
Influence of the Credit Crunch on Aggregate Demand and Implications for Monetary Policy

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This paper investigates the impact of credit restraint on real activity in the 1990-91 economic downturn. In addition, it examines whether financial system fragility, combined with institutional changes over the 1980s, made it more difficult for monetary policy to ease credit conditions and stimulate real activity. These two issues are related because many of the changes in financial structure and regulation that differentiate this credit crunch from previous episodes have also altered the transmission mechanisms of monetary policy.

More specifically, this investigation examines whether credit restraint, measured in several different ways, preceded or caused the 1990-91 recession and the slow-growth recovery that followed. The paper also documents long-run changes in financial structure and nonmonetary factors that made the cycle unique and contributed to slow growth. Finally, the paper asks whether traditional relationships between real activity and economic fundamentals (including monetary policy) accurately predicted the slow economic growth from 1989 to 1992, or whether proxies for credit restraint are necessary to explain the weakness in activity.

Many of the issues dealt with in this paper relate to whether monetary policy affects real activity more through a "money" channel or through a "credit" channel.² Roughly speaking, monetary policy affects the real economy via the money channel if policy works exclusively by changing the relative price of money, the interest rate. The credit channel view suggests that monetary policy also affects the real economy by changing the quantity and composition of credit, for example by changing the supply of intermediated credit relative to market credit. Because this paper looks at the effects on aggregate demand of both interest rates and shifts in credit supply and demand, the results described below should help clarify whether monetary policy channels via interest rates

¹ My thanks to Charles Steindel, M.A. Akhtar, Cara Lown and Ethan Harris for comments on earlier drafts of this paper. Thanks also to Cynthia Silverio and Joshua Gleason for excellent research assistance.

² See Bernanke (1993) for a discussion of the money and credit channels of monetary policy.

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or credit behaved in normal ways during the late 1980s and early 1990s. The main conclusions of the study are as follows:

- While credit supply problems probably had detrimental effects on the real economy after 1989, other factors appear to have contributed to overall slow growth as well. These include balance sheet restructuring by both firms and consumers, relatively tight fiscal policy, and extreme pessimism, particularly on the part of consumers.
- Despite worries that a fragile financial system blocked the effects of easier monetary policy to the real economy, policy was successful in stimulating some sectors of the economy. With the exception of large-scale real estate, sectors most sensitive to policy did slightly better, relative to cyclical norms, than the rest of the economy. Nonetheless, monetary policy did not have the same widespread stimulative effect on the economy that it had had in the past.
- Both informal observations and econometric estimates suggest a general malaise in economic activity, particularly in the household sector, that was more widespread than the credit slowdown and that was not well described by economic fundamentals, including the stance of monetary policy.

The first section of the paper examines patterns in aggregate demand and relates them to credit and monetary policy, comparing behavior across business cycles. In addition it discusses several proxies for credit restraint in the early 1990s episode and looks at the timing of changes in credit and demand. Section II discusses several other possible explanations for the economy's sluggish response to easing monetary policy in 1991 and 1992. Section III presents econometric evidence on aggregate demand and policy during the early 1990s and relates this evidence to several proxies measuring the severity of the credit slowdown.

I. Aggregate Demand and Credit

From an aggregate demand perspective, the early 1990s "credit crunch" was quite different from historical episodes. The aggregate demand boom preceded the recession by more than two years, and the slowdown in credit led rather than lagged the slowdown in activity. Tight monetary policy and disintermediation at depository institutions, which typified previous credit crunches, were almost completely absent. Instead, the 1989-92 credit slowdown was characterized by subpar growth (interrupted by a short recession), easing monetary policy and falling interest rates, and financial distress at many intermediaries. Only in the last of these features did it resemble previous crunches.

Many of the factors that made the credit slowdown unique were direct or indirect consequences of the 1980s "bubble" in debt formation relative to economic activity (Chart 1). In particular, high leverage contributed to the precarious financial health of both borrowers and lenders in the late 1980s, which in turn, appears to have been a major factor in both the slowdown in credit and in aggregate demand.

A number of studies have examined the credit slowdown. For example, see Bernanke and Lown (1991), Johnson (1991), Peek and Rosengren (1991), Hancock and Wilcox (1992) and in this volume, studies by Cantor and Rodrigues, Lown and Weninger, Mosser and Steindel. The general conclusion of these studies is that credit demand factors, in particular aggregate demand components and interest rates, could not, by themselves, explain a significant portion of the 1989-92 credit slowdown.

