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LOAN COMMITMENTS AND MONETARY POLICY

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ABSTRACT

The impact of loan commitment agreements on the way in which changes in modetary policy affects the economy is examined. In particular, the empirical relevance of quantity credit rationing in the transmission of monetary policy is studied with VAR models. We find evidence of a differential impact of monetary policy on loans under commitment and not under commitment. Our conclusion is that credit rationing for bank loans does occur, although loan commitments effectively protect borrowers from credit rationing. Thus, loan commitments which insulate borrowers from the effects of quantity rationing force monetary policy to work exclusively through interest rate channels.

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1. INTRODUCTION

About three-quarters of all bank loans to business in the U.S. are made under loan commitment agreements. Under these agreements, banks promise to provide borrowers with funds, up to a ceiling, any time when the need arises, during the term of the agreement. If and when the commitment is used the borrower pays an interest rate that is usually related to market rates at the time.

In this paper we examine the impact of these commitments on the way in which changes in monetary policy affect the economy. In particular, we examine the empirical relevance of quantity credit rationing in the transmission mechanism of monetary policy. A loan commitment, at least in the short run, insulates borrowers from the possibility of being quantity rationed. So, if indeed such rationing is important we should find that a tightening of monetary policy has a different effect on loans under commitment than on other business loans. If this turns out to be the case, the important implication is that loan commitments by making quantity rationing largely irrelevant, force monetary policy to work only through interest rate changes. To the extent the interest rate channel is less reliable than the quantity rationing channel, the effectiveness of monetary policy will be reduced.

So the main hypothesis we will be testing is whether a tightened monetary policy has a different effect on loans under commitment than on other business loans. To test this hypothesis we disaggregate bank loans into loans under commitment and loans not under commitment and we do causality tests using vector autoregressions.

We believe our study makes two important contributions. First, by disaggregating loans, we devise an empirical test of credit rationing. Second, we use a data set that to the best of our knowledge has not been analyzed in the past. This data set comes from a monthly survey of large banks, the Federal Reserve has been carrying out since 1973. The survey gathers information on the volume of loans under commitment and on total unused commitments.

The paper is arranged as follows. In section 2, the loan commitment arrangement is briefly described and our data set is presented and discussed. Section 3 specifies our hypotheses concerning the channels of monetary policy and relates them to the literature. Causality tests are presented in section 4 and the results are summarized in section 5.

2. LOAN COMMITMENTS

2.1. Institutional Structure

A loan commitment obligates the lender to make loans up to a maximum amount but typically it does not fix the interest rate at which the loan will be made.[1] Most often this rate is a premium over the prime rate. Usually, commitment agreements last about a year and are often routinely rolled over. In addition, to the interest charge paid when the commitment is used, there is a fee paid on the unused portion of the commitment. Typically, this fee is

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[1]It is important to note here that the term loan commitments covers a number of diverse arrangements. For example lines of credit, back-up lines of credit, term loan commitments and revolving credit arrangements all go under this heading.

about 0.4% of the unused volume so that maintaining an unused commitment is expensive. In return for the fee, potential borrowers can obtain financing without further application or review. However, it is also the case that loan commitments often include provisos concerning the borrowers continued credit worthiness.

2.2. Data

The Board of Governors of the Federal Reserve began its Survey of Commercial and Industrial Loan Commitments at Selected Large Commercial Banks in 1973. The monthly survey of approximately 120 banks is the source of our data on commitments. These data include both formal contractual and informal agreements between the lender and borrower. A consistent seasonally adjusted time series of the data was prepared by David Small of the Board's Banking Studies Section. Some further adjustments were necessary to make the data consistent with the survey releases after some recent bank mergers.[2] A plot of data from the loan commitments survey is in Figure 1. It shows the volume of C&I loans under commitment and also the volume of unused loan commitments for the period 1973 to 1985.

Unfortunately, the loan commitments survey does not collect data on the volume of total C&I loans. The best source of data on the total volume of C&I loans is the seasonally adjusted time series prepared by the Federal Reserve Bank of St. Louis from the Federal Reserve Board's survey of large weekly

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[2]The original data (not corrected for bank mergers) are published in Board Statistical Release G.21.

reporting banks.[3] These data are sufficiently comparable to the data from the loan commitments survey to be used together. Figure 2 which shows the volume of C&I loans and the level of M1, provides some indication of the importance of C&I loans. C&I loans outstanding are almost half as large as the money supply and have grown at a similar rate over the last 15 years.

The large weekly reporting banks (banks with current assets in excess of $1.4 billion) own about half of all U.S. commercial bank assets. Table 1 shows the major asset categories for these banks at the end of 1984. All asset categories over 10% of total assets are shown. Since more than two-thirds of all C&I loans are made under commitment agreements, loans under commitment are larger than the next largest asset category (real estate loans). Thus, it is clear that the distinction between C&I loans made under commitment and not made under commitment is worth exploring. It is well known that the other major bank asset categories -- investments, real estate loans, loans to individuals -- behave very differently with respect to monetary and real changes in the economy. It is our purpose to see whether similarly large behavioral differences exist for the components of the largest category - C&I loans.

