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Credit Effects in the Monetary Mechanism

Introduction

Monetary transmission is one of the great mysteries in economics. Namely, how can purchases or sales of just a few billion dollars in securities in the overnight reserve market have such large, persistent effects on overall spending? The traditional monetary transmission mechanism—a change in reserves alters interest rates and deposits, which in turn affects spending—begs a number of questions. For one, can a 50-basis-point change in the federal funds rate really make such a difference for investment in inventories, structures, housing, consumer durables, and other "interest-sensitive" sectors? Is it merely that higher interest rates reduce the present value, and hence demand, for such investments? Why does a shock to the federal funds rate leave spending depressed for a year or more after the funds rate returns to its initial level? It is good to acknowledge these "long" lags, but acknowledgment hardly explains them.

Credit effects, neglected in the traditional monetary mechanism, may solve some of the mystery. Given informational frictions in the right markets, tight monetary policy will also cause contractions in bank lending and therefore declines in spending by bank-dependent borrowers. This channel of policy is typically referred to as the narrow bank lending channel, discussed in some detail in Bernanke and Blinder (1988) and Kashyap, Stein, and Wilcox (1993). A second channel, referred to as the balance-sheet mechanism, can exist because tighter monetary policy causes firms' interest payments to rise at a time when revenues are falling, weakening firms' balance sheets and limiting their ability to grow and spend. Moreover, the increased risk of firms shirking their loans in the aftermath of tight policy may also cause the overall supply of funds to fall (Bernanke, Gertler, and Gilchrist 1999). Note that both credit effects—the narrow bank lending channel and the broader balance-sheet mechanism—are endogenous to the monetary policy process yet are completely missing from the mostly frictionless monetary mechanism.[1]

Policymakers at times have also resorted to more direct actions to limit bank credit "availability," such as interest rate ceilings, credit controls, and jawboning (Romer and Romer 1993). In contrast to the credit *channels*, these actions are not inherent or endogenous to the monetary mechanism; they are ad hoc actions intended to reduce bank loan supply without leading to higher loan rates (for political reasons, or because policymakers view higher rates alone as ineffective in curbing borrowing and spending).

This paper looks for evidence of both types of credit effects—those that are endogenous to the monetary mechanism and those that are exogenous—using information on banks' commercial credit standards as a proxy for bank credit availability. We compare results from an "off-the-shelf" macroeconomic vector autoregression (VAR) model extended to include the commercial loan market. Two different specifications of the loan market are considered: a classical

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market with the quantity and price (that is, interest rate) on loans and an augmented market with standards included as a proxy for loan availability. We consider first whether gyrations in credit standards are important in explaining loan and output dynamics—that is, do standards "matter" for the macroeconomy? Next, do changes in the stance of monetary policy cause lenders to change their standards? In other words, does monetary policy work in part through lending standards, or are changes in standards independent of policy? Last and most generally, is the impact of monetary policy on output diminished when we account for the impact of standards?

We present three principal findings. First, innovations or unanticipated shocks to standards have a significant impact on both commercial loans and output. Second, standards are not very sensitive to changes in monetary policy, at least not the policy *shocks* we identify with shocks to the federal funds rate. Thus, changes in standards appear to be largely exogenous to the policy process. And third, accounting for standards reduces the importance of funds rate shocks on output.

One interpretation of these findings, especially in the earlier part of our sample, is in terms of the credit "actions" and "crunches" described by Wojnilower (1980), Owens and Schreft (1995), and Romer and Romer (1993). These studies document a variety of actions by policymakers or legislators determined to limit credit flows from banks to borrowers, either to augment open market operations that seemed unable to reduce lending and spending or to obviate the political-heat-creating rise in loan rates that would be necessary to slow credit growth. De facto prime-rate ceilings in the late 1960s and early 1970s, for example, caused compression in the spread between bank loan rates and the federal funds rate whenever the funds rate rose, leaving banks no choice but to ration loans, that is, to tighten standards. In fact, we find a strong *negative* correlation between loan spreads and standards over the 1960s and 1970s. Tightenings in standards over these periods seem to mark these crunches reasonably well, which is one reason why we think standards matter so much in accounting for loans and output and in diminishing the importance of the funds rate. Part of the putative effects of monetary policy, that is, open market operations, may be the impact of these credit actions in disguise. When policy tightenings did not initially lead to credit curtailment, banks were "encouraged" to raise their standards.

The Federal Reserve largely eschews such credit actions now, so variations in standards these days are more likely manifested in balance-sheet deterioration that causes banks and other lenders to contract credit supply. In fact, the interest rate spread and standards are positively correlated post-1980, as credit models with informational frictions usually imply (Fuerst 1994): in the face of weakened firm balance sheets, banks raise both loan rates and loan standards.

II. Observing Commercial Credit Standards

The Federal Reserve has solicited qualitative information about banks' commercial credit standards off and on since 1967 through its Senior Loan Officer Opinion Survey on Bank Lending Practices.[2] Participating banks account for approximately 60 percent of all loans by U.S. banks and an even larger share of commercial and industrial (C&I) loans.[3] Coverage is national, with participating banks from all twelve Federal Reserve Districts. The response rate to the quarterly survey is virtually 100 percent.

We focus on the responses of bankers to the following question:

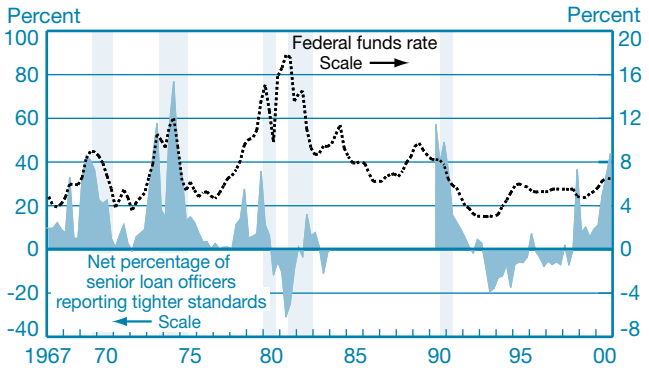
> Over the past three months, how have your bank's credit standards for approving loan applications for C&I loans or credit lines—excluding those to finance mergers and acquisitions—changed? 1) Tightened considerably, 2) tightened somewhat, 3) remained basically unchanged, 4) eased somewhat, 5) eased considerably.

The question's emphasis has changed somewhat over the years, necessitating some splicing of the series. From 1978 to 1984, when the standards question distinguished between loans at prime and loans above prime, we use the average of the responses to the two parts of the question. The question was dropped from the survey between 1984:1 and 1990:1, so our analysis excludes these "dark years."[4] Concerns about a credit crunch led to reinstatement of the question in 1990:2. Since then, lenders have been asked to report separately on standards for small firms (sales of less than $50 million) and middle-size and large firms. We use the latter series because it accounts for a larger percentage of total loans, but the 0.96 correlation between the two series makes the choice immaterial.

The *net* percentage tightening—the number of banks tightening less the number easing, divided by the number reporting—is plotted in Chart 1, along with recession indicators and the federal funds rate.[5] Tighter standards usually precede recessions, and standards appear positively correlated with the federal funds rate. The glaring exception to the second tendency is in 1980-81, when bankers reported easing standards, notwithstanding the sharp *rise* in the federal funds rate. After presenting our findings for the full sample period, we investigate robustness when the curious easing over 1980-81 is excluded from the estimation.[6]

Chart 1

Changes in Commercial Credit Standards and the Federal Funds Rate



Sources: Board of Governors of the Federal Reserve System, Senior Loan Officer Opinion Survey; Federal Reserve Board Statistical Release H.15: Selected Interest Rates.

Notes: Standards are not available between 1984:1 and 1990:2. The shaded bands indicate periods designated national recessions by the National Bureau of Economic Research.

III. Vector Autoregressions with Alternative Credit Markets

The proper modeling of bank loan markets is actually a long-standing macro issue:

> ". . . a recurrent theme in the literature and among market participants is that the interest rate alone does not adequately reflect the links between financial markets and the rest of the economy. Rather, it is argued, the *availability* of credit and the quality of balance sheets are important determinants of the rate of investment" (Blanchard and Fischer [1989], emphasis added).