This section of the paper uses results of these studies to look at the flip side of the

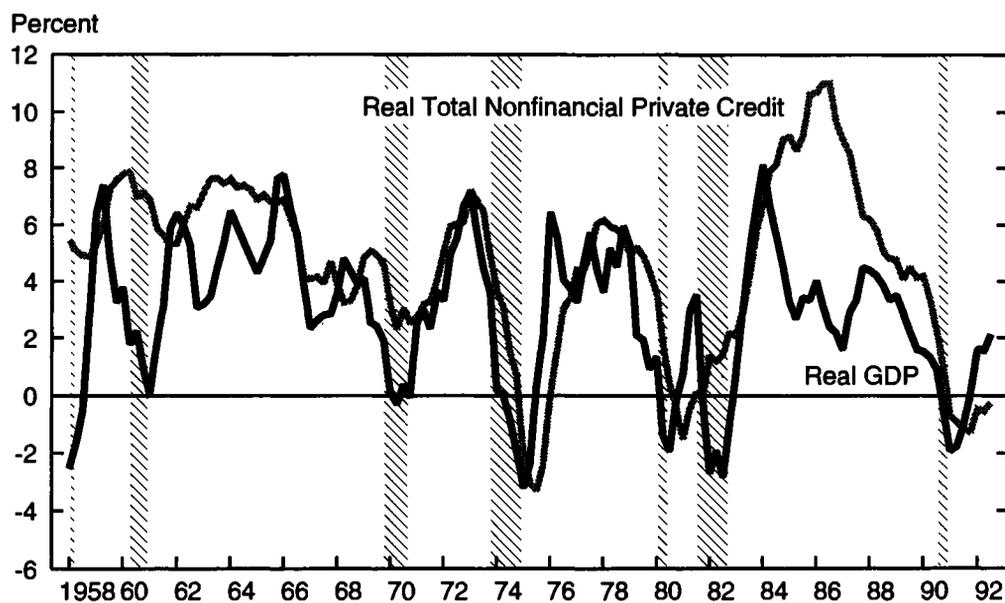
coin: the implications of credit restraint for economic activity. It begins by describing the behavior of activity and debt from 1989 to 1992. In addition, because aggregate output and aggregate credit are simultaneously determined, this paper (like those listed above) attempts to separate credit supply and demand shocks in several imperfect, but hopefully plausible ways. Below, aggregate demand weakness is related to several proxies that measure the degree of credit supply restraint, including proxies derived from studies elsewhere in this volume. In addition, the issue of “causality” or timing of credit relative to aggregate demand is investigated using reduced form relationships between credit aggregates, proxies, and real activity.

A. Cyclical Comparison of Aggregate Demand

The 1990-91 recession was a short, slightly worse-than-average downturn. Chart 2 shows that the economy was quite weak going into the recession, however, and it was well below par coming out. The entire path of the cycle was a slow roll, up and down and up again, rather than the typical boom—bust—boom pattern.

One explanation for this atypical cyclical behavior (discussed in detail below) is that the slowdown in credit growth, in particular restrictions on credit supply by intermediaries, inhibited economic activity and blocked the effects of easing monetary policy. Under such a scenario, the sluggishness in the economy would presumably have been concentrated in those sectors that are most sensitive to monetary policy and most closely connected with credit formation: consumer durables, housing, business investment, and perhaps net exports. Chart 3 presents these components of real output indexed to business cycle peaks and troughs. Somewhat surprisingly, the recession in these sectors looked quite average, certainly less severe than the 1981-82 cycle, when monetary policy was substantially tighter. In contrast, growth before the recession was weak, and the

**Chart 1: Real GDP and Real Total Nonfinancial Private Credit
Four-Quarter Growth Rate**



Note: Shaded areas represent recessions.