Many observers have the impression that the proportion of loans made under

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[3]The series has been corrected to account for breaks in the data and the weekly data were aggregated to form the monthly series used here. There are now 168 large weekly reporting banks in the sample that provides the total loan data. There are 119 large banks in the loan commitments survey. Since there is considerable overlap between the two samples, we feel that the two series can be used together for time series analysis.

commitment has been increasing. However, the data shown in Figures 1 and 2 and summarized in Table 2 do not support this. The proportion of the total volume of outstanding C&I loans made under commitment does not show any discernible trend.

The impression of increasing importance of loan commitments comes from another data source which provides information on the terms of new loans: the quarterly Survey of the Terms of Bank Lending that the Federal Reserve Board has conducted since 1977. This survey collects data from 340 banks on the terms of new loans. Among the information collected is the percent of new loans made under commitment. Table 3 shows the percent of new C&I loans made under commitment for a subsample of 48 large banks. It indicates that there has been a rapid increase in the fraction of new loans made under commitment.

The apparent discrepancy can be understood if we remember that the data in Figures 1 and 2 and the growth rates in Table 2 are based on stock data while the data from the Survey of Terms of Bank Lending in Table 3 are flow data. A larger fraction of new loans are made under commitment and the proportion of total loans outstanding under commitment is apparently unchanged. These two observations are consistent because the average term of loans under commitment has been declining.

A final interesting aspect of the data in Figure 1 is the rapid rise in the volume of unused loan commitments. To a large extent this reflects the fact that many issuers of commercial paper are required to take out credit lines to reduce risk. Also, some unused commitments may be unuseable if the

borrower does not satisfy the performance criteria in the agreement. Nevertheless, this enormous stock of unused commitments could have implications for both the role rationing plays in the transmission of monetary policy and for the health of the banking system. For the banking system, unused commitments represent a potential liability which raises questions of capital adequacy. For the macroeconomy, the unused commitments have the potential of enabling the economy to avoid quantity rationing in periods of monetary tightness.

Although the commitments survey data and the data on total C&I loans are not exactly comparable, it is worth while to investigate the similarities and differences in the behavior of the two series.[4] We do so by comparing the growth rates of the two series over different cyclical episodes. We can isolate three reference cycle recessions in the available time period. In addition we can identify three periods which are commonly called credit crunches.[5] Table 2 shows the annualized growth rates of loans under commitment and total C&I loans in each of these periods. In periods of economic and financial distress there is a tendency for loans under commitment to grow more rapidly than total C&I loans. This observation confirms our initial hypothesis that policy may have a differential impact on loans made

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[4]The data from the Survey of the Terms of Bank Lending will not be used further for two reasons. First, our interest is in the total bank balance sheet so that the new loans data is not relevant. Second the data are only available quarterly for a short period - since 1977.

[5]The reference cycles are the standard NBER-BCD dating. The credit crunches are based on suggestions made by Eckstein and Sinai (1986).

under commitment and those not. Loan commitments are used more intensively in periods of distress for the simple reason that they are by their very nature a form of insurance against such situations.

3. LOAN COMMITMENTS AND THE TRANSMISSION OF MONETARY POLICY

3.1. The Availability Doctrine

The notion that quantity credit rationing is important in the transmission mechanism of monetary policy, can be traced back to the availability doctrine developed in the 1950s.[6] According to this doctrine, monetary policy influences the real economy, through the availability of bank loans. A tightening of monetary policy by creating a reserves shortage raises the cost of funds to banks. The higher bank input costs, affect bank loans in two ways: through loan rates and through quantity rationing.

As their input costs rise, banks may raise loan rates, causing businesses to curtail investment and consumers to postpone purchases. We call this the "interest rate channel". It suggests a causal relationship from monetary policy to bank loan rates, to the quantity of bank loans, to real economic activity.

The availability doctrine actually emphasized quantity rationing rather than loan rate changes as the primary cause of a monetary policy induced economic slowdown. Quantity rationing refers to a reduction in loans over and

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[6]See for example Kareken (1957), Scott (1957) and Tussing (1966).

above any interest rate induced reduction.[7] As the bank input costs rise, banks do not raise loan rates sufficiently to clear the market and resort to credit rationing.[8] We call this the "credit rationing channel" and it implies a direct causal link from changes in monetary policy to changes in bank loans and hence to real economic activity.[9]

Both versions of the availability doctrine are based on two important assumptions. First it is assumed that a Fed induced change in reserves will have a significant impact on the cost of funds to the banking industry. But banks experiencing a reserves shortage, can always purchase funds or liquidate their government securities portfolio. So if the supply of funds to the banking industry is interest elastic, the Fed may fail to significantly raise the input costs of banks and thus fail to achieve a reduction in bank loans. A finding of no causality from a monetary policy indicator to bank loans and/or loan rates will support this view.

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[7]According to De Leeuw and Gramlich (1969), credit rationing can also involve changes in loan terms (down payments, compensating balances) which change the true price of borrowing without being reflected in explicit loan rates.

[8]Scott (1957) suggested that a reason for this is the banks desire to avoid risk. Kareken (1957) suggested a "lock-in" effect because of the banks unwillingness to sell long term securities at a loss in order to expand business loans. More recently "equilibrium" credit rationing models have been developed to explain why banks may not raise rates to clear the market. The crucial ingredient here are information asymmetries. See for example Keeton (1979) and Stiglitz and Weiss (1981, 1983).

