1.61)	(0.64)	(0.69)	(0.42)	0.844	31.3	0.0
6	FRMLLB		1.64	0.0003			7.82			
			(27.37)	(46.60)			(2.38)	0.998	4987.2	0.0
7	FRMLSB	-6.61	2.04	0.0003	0.89	0.87	6.00			
		(0.17)	(3.17)	(1.27)	(1.69)	(0.83)	(0.35)	0.339	3.9	0.0
8	FRMLSB		1.76	0.0002	-.43					
			(4.57)	(7.13)	(1.26)			0.964	249.2	0.0
9	FRSLLB	-51.0	2.45	0.003	0.14	0.10	1.65			
		(0.57)	(2.43)	(1.11)	(0.49)	(0.22)	(0.25)	0.891	46.6	0.0
10	FRSLLB		1.91	0.001						
			(31.11)	(35.51)				0.997	5329.1	0.0
11	FRSLSB	-90.1	1.65	0.003	0.69	0.13	13.6			
		(0.93)	(1.48)	(1.11)	(1.29)	(0.14)	(0.90)	0.297	3.36	0.0
12	FRSLSB	20.6	0.72							
		(6.49)	(3.90)					0.337	15.2	0.0

Notes: 1. t statistics in parentheses.
2. All data comes from the Bulletin of Governors of the Federal Reserve System and Statistical Release E2.

Table 4

Maturity: 1977.I-1984.I

No.	Dependent Variable	Const.	Time	Size	Comm. Paper	T.bill Rate	Var	$\bar{R}^2$	F	ρ
1	MATLLLB	4.2	-0.07	-0.0001	-0.04	-0.01	0.17			
		(12.00)	(4.06)	(1.02)	(1.88)	(0.23)	(0.32)	0.908	56.1	0.0
2	MATLLLB	4.1	-0.07	-0.0001	-0.03					
		(14.48)	(4.54)	(1.12)	(2.72)			0.915	101.1	0.0
3	MATLLSB	3.5	-0.08	-0.00001	0.004	0.05	0.22			
		(4.48)	(2.54)	(0.27)	(0.10)	(0.61)	(0.17)	0.359	4.1	0.0
4	MATLLSB	3.37	-0.08			0.06				
		(8.46)	(4.73)			(1.43)		0.430	11.6	0.0
5	MATMLLB	1.2	0.09	0.00001	-0.03	-0.008	0.42			
		(0.39)	(2.45)	(0.80)	(1.68)	(0.27)	(0.82)	0.520	7.1	0.0
6	MATMLLB		0.09	0.00002	-0.02					
			(8.33)	(19.3)	(1.84)			0.994	1609.3	0.0
7	MATMLSB	5.00	-0.15	0.00001	-0.01	-0.08	-0.08	.793		
		(3.06)	(1.22)	(1.22)	(0.70)	(2.14)	(0.12)		21.2	-0.35
8	MATMLSB	3.09	0.08			-0.09				
		(17.32)	(11.10)			(4.30)		.833	18.4	-0.37
9	MATSLLB	0.09	0.16	.0002	-0.05	-0.04	1.43			
		(0.15)	(0.83)	(0.42)	(0.90)	(0.40)	(1.16)	.080	1.5	0.0
10	MATSLLB		0.13	0.0001	-0.06		1.08			
			(4.00)	(9.46)	(1.77)		(1.11)	0.975	277.9	0.0
11	MATSLSB	-0.31	0.09	0.0001	0.004	-0.07	1.03			
		(0.07)	(1.74)	(0.91)	(0.17)	(1.71)	(1.55)	0.325	3.70	0.0
12	MATSLSB		0.09	.0001		-0.07	1.08			
			(8.55)	(13.40)		(1.96)	(1.86)		659.1	0.0

Notes: 1. t statistics in parentheses.
2. All data comes from the Bulletin of Governors of the Federal Reserve System and Statistical Release E2.

numbered regressions report the results of a search for the specification that maximized the adjusted R squared.

Table 3 shows the results of regressions on the proportion of loans in each category that carry a floating rate. We can see immediately that, except for the small and medium loans of the small banks, the R squared's are quite high and that there is no autocorrelation in the residuals. The volume of commercial paper outstanding does have a significant negative correlation with the use of floating rates on large loans. Remember that these are the only class of loans for which commercial paper is a close substitute. The SIZE variable is predicted to have a negative impact on the use of floating rates. In all categories of loans except large ones its coefficient is insignificant. For the large loans its coefficient is of the predicted negative sign for the large loans of the large banks but is positive for the large loans of the small banks.

Table 4 shows the results for the maturity regressions. The prediction for the commercial paper variable is again that it should enter with a negative sign in the large loan regressions, and the data support this for the large banks. Similarly, the SIZE variable is predicted to enter negatively. However, the regressions show it to be insignificant in all categories of loans except the small loans of the small banks, where it is very small but positive.

It is worth noting that in all the regressions the volatility of the Treasury Bill rate is insignificant and that in most of the regressions the level of the Treasury Bill rate is insignificant and where it is significant it has opposite signs in different equations. This suggests that interest rate movements had little or no independent impact on the terms of bank loans over this period.

3. Conclusions

Contract, or more precisely, indexation theory's ability to explain the changes in terms of lending is mixed. Table 2 gives very strong support for Gray's theory, which predicts an inverse correlation between maturity and the use of floating rates. The extensions of that theory used to explain the diversity of behavior across loan and bank categories do less well. Indeed, only in the case of the large loans of the large banks is it confirmed. While this is disappointing in itself, it is gratifying that the large loans of the large banks represented 73.2% of all the new, short-term, commercial and industrial loans of all sizes made by all banks in the period 1983.I - 1984.I. Thus at least the theory works for almost three-quarters of all such loans. That the theory does not work well for small and medium loans may reflect the fact that these loans are often not sold separately from banking services. In contrast, the theory treats loans as independent of other trades between the bank and its borrowers which is often the case for large loans but seldom the case for small loans.

The hypothesis that the growth of the commercial paper market is somehow connected to the changes in the terms of large loans is supported by the data, though how it is connected is still an open issue. Finally, we have seen that the data reject any independent role of interest rates or their volatility on the terms of lending within this period.

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