In the spirit of this debate, we compare the impact of monetary policy shocks under a "classical" market with loans and loan rates with an augmented market that includes standards as a proxy for credit availability. We consider three questions: 1) Does the classical formulation suffice, or do we need standards for an accurate accounting of loan dynamics (that is, do standards "matter")? 2) Does tighter policy beget tighter standards (that is, is there a "standards channel" of policy)? and 3) Does accounting for standards alter the overall impact of a policy shock, through whatever channel (that is, are policy effects, or some part of them, really disguised credit effects)? To anticipate: yes, yes, and yes.

The core VAR is comprised of four macroeconomic variables: the logarithmic value of real GDP, the GDP deflator, commodity prices, and the level of the federal funds rate. This foursome represents a parsimonious but potentially complete macroeconomy: output, the price level, "supply" (commodity prices, notably oil), and "demand" (the funds rate). These four core variables have become more or less standard in macro VAR modeling.[7] Sources and additional information on these series are presented in the appendix.

The three commercial credit variables are from several sources. Outstanding commercial loans at banks are from the quarterly Call Reports filed by commercial banks with federal regulators. The commercial loan rate is, more precisely, the most commonly charged (modal) rate on new loans extended during the second week of the second month of the quarter. This loan rate series is from the Federal Reserve's Survey of Terms of Bank Lending. Changes in commercial credit standards (the net percentage tightening over the previous quarter) are from the Loan Officer Opinion Survey. All models include four lags of all variables. All models, even the one without standards, are estimated over the disjoint period for which the data on standards are available: 1967:1-1983:4 and 1990:2-2000:3.

VAR Regression Statistics

Regression statistics for the VAR with a classical loan market are presented on the left side of Table 1.[8] The numbers in the table are the *p*-values for the null hypothesis that each independent variable contains no information for the dependent variable. Some of these relationships may be familiar from the earlier lending channel literature, which examined the empirical evidence on monetary policy operating through the loan market.[9] Lagged values of the federal funds rate are highly significant in predicting output. The funds rate does not predict loans, but output does. These three facts are at the heart of the empirical evidence against the lending channel: monetary policy impacts output, and changes in output (*not monetary policy*) impact loan growth. Defenders, of course, object to inferring economic structure from reduced-form time series results. Moving on, note that the funds rate predicts the loan rate, while the significance of the loan rate for loans is somewhat weaker (0.038). The absence of a strong correlation between interest rates and loans, even in these reduced-form equations, suggests that the classical loan market might be missing something.

Table 1

Vector Autoregression Statistics for Classical and Augmented Credit Markets

	Classical Credit Market: Loans and Rates					Augmented Credit Market: Loans, Rates, and Standards				
	Dependent Variable					Dependent Variable				
Independent Variable	Y	L	FF	R	S	Y	L	FF	R	S
Y	0.000	0.003	0.000	0.000		0.000	0.023	0.000	0.000	0.716
L	0.259	0.000	0.001	0.001		0.000	0.000	0.000	0.000	0.000
FF	0.000	0.957	0.000	0.000		0.000	0.352	0.000	0.000	0.388
R	0.110	0.038	0.001	0.000		0.555	0.012	0.000	0.000	0.093
S						0.000	0.000	0.000	0.002	0.000

Source: Authors' vector autoregression analysis using data sources in the appendix table.

Notes: The vector autoregressions comprise four lags of: Y = log GDP, P = log GDP deflator, PC = log commodity prices, L = log commercial and industrial (C&I) loans, FF = the federal funds rate, R = the C&I loan rate, and S = the net percentage of lenders tightening C&I standards. Both models are estimated over 1967:1-1983:4 and 1990:2-2000:3. Reported are *p*-values for a joint F-test in which the lagged variables are not significant.

Now consider the augmented market, with standards (Table 1, right side). Several findings are worth noting. First, lagged values of standards are highly significant in predicting both loans and output. Second, accounting for standards partly reverses the time series evidence against the lending channel; in the augmented credit market, loans *do* predict output. Finally, the funds rate still fails to predict loans in the augmented credit market, nor does it predict standards; standards are predicted only by loans, commodity prices (not shown), and lagged standards.[10]

In sum, we can draw several inferences from the regression statistics. First, standards are highly significant in predicting loans and output. Second, VAR results with a "classical" credit market, excluding standards, may be unduly negative toward a lending channel hypothesis; once we control for standards, loans *do* predict output. Loans are more like the dog and less like the tail when we control for standards, and the usual "bank loans are just endogenous (to output)" critique loses force. Third, contrary to a hypothesis of a *standards* channel for monetary policy, changes in the funds rate do not lead to changes in lending standards. Rather than tightening standards when the funds rate rises, lenders just raise rates.

Impulse Responses and Variance Decompositions

We now look at the dynamics implied by these regression estimates. In particular, we focus on the impact that shocks to monetary policy have on the credit market variables—namely, does monetary policy work through the credit market? We also focus on the impact that shocks to the credit variables have on the macroeconomy. Following the literature, we identify changes in monetary policy with shocks to the federal funds rate, that is, the transitory, possibly small, perturbations in the funds rate not attributable to current and lagged macro conditions.[11] The shock approach means, of course, that we ignore the endogenous policy component: the systematic changes in interest rates associated with fluctuating business conditions (Bernanke, Gertler, and Watson 1997). These systematic changes in the funds rate may operate through fluctuations in standards even though *shocks* to the funds rate do not (as we shall conclude). We revisit that possibility later in the paper.

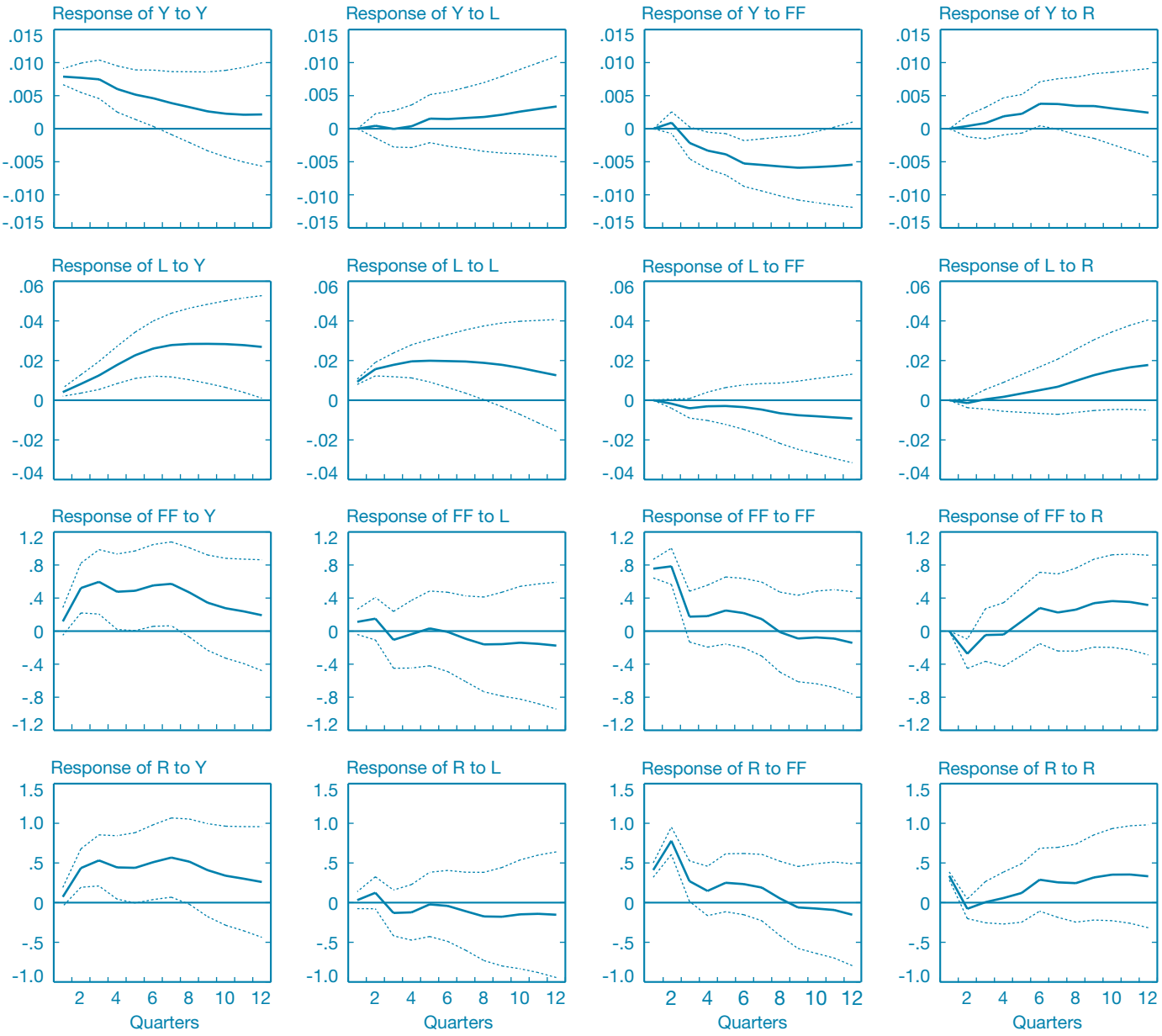
For these exercises, the ordering of the variables matters. As is typical, we place the financial market variables after the real sector variables. Such an ordering assumes that financial markets are sufficiently flexible to be affected by macro shocks within the same quarter, but also assumes that the macroeconomy takes at least one quarter to respond to financial markets. The financial variables are ordered loans, the funds rate, the loan rate, and then standards, implying that shocks to the quantity of loans can affect lending terms within the quarter, but lending terms only affect loans with a one-quarter lag. Furthermore, our ordering allows unanticipated movements in the funds rate to have an immediate (within the quarter) effect on the loan rate and standards, while standards can impact the other variables only with a one-quarter lag. Hence, this ordering