[9]Blinder and Stiglitz (1983) and Blinder (1984), use the "equilibrium" credit rationing models to emphasize the credit rationing channel.

Second, there is the assumption that bank loans are unique, so that a reduction in bank loans will inevitably lead to a slowdown in real economic activity. This need not happen if there are close substitutes to bank loans, for example commercial paper, corporate bonds and equity. In such a case there may be a monetary policy induced fall in bank loans, but no effect on real economic activity.

3.2. Effect of Commitments

The fact that most bank loans to business are made under commitment, changes the picture dramatically. First of all, the great demand for loan commitments, in itself, can be viewed as evidence that borrowers fear they may be quantity rationed in the future. Loan commitments are essentially an insurance policy. But insurance against what? Since most of these commitments do not fix the loan rate in advance, it is not interest rate uncertainty that borrowers are insuring against.[10] Moreover, since these arrangements, typically can be reviewed if the creditworthiness of the borrower deteriorates dramatically, they cannot be viewed as an insurance against such an event.

One possibility is that loan commitments are a way of reducing transaction costs and delays in satisfying an unanticipated urgent need for funds.

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[10]Almost all of the theoretical work on loan commitments and credit lines assumes that the loan rate is fixed in advance which is not always the case. See for example Campbell (1978), Thakor, Hong and Greenbaum (1981), Thakor (1983) and more recently Boot, Thakor and Udell (1986) and Greenbaum and Berkovitch (1986). In our view, loan commitments emerge as a mechanism that allows the avoidance of rationing effects on borrowers.

Establishing a new banking relationship may involve extensive delays which can be very costly. Furthermore, the customer may find that a new banking relationship is not readily available with as attractive a credit rating. However, given the high upfront fee expense it is hard to imagine that firms obtain these commitments just to reduce transaction costs.

The most plausible explanation, is that loan commitments are a means of insuring against the possibility of being rationed:[11] through these commitments, companies make sure they will be able to get credit, at some price, in the event of a credit crunch. In its absence, the unavailabilty of funds may sometimes impose serious constraints on the operations of the firm.

The implications for monetary policy are clear. Since loan commitments insulate borrowers from the danger of being quantity rationed in the future, changes in monetary policy could only affect loans under commitment through the interest rate channel. Essentially, under a loan commitment, the supply of funds to the borrower is horizontal at the going market rate, up to the commitment ceiling.[12] If banks raise their lending rates in response to a scarcity in reserves, we will be moving up the loan demand schedule. If banks do not raise loan rates sufficiently to clear the market so that they have to

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[11]In a few cases loan commitments may have a strategic motivation, e.g. to indicate seriousness in a take-over bid.

[12]For simplicity in our discussion we assume the commitment ceilings do not bind. Ham and Melnik (1985) find some evidence that for corporate borrowers these ceilings occasionally bind. On the other hand, Sofianos (1986), finds that for consumers, ceilings on bank credit cards do not bind.

resort to rationing, it is those without commitment agreements that will be rationed. Thus the brunt of the impact of a tightened monetary policy is likely to fall on loans not under commitment.

Our maintained hypothesis is represented by case 3, in Table 4. Monetary policy affects the cost of inputs to banks and this effect is transmitted to the market for bank loans through both the interest rate channel and the credit rationing channel. Loans are disaggregated into loans not under commitment (NUC) and loans under commitment (LUC). The interest rate channel is represented by arrows from monetary policy (MP) to loan rates (LR) to both types of loans.[13] The credit rationing channel is represented by the direct arrow from monetary policy to loans not under commitment. Credit rationing does not affect loans under commitment. We also hypothesise that bank loans are unique, so that supply side induced changes in bank loans will affect real economic activity (IP), hence the arrows from both types of loans to IP.

If only the interest rate channel is operating and there is no credit rationing, there should be no direct effect from monetary policy to loans under commitment: Case 2 in Table 4. So the crucial test confirming the presence of quantity rationing is direct causality from monetary policy to loans not under commitment. Unless the two types of loans are examined separately, any evidence of rationing may be obscured by the fact that the

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[13]The interest rate effect on the two types of loans need not be the same. The only evidence on the interest rate elasticity of commitments and loan demand under commitment can be found in Kim, Plaut and Melnik (1986). They analyze a sample of loan commitments and conclude that there is considerable interest elasticity of both loan demand and the demand for commitments.

market is dominated by loans under commitment.

Table 4 also presents a number of other possibilities. If there are no interest rate effects (e.g. if loan demand is interest inelastic), and only the credit rationing channel is operating, monetary policy can affect real economic activity only through loans not under commitment, Case 1. If bank loans are not unique there should be no causation from either type of loan to real economic activity, Case 4. Finally, Case 5, represents the situation when monetary policy has no significant effect on bank inputs.[14]

3.3. Evidence on the Transmission Mechanism of Monetary Policy

A recent paper by King (1986) examines the transmission mechanism of monetary policy through bank loans. King finds evidence of a direct link between a measure of liquidity (demand deposits) and economic activity, rather than an indirect link through bank loans.[15] Changes in bank loans do not appear to Granger cause economic activity. This finding is confirmed in a more recent study by Bernanke (1986). King also finds very little evidence that banks ration loans, although banks themselves appear to be liquidity constrained, especially in periods of "tight money". One interpretation of these findings is that although the interest rate channel seems to be working,

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[14]In Table 4 we only present policy induced causation patterns. Any reverse causation from real economic activity to bank loans, loan rates and/or our monetary policy measures we interprete as caused by changes in the demand for loans.