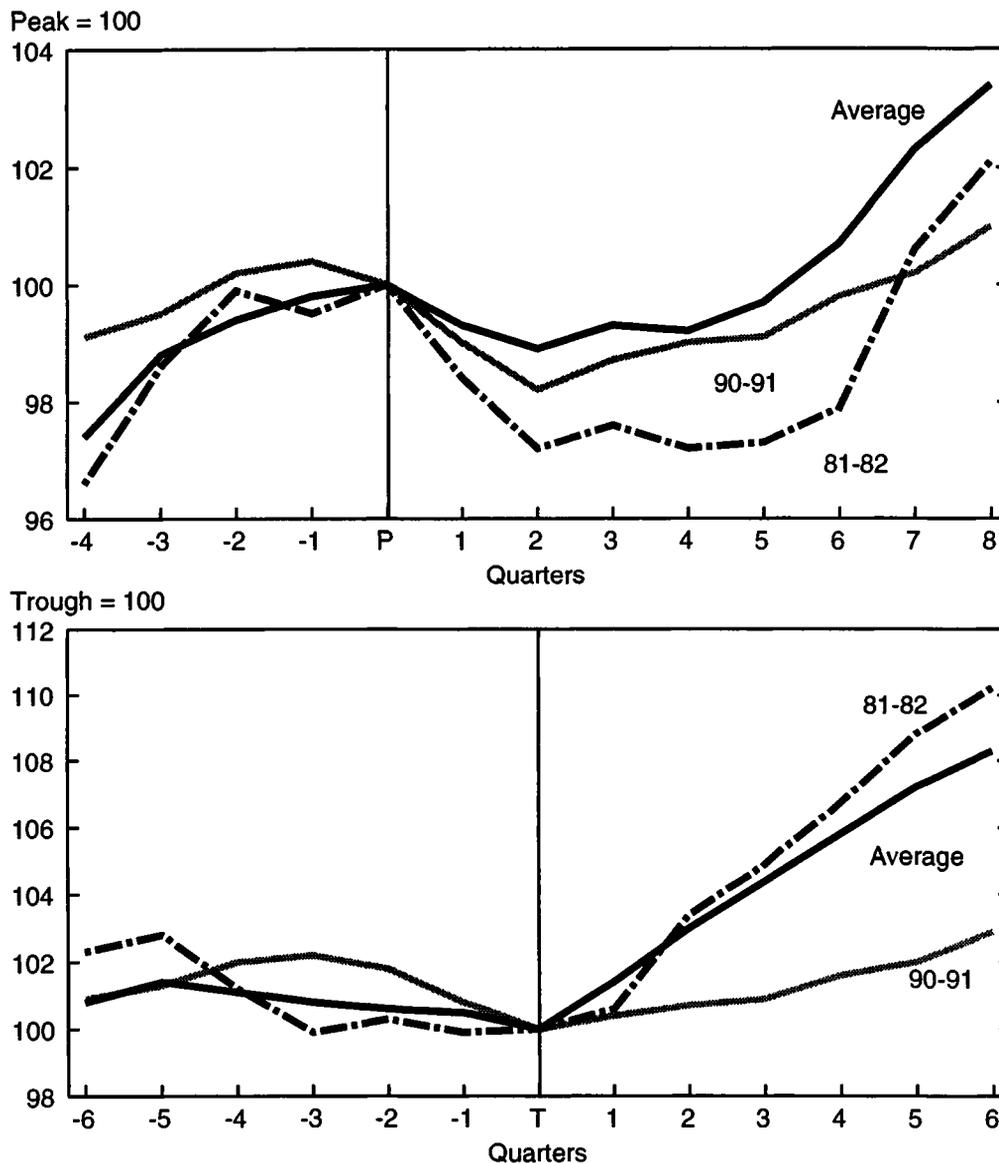
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recovery was well below par in spite of steady easing of monetary policy and falling interest rates.

For comparison, sectors less directly sensitive to monetary policy (and generally less closely connected to credit) are shown in Chart 4. Here both the 1990-91 recession and the recovery look exceptionally weak. The peak comparison shows slow growth before the recession and a worse-than-average downturn during the recession—on a par with the severe 1981-82 recession. Further, these sectors had almost no recovery in 1991 and 1992.

The widespread weakness in activity can also be seen in aggregate demand components. For example, all categories of consumer spending were weak from 1989 to 1992 (Chart 5). Consumer spending on durables, which is more sensitive to credit and mon-