biases our results toward a finding that monetary policy works through standards and against a finding that changes in standards have a significant impact on the real economy.

Chart 2 plots the impulse response functions for the classical credit market. The funds rate shock, shown in the third row, third column, appears as a sharp, significant rise of roughly 75 basis points, a big tightening nowadays, but not unusual for the early part of the sample (pre-1990s). The output response to the funds rate shock is textbook: *no* response for three quarters, peak response at six-to-eight quarters, persisting

Chart 2

Impulse Responses for the Classical Credit Market



Source: Authors' vector autoregression (VAR) analysis using data sources in the appendix table.

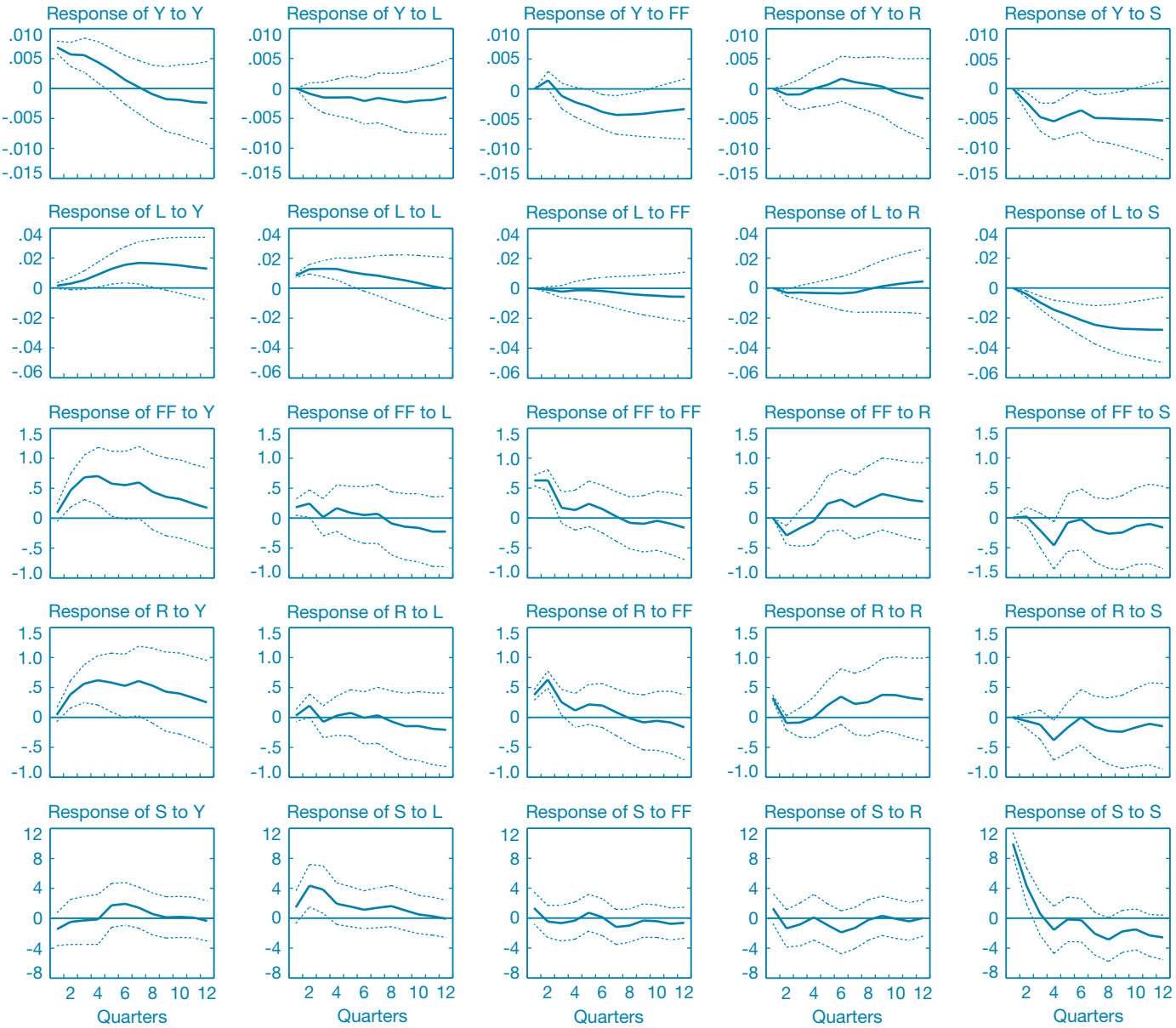
Notes: The panels depict the response to one standard deviation. Innovations are plus or minus two standard errors. The VARs comprise four lags of: Y = log GDP, P = log GDP deflator, PC = log commodity prices, L = log commercial and industrial (C&I) loans, FF = the federal funds rate, and R = the C&I loan rate. The order of variables in the VARs is the order reported above. A continuation of this chart can be found in Chart A1.

effects for ten quarters. The trough in output is more than 0.5 percent below the pre-shock level.[12] The path of the loan rate parallels that of the funds rate, suggesting that bankers raise rates in response to tighter policy, though not one-for-one. The credit market dynamics are largely consistent with the regression statistics; loans are highly sensitive to output shocks, but not vice versa, while the impact of loan rate shocks on loans is small and fleeting.

Next, we consider a standards shock in the augmented credit market, as plotted in the last column of Chart 3. Standards

Chart 3

Impulse Responses for the Augmented Credit Market



Source: Authors' vector autoregression (VAR) analysis using data sources in the appendix table.

Notes: The panels depict the response to one standard deviation. Innovations are plus or minus two standard errors. The VARs comprise four lags of: Y = log GDP, P = log GDP deflator, PC = log commodity prices, L = log commercial and industrial (C&I) loans, FF = the federal funds rate, R = the C&I loan rate, and S = the net percentage of lenders tightening C&I standards. The order of variables in the VARs is the order reported above. A continuation of this chart can be found in Chart A2.

initially tighten by 10 percent (on net), but the tightening cumulates for three quarters (these are *changes* in standards, recall). Lenders commence easing after about eight quarters, a necessary reversal to undo the cumulative tightening in quarters one through three. The responses of output and loans are dramatic: both decline immediately and substantially; output falls 0.5 percent at its trough and loans fall more than 2 percent. The low point in output comes about one quarter after lenders stop tightening on net, a notable coincidence. Loans continue contracting over the entire horizon, but the contraction abates at about eight quarters, the same time lenders start easing, another interesting coincidence. The federal funds rate also falls about a year after the tightening in standards, suggesting that policymakers lean against the "headwinds" generated by tightening credit standards (although we argue later that policymakers initially command tighter standards). In sum, shocks to standards are followed by a sharp contraction in loans, falling output, and easing monetary policy—in short, a "crunch."