[15]B. Friedman (1982) reaches a somewhat different conclusion. He finds that total credit is more closely related to real economic activity than narrower measures of liquidity.

the relevant interest rate elasticities are not big enough for a rise in interest rates to cause a significant economic slowdown.

Another interpretation is that both the relationship between monetary policy and the supply of bank loans and the relationship between bank loans and economic activity, are dominated by the large fraction of loans made under commitment. It is necessary to disaggregate in order to see whether the credit rationing channel is indeed important for loans not under commitment. If this is the case, the conclusion would be that the increasing popularity of loan commitments has reduced the impact of monetary policy, by confining the credit rationing channel to a small subset of loans. This possible consequence of loan commitments was first noted by Wojnilower (1980). He argues that the growth in commitments was a response to the threat of credit crunches. He is primarily concerned, however, with their implications for the adequacy of bank capital rather than on their impact on monetary policy.

4. THE EMPIRICAL EVIDENCE

In this section the channels of causality discussed in the previous section are tested. VAR techniques are used to investigate causality among monetary policy, interest rates, bank loans and economic activity. Vector autoregressions are well suited for this type of investigation which focuses on issues of causality without specifying a full structural model of all relevant interrelationships. It is a valuable technique for testing directions of causality among a set of variables with a model that does not impose any structural priors.

The VAR models are estimated from July 1973 to October 1985. The estimation period is short because the loan survey data is only available since 1973.[16] The data are monthly which we believe is a distinct advantage for examining the channels of monetary influence. It is likely that many of the existing causal patterns would be obscured with quarterly data.

The data on loans have already been extensively discussed in section 2. The following terminology is used for the loan variables: CIL stands for total C&I loans, LUC represents C&I loans made under commitment and NUC, C&I loans not under commitment, NUC = CIL - LUC.[17] The additional variables which appear in the models are indicators of monetary policy, interest rates and a measure of real economic activity. These variables were taken from the Citibase data tape. The indicators of monetary policy tested are:

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[16]Although the period is short, it does include several full business cycles. Making things more difficult for us the sample period includes at least one important policy regime change. Unfortunately, the number of sample points is too small to examine differences across regimes.

[17]In doing this disaggregation two issues must be considered. First, as discussed in section 2, the data series for LUC is not entirely comparable to the series for CIL because the two series are constructed from two different survey samples. The two samples are sufficiently similar so that we feel this is not an important problem. Second, instead of constructing NUC in this way, we could have estimated regressions with LUC and CIL and then tried to make inferences about the behavior of NUC. For example, suppose monetary policy affects CIL but it does not affect LUC. Does this imply that monetary policy must affect NUC? The answer is no, not necessarily. The correlations of the errors could be such that the results from an LUC, NUC specification can be quite different from the results from an LUC, CIL specification. An unexplained shock could have opposite effects on LUC and NUC, so that the dynamic behavior of the aggregate series could be very different from that of its components. We believe that nothing can be learnt about the behavior of NUC by examining the behavior of LUC and CIL.

M1 -- Narrowly defined money supply
DD -- Total bank demand deposits
NBR -- Nonborrowed reserves
FF -- Average effective Federal Funds rate.

Some of these can be viewed as truly exogenous (e.g. NBR) while others are subject to feedback effects from the level of economic activity (e.g. M1). The interest rate variables used in our experiments are:

RCP -- Commercial paper rate
RP -- Prime rate.

The commercial paper rate is a representative short-term interest rate which is likely to vary closely with bank loan rates. We view it as a better proxy for loan rates than the prime rate which is not as sensitive to changes in financial conditions. Finally, the level of real economic activity is measured by the index of industrial production (IP).

Since the number of degrees of freedom is limited (there are 160 monthly observations), the VAR systems estimated restrict the number of lags to 12 for each variable. All variables are in logs and the data (except interest rates) are seasonally adjusted. Each VAR system includes trend and trend squared terms.

The first set of relationships to be examined concern the transmission of monetary policy shocks to loan rates and on to bank loans. Table 5 presents the significance levels of the F statistics for Granger causality tests for two systems. The first treats C&I loans as an aggregate and the second separates them into two parts depending on whether the loans are made under commitment or not. The column heads represent the dependent variables. The

significance of the determinants of the respective dependent variables is found by reading down the column. An asterisk indicates significance at the 10% level.

Table 5(A) shows support for the credit rationing channel; there is a direct effect from M1 to CIL. Although M1 strongly causes interest rates, interest rates do not cause loans, so that the interest rate channel is inoperative. However, in Panel (B) where CIL is disaggregated there is evidence of both the interest rate and credit rationing channels. The monetary policy indicator (M1) has a direct effect on loans not under commitment and no effect on loans under commitment. In addition, M1 affects both types of loans indirectly through interest rates. The interest rate effect on loans under commitment, however, is weak, significant only at the 15% level.[18] The results here support our maintained hypothesis. Notice that in both models there is feedback from RCP to M1 which reflects the fact that the money supply is to some extent endogenous.