Chart 2: Real GDP



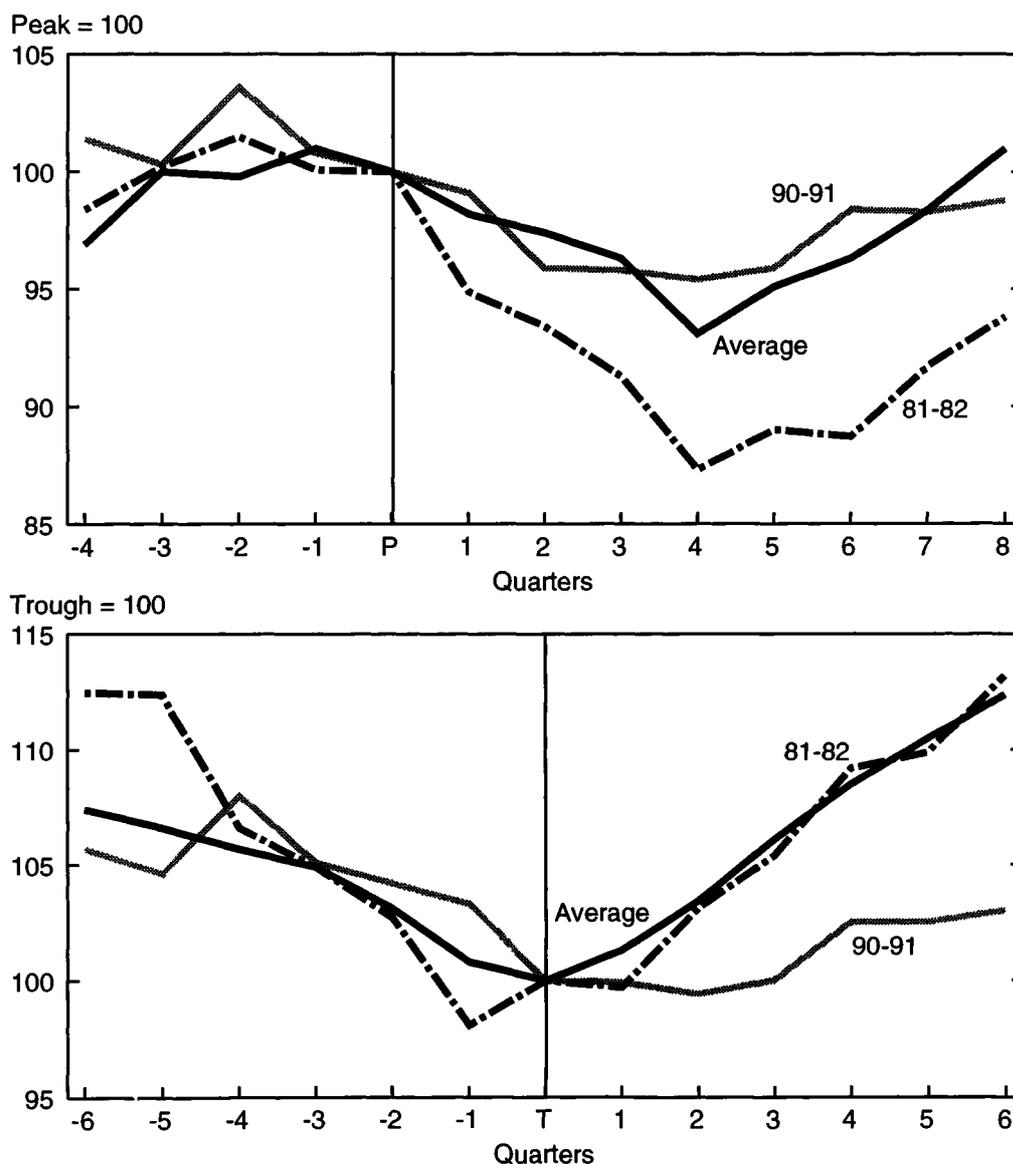
Note: AVG includes 1960-61, 1969-70, 1973-75, 1981-82 recessions.

etary policy, suffered a fairly typical decline during the recession but had a weak recovery thereafter in spite of falling interest rates. Expenditures on nondurables and services were even weaker in comparison with historical norms. They were a drag on the economy before the recession, and they actually declined in 1990. Their recovery was only 2.2 percent by the end of 1992, compared with more typical 6 percent increases.³

Cyclical comparisons for the investment components are shown in Charts 6 and 7. Real equipment investment (Chart 6A) was well above previous norms during both the

³ Also see Blanchard (1993), Leeper (1992), Steindel (1992) and Throop (1991) for further discussion of the unusual weakness in consumer spending both during and after the 1990-91 recession.