Now, compare the impact of a funds rate shock in the two models. The shocks are not substantially different in magnitude (75 versus 60 basis points), but the output response is modestly smaller in the model with standards. The variance decompositions make the diminished impact more readily apparent (Table 2). Funds rate innovations account for 20 percent of the variance in the forecast error of output at

Table 2

Variance Decompositions for Vector Autoregressions for Classical and Augmented Credit Markets

		Classical Credit Market: Loans and Rates							Augmented Credit Market: Loans, Rates, and Standards						
		Dependent Variable							Dependent Variable						
	Quarters	Y	P	PC	L	FF	R	S	Y	P	PC	L	FF	R	S
Y decomposition at	4	87.6	0.9	2.7	0.1	6.8	1.8		59.9	1.9	4.3	2.5	3.9	0.9	26.6
	8	46.3	8.5	15.5	1.7	19.8	8.0		27.1	11.6	16.5	3.6	13.2	1.3	26.7
	12	26.7	15.2	25.2	3.7	21.9	7.3		15.3	18.4	26.3	3.3	12.0	1.1	23.6
P decomposition at	4	0.4	74.3	23.0	1.2	0.7	0.3		0.5	77.1	20.4	1.2	0.4	0.2	0.2
	8	3.4	48.8	46.9	0.6	0.2	0.1		5.0	53.0	40.7	0.8	0.1	0.1	0.3
	12	4.7	38.9	53.1	1.9	1.4	0.1		5.4	42.8	48.4	1.3	1.1	0.0	1.0
PC decomposition at	4	4.9	10.5	82.5	0.6	1.4	0.1		9.7	13.3	74.4	0.3	1.3	0.0	1.0
	8	3.6	13.3	73.2	2.8	6.9	0.2		6.2	15.0	70.7	1.4	5.4	0.2	1.1
	12	2.8	12.1	65.6	7.6	11.6	0.2		5.6	13.5	67.7	2.2	8.8	0.3	1.9
L decomposition at	4	28.7	2.9	13.1	53.6	1.5	0.3		9.1	7.7	12.1	43.7	0.6	2.3	24.5
	8	45.6	2.5	12.6	35.2	1.6	2.5		20.2	7.1	8.9	16.9	0.6	1.2	45.0
	12	49.5	2.4	9.0	27.2	3.1	8.9		19.5	7.1	5.5	9.6	1.4	1.1	55.7
R decomposition at	4	20.8	18.1	29.0	1.5	26.8	3.8		26.8	27.2	15.8	1.5	19.5	3.9	5.2
	8	23.1	22.8	34.4	1.2	13.8	4.7		27.4	30.3	23.7	0.7	9.2	5.2	3.5
	12	20.8	24.8	34.6	1.8	10.2	7.8		24.0	29.9	25.9	1.6	6.9	8.0	3.6
S decomposition at	4								1.3	1.2	10.6	20.6	1.3	2.2	62.8
	8								4.8	2.7	9.7	20.1	2.3	4.4	56.0
	12								4.2	5.4	12.5	17.6	2.4	3.8	54.0
FF decomposition at	4	20.7	14.0	32.6	1.1	29.7	1.9		28.2	22.1	18.2	2.8	19.8	2.7	6.1
	8	24.9	18.3	34.5	1.0	17.5	3.7		29.1	25.4	23.6	1.8	11.3	4.8	4.6
	12	22.6	20.6	33.1	1.8	14.3	7.6		25.8	25.7	22.9	2.8	9.3	8.1	4.7

Source: Authors' vector autoregression analysis using data sources in the appendix table.

Notes: The decomposition for each variable at each horizon indicates the percentages of the variance of the forecast error attributable to a shock in the corresponding column variable. The variable labels are: Y = log GDP, P = log GDP deflator, PC = log commodity prices, L = log commercial and industrial (C&I) loans, FF = the federal funds rate, R = the C&I loan rate, and S = the net percentage of lenders tightening C&I standards. The order of variables in the vector autoregressions is the order reported above.

eight quarters in the model without standards versus just 13 percent in the model with standards, and the difference becomes larger at longer horizons. Standards shocks account for more than a quarter of the variance decomposition in output at every horizon, and an even larger share of the decomposition in loans: 56 percent at twelve quarters. Standards seem to matter *a lot* for loans and output.

How do the credit market variables respond to a funds rate shock in the augmented market? The standards response is essentially a flat-line and insignificant, though, as we note below, that result is somewhat fragile. Lenders raise rates in response to a higher funds rate, but again, not strictly one-to-one. Loans are less responsive to most of the shocks in the augmented model, precisely because they are so sensitive to changes in standards. Shocks to loans are associated with tightening standards, but only a modest and short-lived tightening in loan rates. This finding is consistent with the credit narratives (recounted later) wherein de facto ceilings on loan rates in the 1960s and early 1970s prevented these rates from rising, inducing excess demand for bank loans and hence tighter standards. The unresponsiveness of loan rates is also consistent with rationing theories, wherein the incentive problems that would be engendered by higher loan rates (only the riskiest borrowers with little intention of repaying would agree to such a loan) lead to rationing via nonprice terms, for example, standards, instead.

Robustness

Recall the curious easing in standards over the 1980:3-1982:4 period amidst a sharp policy contraction and a shift toward nonborrowed reserves targeting by the Federal Open Market Committee. If we exclude that period, the funds rate has marginally more explanatory power for standards, and the role of the funds rate (relative to standards) in explaining output is enhanced, although not enough to change our overall conclusions.

Chart 4 plots the impulse responses for the VAR when the 1980:3-1982:4 period is excluded. Shocks to the funds rate in this model do cause a significant, albeit small and brief, tightening in standards; a 50-basis-point funds rate shock causes an almost 4 percent net tightening in standards and a much belated, but significant, easing after about eight quarters. In other words, there does appear to be evidence of a weak credit channel whereby a positive monetary policy shock leads banks to raise their lending standards, which in turn causes loan growth and output to slow. The opposite would of course hold true for a policy easing. Observe that the impact on output of the funds rate shock is more pronounced here than in Chart 3, while the impact of the standards shocks on output diminishes slightly.

The variance decompositions (not reported) change accordingly: innovations in the funds rate explain 29 percent of the innovations in output at twelve quarters, versus 12 percent when the early 1980s period is included (Table 2). The enhanced role for the funds rate here is hardly surprising, as we are excluding the majority of time when the FOMC experimented with nonborrowed reserves targeting rather than funds rate targeting. This time-period exclusion also lowers the share of output decomposition attributed to standards from 24 to 17 percent. That 17 percent is hardly a negligible figure, however, and it represents a somewhat conservative estimate because, as we have noted, the standards variable was ordered last in the VAR.

IV. Interpreting the Role of Standards

Why does controlling for standards diminish the impact of a policy shock on output? The obvious omitted variable story, that standards are correlated with the federal funds rate and output, is only half true; lagged standards are highly correlated with output, but not with the funds rate. Another omitted variable story—tightening standards signal other shocks that trigger monetary tightenings—works a bit better. A supply shock, such as an unanticipated increase in commodity prices, causes tighter standards, tighter policy, *and* lower output, so when we control for the linkages between commodity prices, standards, and output, policy pales in importance.[13] Putting it differently, the monetary tightening necessary to neutralize an inflationary commodity shock depends on whether credit standards are already tightening. If so, policymakers may have less tightening to do.