A VAR system can also be used to calculate the proportion of each variable's forecast error which can be attributed to the innovations in each variable in the model. This procedure is called a variance decomposition. It requires inverting the estimated autoregressive equations so that each variable appears as a function of lags in the innovations in itself and the other variables in the model. The variance decomposition uses an

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[18] A joint significance test for the effect of both M1 and RCP on LUC was carried out. No evidence of joined causality is found (the F statistic is 1.24).

orthogonalized version of the errors which depends on the ordering of the variables.[19] In all cases we use the ordering implicit in the discussion in section 3. It is the order in which the variables appear in Table 5. This ordering assumes that monetary policy is exogenous and does not react to economic conditions which might be the case in certain policy regimes. The variance decomposition results are important because they provide some indication of the magnitude of the relationships among the variables.

The variance decomposition results for the system shown in Panel (B) of Table 5 are summarized in Table 6. The decomposition is shown for forecast horizons of 12 and 36 months. Each entry in the table is the percent of the variance in the forecast error of the row variable attributable to the variable at the column head. The results indicate that interest rates have a small influence on both LUC and NUC (6% in both cases, at 36 months). Contrary to our priors, M1 has a larger impact on loans made under commitment than on loans not under commitment (22% and 4% respectively, at 36 months). This finding contradicts the results in Table 5(B). Forced to choose, we believe the causality tests are the more reliable, since the variance decompositions depend on the size of coefficients many of which are individually insignificant.

In Table 7 we present causality tests with each of the models in Table 5

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[19]Cooley and Leroy (1985) express some reservations about VAR modelling in part because of this subjective element. However, the causality tests which are our principle interest are not subject to this critique. In addition, the variance decompositions for our results were largely robust to changes in the ordering of the variables.

extended to include industrial production. Panel (A) again provides strong support for our maintained hypothesis. There is evidence of both direct effects on C&I loans from monetary policy (rationing channel) and indirect effects through interest rates. In addition bank loans cause real activity. As before, there is feedback from RCP to M1; although there is none from IP or CIL to RCP.

The results in Panel (B) are for a five variable VAR system. We should view these with some caution because the estimation uses up a large number of degrees of freedom. Nevertheless, some interesting inferences can be drawn. There is a very distinct difference between loans under commitment and not under commitment. C&I loans made under commitment are entirely exogenous. A joint significance test for M1, RCP and IP supports this exogeneity finding: there is no evidence of joint causality from these three variables to C&I loans under commitment (the F statistic is 1.3). Loans not made under commitment arrangements are affected both by interest rates and directly by monetary policy (the rationing channel). The disappointing aspect of this particular set of results is that contrary to our maintained hypothesis interest rates do not affect loans under commitment. Another disappointing result is the apparent exogeneity of industrial production. Loans neither individually nor jointly have any significant effect on IP.[20] A possible explanation for this result is that bank loans are not unique. As mentioned in section 3, a monetary policy shock which reduces loan volume may not effect

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[20]The F statistic for the joint significance test is 1.15. The critical value at the 5% significance level is roughly 1.7.

real activity if there are available substitutes for bank financing.

More generally, the exogeneity of industrial production can be interpreted as supporting the real business cycle view which states that the financial sector responds passively to exogenous real sector shocks (King and Plosser (1984)). However, such an interpretation may be premature for two reasons. First, although each individual variable in the IP regression is insignificant there is some evidence that M1, RCP, LUC and NUC, jointly have some explanatory power. The F statistic for this joint significance test is 1.55 which is slightly higher than the critical value at the 5% significance level (1.52). Moreover, the differences between the results in Panels (A) and (B) indicate some sensitivity of the causality orderings to specification changes. As will be shown below this sensitivity does not depend on the choice of monetary policy indicator or interest rates. Instead, it only depends on whether CIL is disaggregated or not.

Although the causality tests in Panel (B) of Table 7 indicate that IP is not significantly caused by loans, the variance decomposition results for the system show sizeable effects. These results are shown in Table 8. There are some reasonably large effects of the loan variables on IP when the forecast horizon is lengthy. With a 36 month horizon, loans not under commitment have a larger effect (10%) on the variance of forecast errors of IP than do loans under commitment (6%). This provides some evidence that loans not under commitment are more important in determining economic fluctuations. The impact of interest rates on LUC and NUC are about the same size, while M1 has a larger impact on NUC. This is consistent with the hypothesis that monetary

policy has a larger direct effect on loans not under commitment: the commitment arrangements imply that NUC bears the brunt of any rationing effect. Again, like in Table 6, the direct effect of M1 is larger on LUC than on NUC which is contrary to our expectations.

The VAR models shown in Tables 5 and 7 are for the most part robust with respect to changes in the specification of the interest rate and monetary policy variables. Causality tests with alternative variable specifications are shown in Table 9. The prime rate was tried as an alternative measure of the loan rate. The results in Table 9(A) can be compared to those in Table 5(B) which use the commercial paper rate. As before the interest rate and M1 channels are stronger on NUC than on LUC.

The next three panels of the table use alternative indicators of monetary policy. The model in Panel B uses demand deposits as the monetary policy variable like in King (1986). The results shown here suggest that loans under commitment are exogenous. Similar results are found with the Federal Funds rate (Panel C), but not with nonborrowed reserves (Panel D). In this last system, the results are the opposite of what we expect.