Chart 3: Credit and Policy Sensitive Components of Real GDP

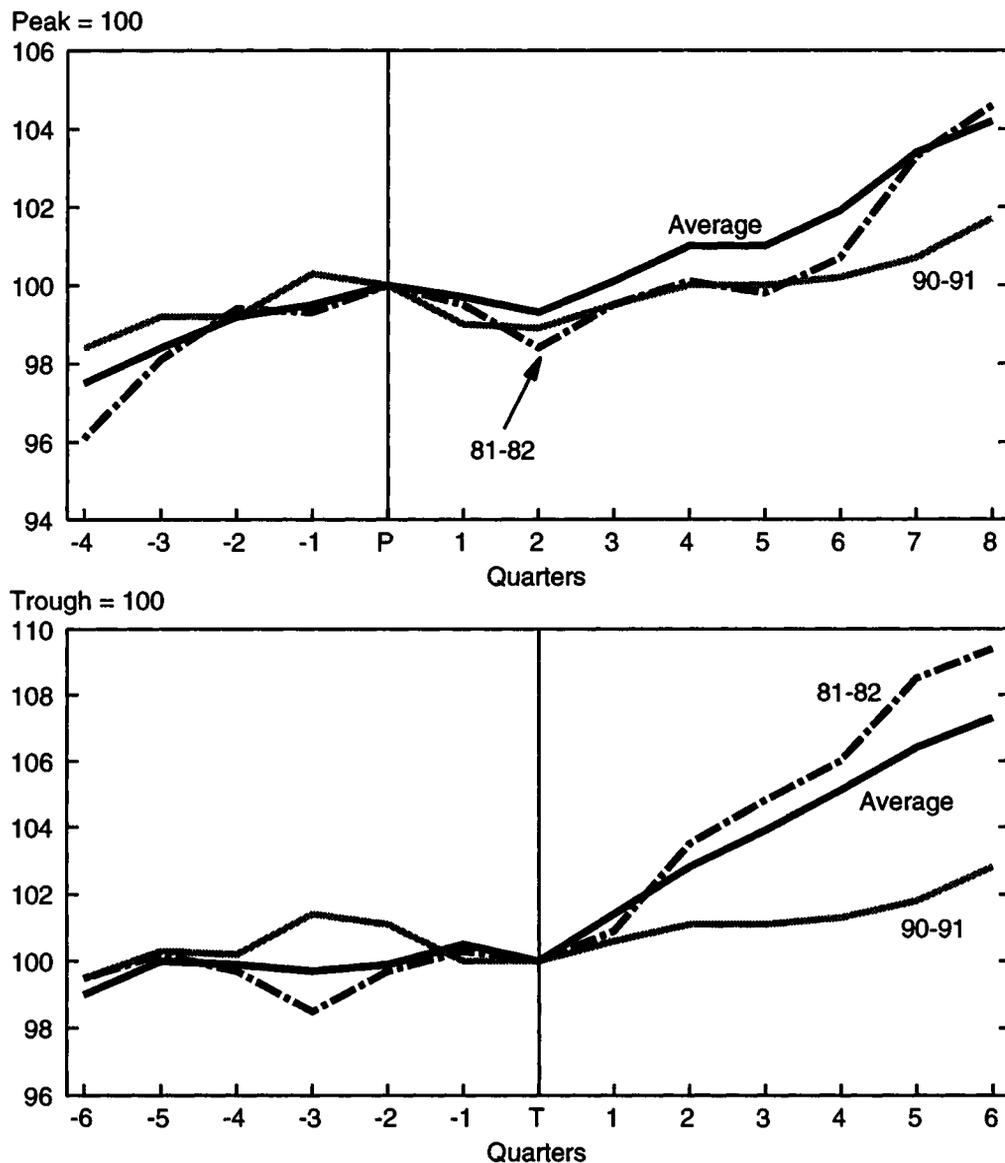


Note: Includes consumer durables expenditure, residential investment, nonresidential investment, and net exports.
 AVG includes 1960-61, 1969-70, 1973-75, 1981-82 recessions.

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recession and the recovery because of large relative price declines for computers. The inventory cycle before and during this recession was quite small by historical standards (Chart 6B), largely because of improved inventory management techniques adopted over the 1980s. Nonresidential construction, pictured in Chart 7A, was incredibly weak during the latest cycle. Here the low level of activity appears to have been the result of massive overbuilding in the mid 1980s and perhaps credit constraints as well. Whatever the cause of this weakness, easier monetary policy and falling interest rates had little or no short-run effect on activity during the recovery. Housing (Chart 7B) had a fairly typical decline during 1990 but recovered more slowly and did not seem to respond quite as much to monetary easing as it had in the past. However, long-run changes in financial

Chart 4: Components of Real GDP Less Sensitive to Credit and Monetary Policy



Note: Includes nondurables and services consumption, and government purchases.
AVG includes 1960-61, 1969-70, 1973-75, 1981-82 recessions.