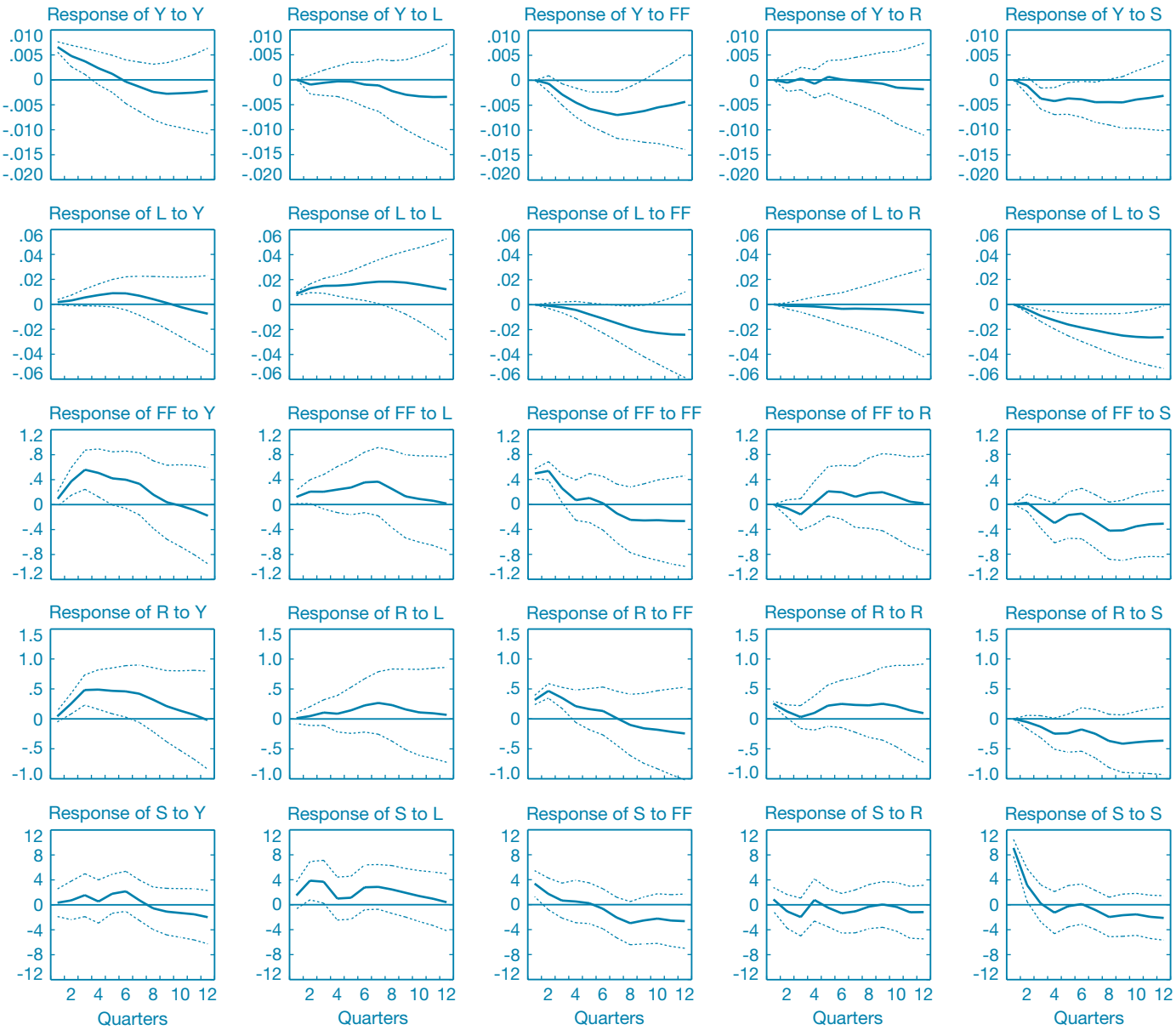
The spikes in standards associated with credit disruptions described in Wojnilower (1980), Romer and Romer (1993), and Owens and Schreft (1995) suggest to us that these gyrations in standards might matter because they mark real, forceful interventions in credit markets by policymakers (monetary and legislative), especially back in the 1960s, 1970s, and 1980s (Chart 5). Apart from the occasionally binding Regulation Q ceiling on deposit rates, all three accounts note the de facto ceilings in 1969, and again in the early 1970s, a result of President Nixon's wage and price controls. As a specific example, in the 1970s episode, as Chairman of the Committee on Interest and Dividends, Federal Reserve Chairman Burns

required justification from bankers for raising their prime rate. Rising market rates were not reason enough, apparently. In both instances, compressed loan spreads occurred during policy tightenings, and hence *re*intermediation occurred whereby arbitraging commercial borrowers shifted from pricier commercial paper and other sources to cheaper bank loans, often borrowing under prearranged lines of credit. Loan growth accelerated, notwithstanding the tighter monetary

Chart 4

Impulse Responses for the Augmented Credit Market

Excluding 1980:3 to 1982:4

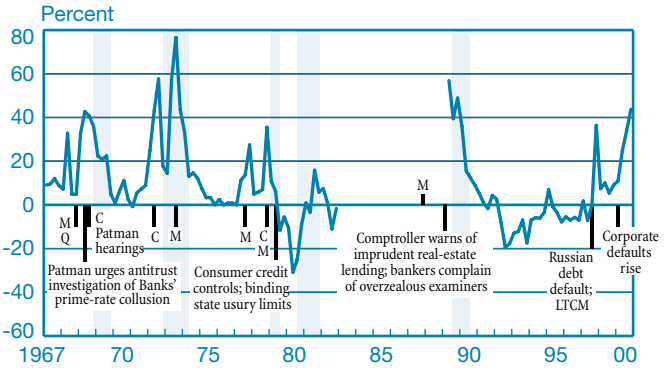


Source: Authors' vector autoregression (VAR) analysis using data sources in the appendix table.

Notes: The panels depict the response to one standard deviation. Innovations are plus or minus two standard errors. The VARs comprise four lags of: Y = log GDP, P = log GDP deflator, PC = log commodity prices, L = log commercial and industrial (C&I) loans, FF = the federal funds rate, R = the C&I loan rate, and S = the net percentage of lenders tightening C&I standards. The order of variables in the VARs is the order reported above. A continuation of this chart can be found in Chart A3.

Chart 5

Significant Monetary and Credit Events and the Associated Changes in Standards



Sources: Romer and Romer (1989); Owens and Schreft (1995); Wojnilower (1980).

Notes: The shaded bands indicate periods designated national recessions by the National Bureau of Economic Research. M = monetary tightening (Romer and Romer 1990), C = credit action (Romer and Romer 1993), Q = binding Regulation Q ceiling on deposit rates, and LTCM = Long-Term Capital Management hedge fund.

policy. Bankers funded the increased loan demand by issuing nonreservable liabilities and by innovating entirely new liabilities in some cases (Romer and Romer 1993). Thwarted in their efforts to slow lending via open market operations, policymakers acted directly by jawboning and by imposing ad hoc reserve requirements, credit controls, moral suasion, and "intimidation" (Owens and Schreft 1995).

The loan spread compression and standards tightening associated with these episodes are evident in Chart 6, at least through the late 1970s.[14] Falling spreads meant that only loans to the highest quality, lowest risk borrowers were profitable, hence standards were tightened.[15] This pattern breaks in the early 1980s, when the rising (and volatile) funds rate was associated with higher (and volatile) spreads and the curious easing in standards previously noted.