King finds that M1 dominates C&I loans in causing economic activity. However, his measure of economic activity is "nominal industrial production," the index of industrial production multiplied by the Consumer Price Index. With that measure, his results are replicated with our data. Causality from loans to nominal IP is weak (significant at the 10% level only) and causality from M1 to the real sector is significant at the 5% level. There is however a

readily available and more sensible monthly measure of aggregate nominal economic activity: personal income. However, with personal income, both M1 and C&I loans are exogenous. Generally, both ours and King's results indicate some sensitivity to the specification of the real sector variable.

5. CONCLUDING COMMENTS

Using vector autoregressions and a unique data set, we find some evidence of a differential impact of monetary policy on loans under commitment and not under commitment. Both types of loans respond to fluctuations in interest rates, but loans not under commitment are also directly affected by monetary policy. This result can be interpreted as evidence of quantity rationing of loans not under commitment. Thus, the eagerness of borrowers to obtain, at considerable expense, loan commitments can be understood as a desire to insure against any such rationing.

Our conclusion is that credit rationing does occur in the market for bank loans. However, loan commitments effectively protect borrowers from quantity rationing. The implication is that loan commitments by insulating borrowers from the effects of quantity rationing force monetary policy to work exclusively through interest rate changes. The interest rate channel is likely to be more slow and less reliable than the rationing channel, so that the effectiveness of monetary policy will be reduced. This implication and the observation that the volume of unused commitments has increased rapidly, leads us to expect that monetary policy is likely to become even less effective in the future.

We consider our results in many respects preliminary. First, we only look at business loans. Credit crunches may also have a differential impact on household borrowing. Second, our data set on loan commitments only covers a relatively short period. Third, tests based on structural models like that specified by King (1986) and on mixed VAR-structural models as suggested by Bernanke (1986) can throw more light on the whole issue. Finally, there is another possible explanation for our finding that rationing has no effect on loans under commitment. This may be so not because commitments effectively protect borrowers from rationing but because the borrowers that get these commitments are those that would not have been rationed anyway. Commitments are useful for these borrowers as a signalling device. If this is the true explanation then commitments have no implications for the transmission mechanism of monetary policy. It is very difficult to distinguish between these two alternative explanations, but clearly some attempt should be made.

Figure 1

C & I Loans Under Commitment and Unused Commitments

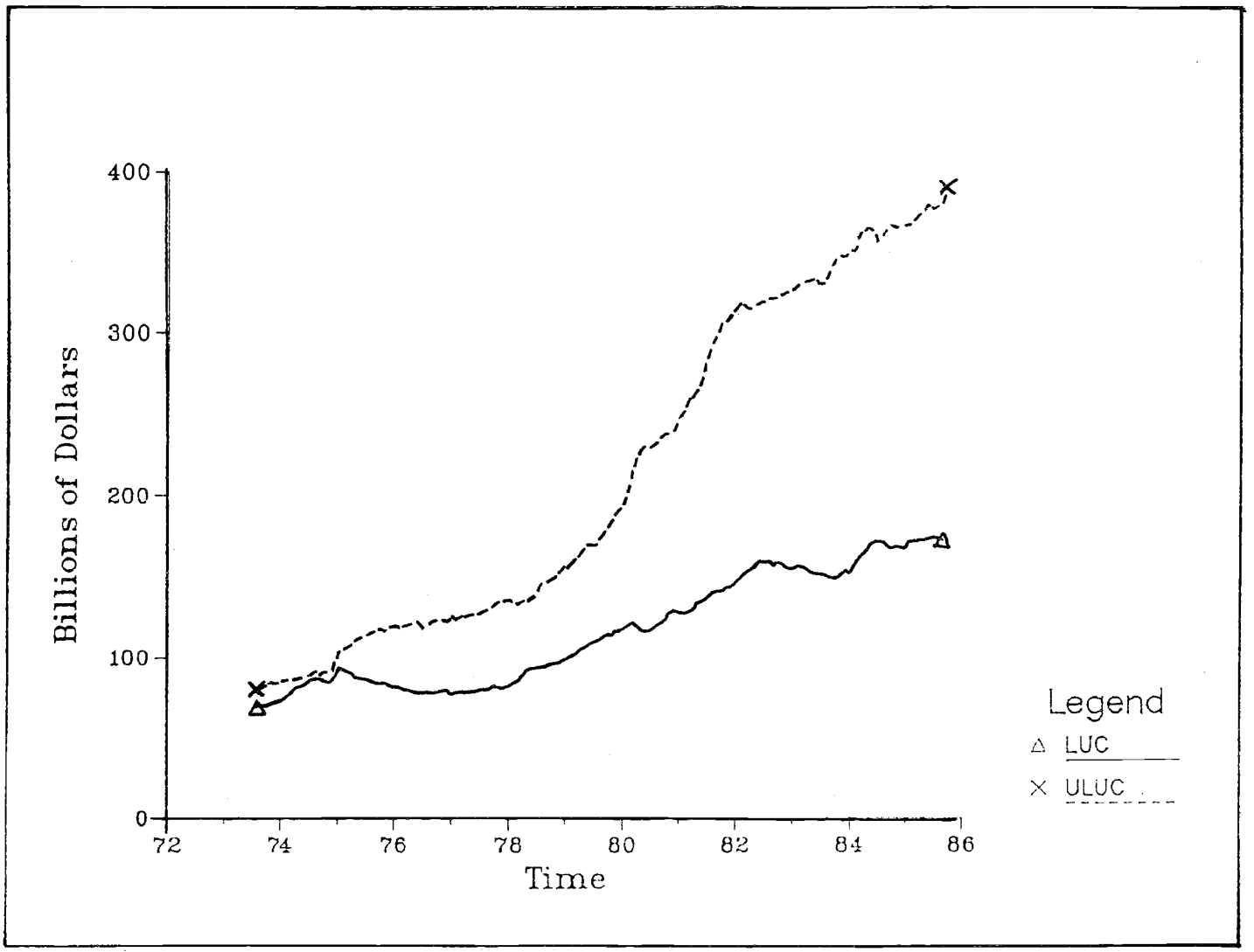


Figure 2

Total C&I Loans and M1

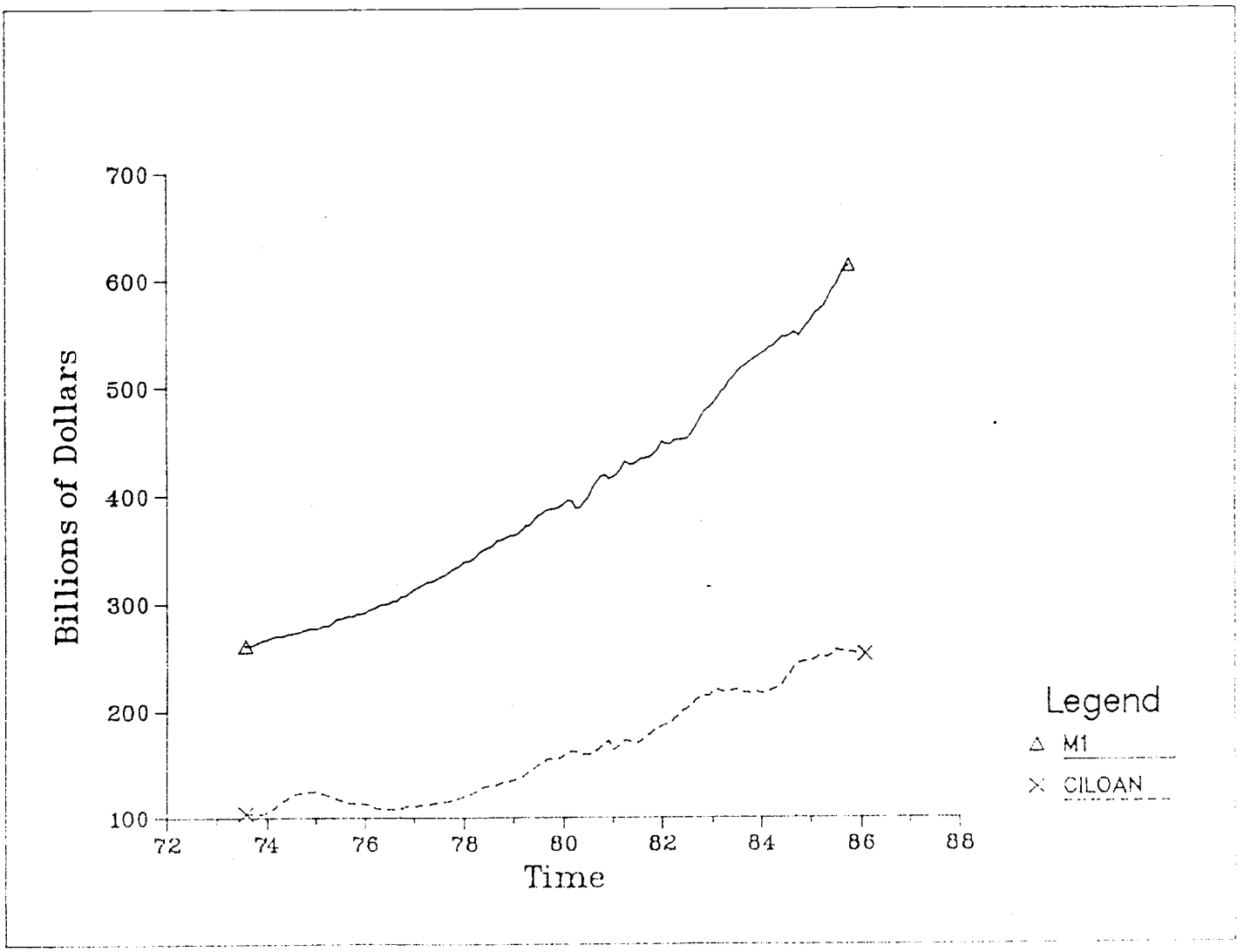


Table 1

All Large Weekly Reporting Banks - % Of Total Assets, 1984

Investments	12%
Loans	61
C&I	24
Real Estate	15
Individuals	11

Table 2

Annualized Growth Rates of C&I Loans

	Loans Under Commitment	Total C&I Loans
Overall sample period:		
73-8 to 85-10	7.7	7.5
73-8 to 81-1	8.6	7.0
81-1 to 85-10	6.4	8.3
Recessions:		
73-11 to 75-3	20.9	13.7
80-1 to 80-7	-1.2	1.4
81-1 to 82-11	7.4	10.3
Credit crunches:		
73-8 to 74-8	24.7	18.0
78-1 to 80-3	49.8	36.1
81-1 to 82-1	14.4	13.5