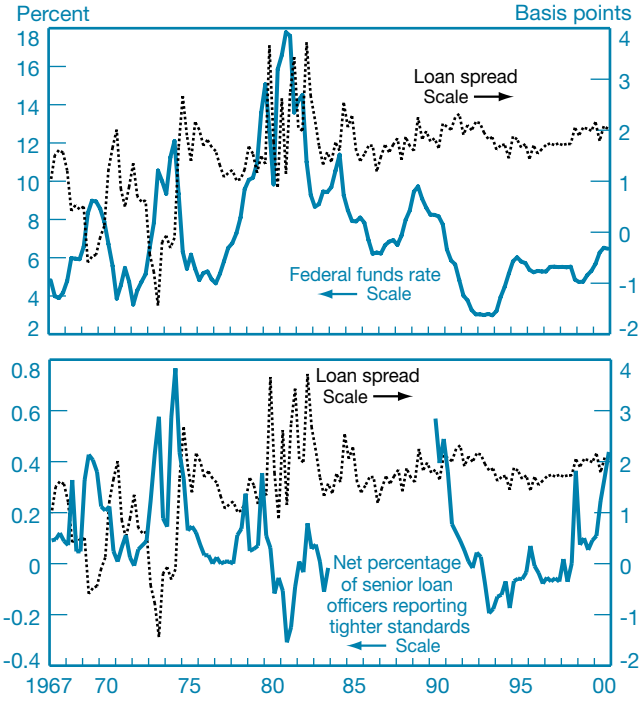
Spreads have clearly stabilized since roughly 1984, presumably because the Fed has eschewed direct credit actions on its own and is less often forced to act for other agencies. Consistent with this observation, the results in Table 3 suggest a shift in the relative role of spreads and standards over the two periods. Spreads have been much more stable since the early 1980s, and the negative correlation between spreads and standards before 1984 has become positive. Changes in standards substituted for changes in spreads back then; now, they seem more like complements in the credit allocation mechanism.

These changing patterns, along with the decreased use of moral suasion in recent years, raise the question of whether lending standards remained informative throughout the 1990s, and whether they might be expected to remain so in the future. The relatively short track record of the post-1990 survey makes it impossible to settle this question definitively. Nonetheless, in more parsimonious model specifications, necessitated by the short sample, standards shocks had a significant effect on output in both the pre-1984 and the post-1990 subsamples. In addition, a formal statistical test failed to reject the hypothesis that coefficients on lagged lending standards were unchanged across subsamples.

Exactly *why* standards appear to have remained informative, in spite of the diminished incidence of credit "actions" and "crunches," remains an open question. One possibility, suggested by the positive post-1984 correlation between standards and spreads, is that the standards variable has

Chart 6

Federal Funds Rate and Loan Spread, and Commercial Credit Standards and Loan Spread



Sources: Federal Reserve Board Statistical Release E.2: Survey of Terms of Business Lending, Table 2; Board of Governors of the Federal Reserve System, Senior Loan Officer Opinion Survey; Federal Reserve Board Statistical Release H.15: Selected Interest Rates.

Notes: Standards are not available between 1984:1 and 1990:2. The loan spread is the commercial and industrial loan rate minus the federal funds rate.

Table 3

Variance and Covariance of Commercial Loan Spread and Standards: Various Periods

	1967:1 to 2000:3		1967:1 to 1984:1		1967:1 to 1979:4		1990:2 to 2000:3	
Variance:								
Spread	0.66		1.06		0.77		0.05	
Standards	0.04		0.04		0.03		0.03	
Correlation: Spread at t, standards at $t - k$:								
$k =$ -4	-0.47		-0.59		-0.54		0.06	
-3	-0.43		-0.53		-0.50		0.09	
-2	-0.43		-0.54		-0.51		0.14	
-1	-0.48		-0.61		-0.59		0.20	
0	-0.44		-0.56		-0.58		0.37	
1	-0.35		-0.44		-0.31		0.36	
2	-0.20		-0.24		-0.02		0.56	
3	-0.18		-0.21		0.07		0.61	
4	-0.22		-0.25		0.09		0.56	
Memo: Ljung box Q-statistics and significance of correlations: k_1 to k_2								
1 to 4	33.14	0.000	25.58	0.000	6.00	0.199	53.26	0.000
-4 to -1	115.25	0.000	95.16	0.000	65.33	0.000	3.33	0.504
-4 to 4	174.49	0.000	143.25	0.000	89.22	0.000	62.49	0.000

Source: Authors' vector autoregression analysis using data sources in the appendix table.

Notes: The spread is the commercial and industrial loan rate minus the federal funds rate (in basis points). Standards are the net percentage of senior loan officers reporting tighter standards from the previous quarter.

evolved from a pure measure of credit availability to an increasingly informative gauge of the quality of banks' borrower pools. Understanding the ways in which changes in the financial system may have affected the interpretation of banks' reported lending standards is clearly an important question deserving further investigation.

V. Conclusion

Gyrations in commercial credit standards matter a lot in explaining fluctuations in loans: loans contract by 2 percent following a mere 8 percent net tightening in standards, not an especially severe tightening. Although some of this decline may reflect reduced demand for loans, the sheer magnitude of the decline is impressive: standards or whatever it is they stand for are clearly required for a proper VAR accounting of loan dynamics.

Standards also matter a lot for output, and when properly accounted for, shocks to the funds rate matter considerably less (than they do when standards are omitted). One reason that standards likely matter for both loans and output is that they mark the direct credit "actions" by policymakers that were not unusual up to the early 1980s. As the Fed has eschewed such actions in recent years (or avoided enforcing them), changes in standards now serve more as a proxy for credit market imperfections whereby banks alter standards in response to deterioration in their own, or in firms', balance sheets. These factors may be more apparent today, as the forecasting power of some of the traditional monetary policy indicators has deteriorated.

Our principal finding is that part of the impact of "monetary" policy is really overlooked, or misidentified, *credit* effects proxied by gyrations in standards. On the one hand, when standards are taken into account, the importance of monetary policy shocks for output diminishes. On the (inevitable) other hand, our finding that lenders do not adjust

standards in response to policy shocks runs contrary to a narrow "standards" or lending channel of monetary policy. Changes in lending standards do not appear to be endogenous to the monetary policy mechanism. However, this finding does not rule out broader effects—that is, standards tighten in response to deteriorating balance sheets both at banks and at firms, a deterioration that could be in response to changes in monetary policy. Moreover, we have not investigated the possibility that the systematic component of monetary policy, as opposed to the shocks, leads to changes in lenders' standards. Given the overall importance of standards suggested here, more work on their proper interpretation and association with monetary policy seems warranted.

Appendix

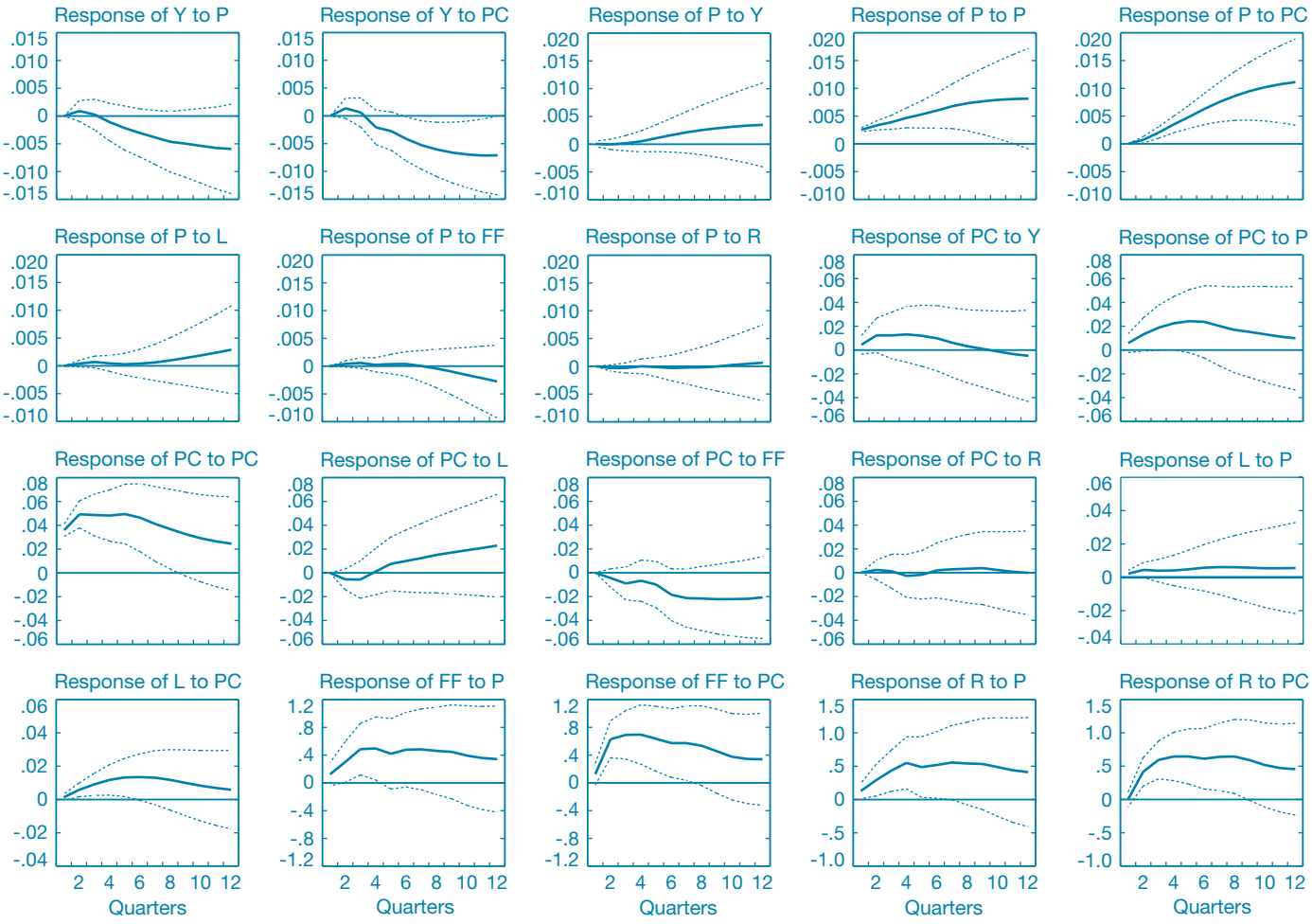
Variable Descriptions

Variable	Definition	Time Period	Observations	Summary Statistics[a]				Source(s)
				Median	Standard Deviation	Minimum	Maximum	
Real gross domestic product (GDP)	Total income earned domestically or expenditure on domestic goods and services, billions of chain-weighted 1996 dollars, seasonally adjusted at annual rates	1967:1-1983:4 1990:2-2000:4	68 43	8.33 8.93	0.14 0.11	8.10 8.80	8.57 9.15	Bureau of Economic Analysis
GDP deflator	Ratio of nominal GDP to real GDP, seasonally adjusted at annual rates	1967:1-1983:4 1990:2-2000:4	68 43	3.69 4.59	0.33 0.06	3.21 4.46	4.25 4.68	Bureau of Economic Analysis
Commodity prices	JOC-ECRI industrial price index, spot inflation rate smoothed, seasonally adjusted	1967:1-1983:4 1990:2-2000:4	68 43	3.97 4.48	0.42 0.08	3.30 4.38	4.48 4.67	JOC-ECRI[b]
Commercial and industrial loans	C&I loans in bank credit for domestically chartered commercial banks	1967:1-1983:4 1990:2-2000:4	68 43	5.17 6.28	0.45 0.22	4.38 6.08	5.94 6.78	Federal Reserve Board; pre-1973: Annual Statistical Digest
Loan rate	Interest rate on C&I loans made by domestic banks, annualized; pre-1982 is prime rate.	1967:1-1983:4 1990:2-2000:4	68 43	7.99 7.14	3.96 1.30	4.90 4.83	20.33 10.08	Federal Reserve Board Statistical Release E.2: Survey of Terms of Business Lending, Table 2
Standards	Net percentage of domestic banks reporting tightened standards over the previous quarter; during 1978-83, standards are computed by averaging changes in credit standards on loans at prime and loans above prime	1967:1-1983:4 1990:2-2000:4	68 43	0.07 0.01	0.19 0.19	-0.31 -0.19	0.77 0.57	Federal Reserve Board: Senior Loan Officer Opinion Survey
Federal funds rate	Effective overnight interbank lending rate	1967:1-1983:4 1990:2-2000:4	68 43	7.55 5.31	3.65 1.30	3.55 2.99	17.79 8.24	Federal Reserve Board Statistical Release H.15: Selected Interest Rates

[a]All variables are in natural log values except loan rate, standards, and federal funds rate.
[b]*Journal of Commerce*-Economic Cycle Research Institute.

Chart A1

Additional Impulse Responses for the Classical Credit Market

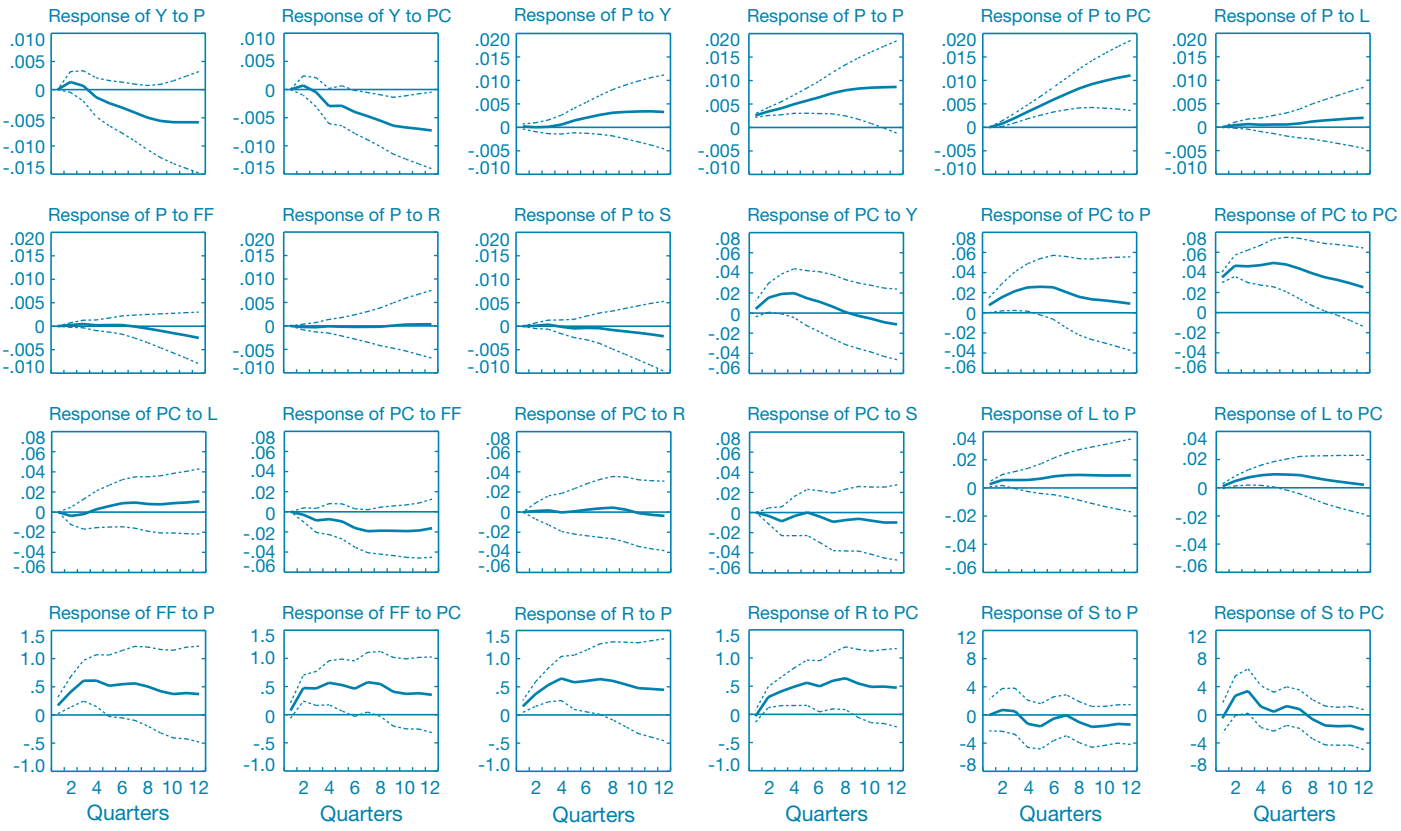


Source: Authors' vector autoregression (VAR) analysis using data sources in the appendix table.

Notes: This chart is a continuation of Chart 2. The panels depict the response to one standard deviation. Innovations are plus or minus two standard errors. The VARs comprise four lags of: Y = log GDP, P = log GDP deflator, PC = log commodity prices, L = log commercial and industrial (C&I) loans, FF = the federal funds rate, and R = the C&I loan rate. The order of variables in the VARs is the order reported above.