Table 3

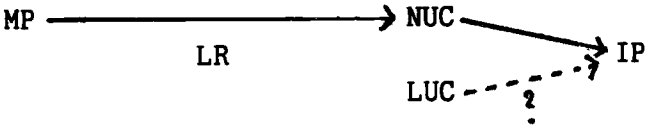
Proportion on New C&I Loans Made Under Commitment

1977	56.6%
1978	55.6
1979	54.2
1980	54.7
1981	53.0
1982	62.8
1983	67.0
1984	72.5
1985	74.4

Source: Survey of Terms of Bank Lending

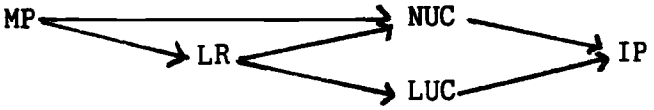
Table 4: Possible Causation Patterns

1. Monetary Policy affects bank inputs, banks are unique, only credit rationing channel.



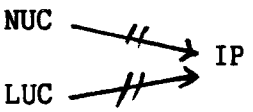
2. Monetary Policy affects bank inputs, banks are unique, only interest rates channel.

3. Monetary Policy affects bank inputs, banks are unique, credit rationing and interest rates channels.

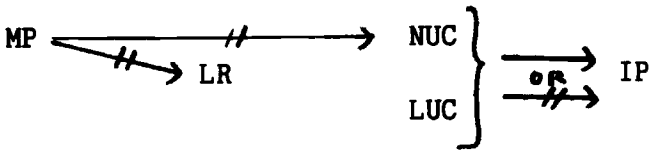


4. Monetary Policy affects bank inputs, banks are not unique.

As in 1, 2 or 3



5. Monetary Policy does not affect bank inputs.



Notation

MP: monetary policy
LR: loan rates
LUC: loans under commitment
NUC: loans not under commitment
IP: real economic activity

Table 5

Significance Levels for Causality Tests

(A)

	M1	RCP	CIL
M1	0.00*	0.00*	0.05*
RCP	0.01*	0.00*	0.54
CIL	0.41	0.44	0.00*

(B)

	M1	RCP	LUC	NUC
M1	0.00*	0.00*	0.83	0.10*
RCP	0.00*	0.00*	0.15	0.01*
LUC	0.03*	0.59	0.00*	0.10*
NUC	0.15	0.18	0.19	0.00*

Table 6

Variance Decomposition of VAR System in Table 5(B)

	M1	RCP	LUC	NUC
Dependent Variable:				
M1				
12 months	39	20	28	13
36 months	23	13	27	36
RCP				
12 months	46	37	14	2
36 months	30	23	35	11
LUC				
12 months	14	12	44	29
36 months	22	6	45	27
NUC				
12 months	4	4	16	76
36 months	4	6	18	72

Table 7

Significance Levels for Causality Test With Industrial Production

(A)

	M1	RCP	CIL	IP
M1	0.00*	0.00*	0.00*	0.16
RCP	0.00*	0.00*	0.02*	0.23
CIL	0.71	0.60	0.00*	0.05*
IP	0.09*	0.32	0.02*	0.00*

(B)

	M1	RCP	LUC	NUC	IP
M1	0.00*	0.00*	0.49	0.07*	0.31
RCP	0.02*	0.00*	0.15	0.03*	0.58
LUC	0.19	0.45	0.00*	0.15	0.51
NUC	0.05*	0.19	0.43	0.00*	0.24
IP	0.10*	0.18	0.30	0.11	0.00*

Table 8

Variance Decomposition of VAR System in Table 7(B)

		M1	RCP	LUC	NUC	IP
Dependent Variable:						
M1						
	12 months	28	18	16	23	15
	36 months	18	21	12	21	28
RCP						
	12 months	29	36	8	4	23
	36 months	14	26	15	17	28
LUC						
	12 months	25	10	47	11	6
	36 months	13	7	37	21	23
NUC						
	12 months	3	15	18	40	23
	36 months	5	22	19	29	26
IP						
	12 months	7	7	4	3	78
	36 months	8	19	6	10	57

Table 9

Significance Levels With Alternative VAR Specifications

(A)

	M1	RP	LUC	NUC
M1	0.00*	0.00*	0.44	0.20
RP	0.03*	0.00*	0.13	0.08*
LUC	0.29	0.11	0.00*	0.21
NUC	0.20	0.03*	0.13	0.00*

(B)

	DD	RCP	LUC	NUC
DD	0.00*	0.01*	0.53	0.19
RCP	0.00*	0.00*	0.30	0.09*
LUC	0.20	0.70	0.00*	0.35
NUC	0.27	0.85	0.14	0.00*

(C)

	FF	RCP	LUC	NUC
FF	0.03*	0.21	0.45	0.23
RCP	0.60	0.04*	0.28	0.02*
LUC	0.38	0.52	0.00*	0.02*
NUC	0.86	0.54	0.09*	0.00*

(D)

	RES	RCP	LUC	NUC
RES	0.00*	0.40	0.02*	0.29
RCP	0.45	0.00*	0.00*	0.12
LUC	0.43	0.06*	0.00*	0.27
NUC	0.53	0.07*	0.18	0.00*

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