Chart A2

Additional Impulse Responses for the Augmented Credit Market



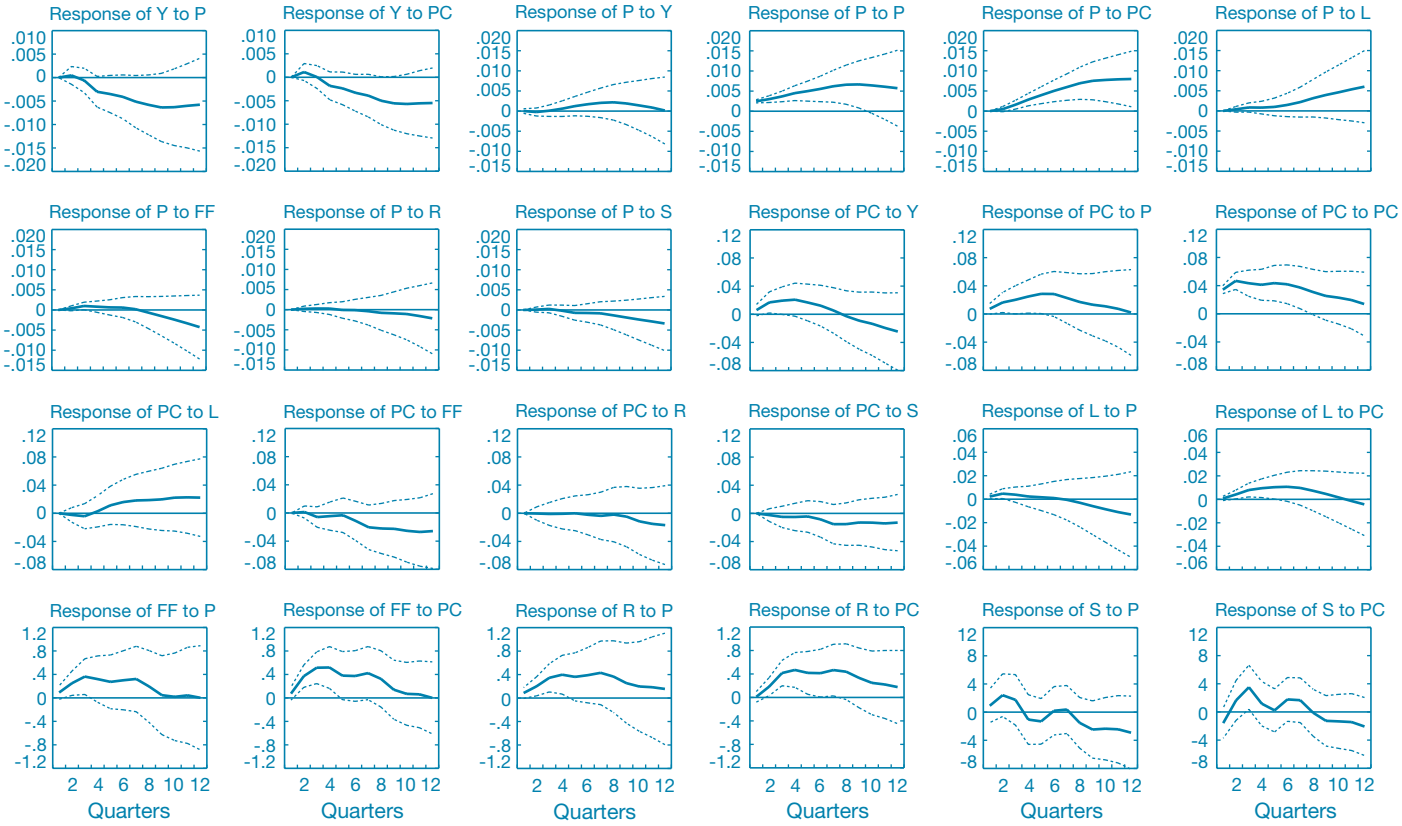
Source: Authors' vector autoregression (VAR) analysis using data sources in the appendix table.

Notes: This chart is a continuation of Chart 3. The panels depict the response to one standard deviation. Innovations are plus or minus two standard errors. The VARs comprise four lags of: Y = log GDP, P = log GDP deflator, PC = log commodity prices, L = log commercial and industrial (C&I) loans, FF = the federal funds rate, R = the C&I loan rate, and S = the net percentage of lenders tightening C&I standards. The order of variables in the VARs is the order reported above.

Chart A3

Additional Impulse Responses for the Augmented Credit Market

Excluding 1980:3 to 1982:4



Source: Authors' vector autoregression (VAR) analysis using data sources in the appendix table.

Notes: This chart is a continuation of Chart 4. The panels depict the response to one standard deviation. Innovations are plus or minus two standard errors. The VARs comprise four lags of: Y = log GDP, P = log GDP deflator, PC = log commodity prices, L = log commercial and industrial (C&I) loans, FF = the federal funds rate, R = the C&I loan rate, and S = the net percentage of lenders tightening C&I standards. The order of variables in the VARs is the order reported above.

Endnotes

1. The mechanism requires imperfect substitutability between bank deposits and bonds. Both the money and credit views require sticky prices, or else prices would adjust to offset changes in nominal money and credit on real output.

2. The survey was initiated in 1964, but only the results after 1967 are officially available.

3. Participants are selected primarily by size and portfolio characteristics (for example, a substantial share of C&I loans). The sample size has varied from about 120 in the early years to approximately 60 at present. Banks are added or replaced as needed, for example, due to mergers. The survey comprised a fixed set of twenty-two questions from its inception in 1964 until 1981. At that time, all but six of those questions were dropped to make room for more ad hoc questions on emerging developments. In 1984, five of the remaining six core questions were dropped, including the question that we focus on. Recent survey results are available at <http://www.federalreserve.gov/boarddocs/SnLoanSurvey/>.

4. According to Schreft (1990), the question on commercial credit standards was dropped from the survey under the presumption that such nonprice rationing would wane with the deregulation of deposit rates. The question may have been eliminated as part of the Paper Work Reduction Act.

5. Weighting the responses over the 1990s by the extent of change (somewhat versus considerably) did not change the picture or the results, nor did using a diffusion index. Integrating the changes reported by lenders over time did not work as well as any of the other measures.

6. The consumer credit controls imposed between March and July 1980 may have prompted easier *commercial* standards to replace lost business on the consumer side. See Schreft and Owens (1991) for an alternative interpretation.

7. See, for example, Christiano, Eichenbaum, and Evans (1996) and Bernanke and Mihov (1998).

8. To maintain comparability, we estimated both models with the dark years (1984:1-1990:1) excluded.

9. See Ramey (1993) and the discussion in Bernanke and Blinder (1988).

10. Though not reported, we also replaced loan rates with standards to run a type of race between the two. Standards easily outdistanced loan rates in predicting loans, with significance levels an order or two higher or more. Racing analogies may not be apt, however, since loan rates seem to perform better with standards in the model.

11. See Bernanke and Blinder (1992) and Friedman and Kuttner (1996) and the citations therein. Bernanke and Mihov (1998) recommend a hybrid indicator that accounts for the Federal Open Market Committee (FOMC) experiment with a nonborrowed reserves targeting over 1979-82. Our experiments with their series through 1996 (graciously provided to us by Mihov) did not change our main results. Nor did simply excluding the entire 1979-82 period substantively alter our findings.

12. Responses of all the logarithmic variables represent the cumulative percentage change following the shock.

13. This hypothesis implies that the impact of commodity shocks on output should also diminish when we account for standards. Though no difference is apparent in the impulse responses, the variance decompositions (Tables 1 and 2) reveal a slight diminishment in quarters two and three, the same quarters over which standards tighten in response to the commodity price shock.

14. Keeton (1986) has a similar chart in his article on deposit rate deregulation and credit rationing.

15. Note that the linear specification of the equations in our empirical work prevents us from distinguishing between policy effects when market interest rates are below versus above an implicit ceiling. If we could make such a distinction, we might have found a stronger link from policy changes to changes in standards during times when interest rates were high.

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