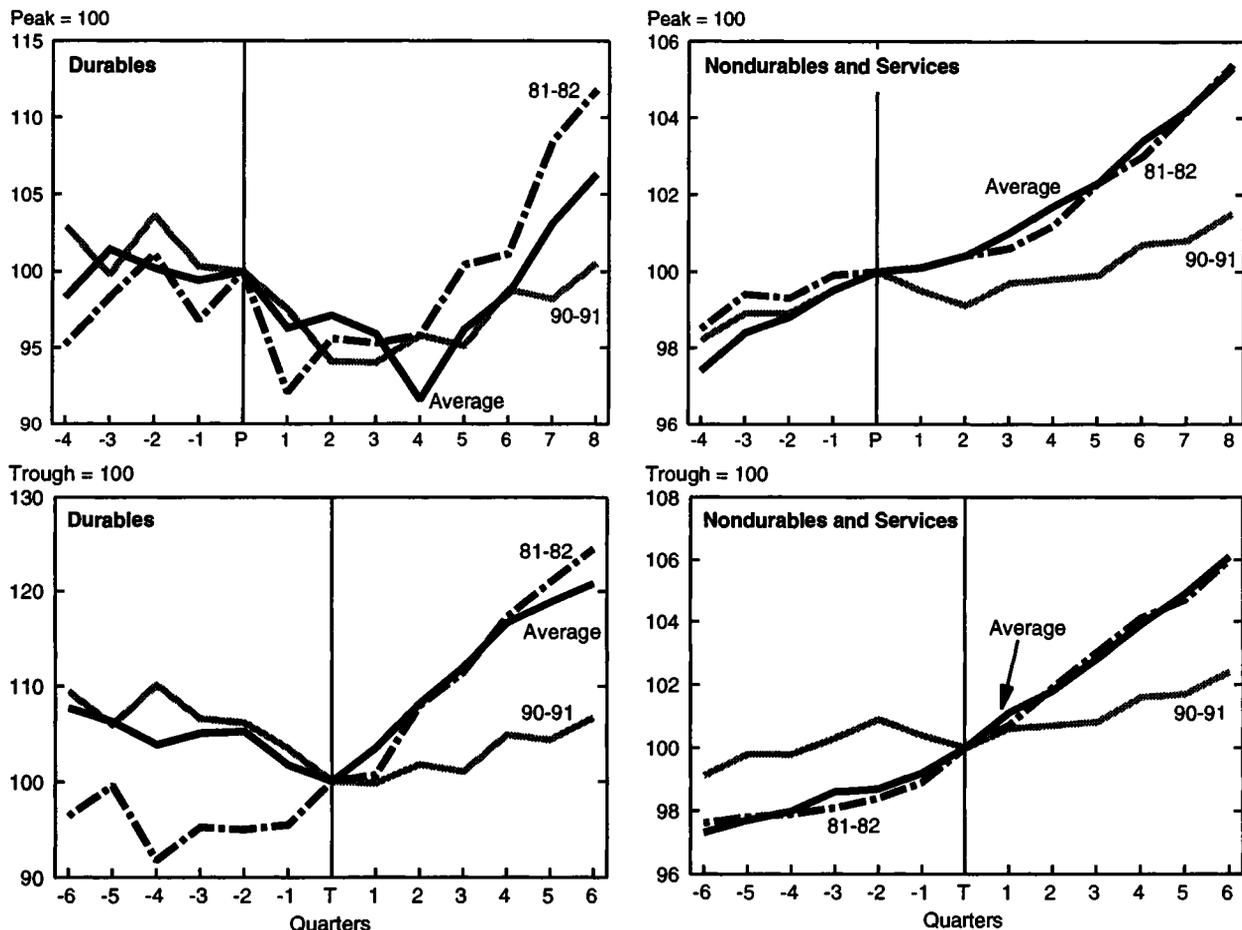
structure (discussed below), particularly the end of Regulation Q, make historical comparisons for this sector difficult to interpret.

Chart 8 shows that both federal and state and local government purchases had a depressing effect on the economy that were largely independent of credit conditions and monetary policy. Here large federal budget deficits and deteriorating revenues at the state and local level kept these sectors from making their normal contributions to economic activity.

Finally, Chart 9 gives peak and trough comparisons for the trade sector. Peak comparisons show that exports were exceptionally strong, probably a lagged effect of easier monetary policy and a falling dollar during the late 1980s. Slower export growth in 1991-92 was probably more a reflection of weak economic performance abroad than of any credit constraints or U.S. monetary policy effects. In fact, monetary policy easing during 1991 and 1992 probably made U.S. goods even more competitive in international markets, but slow growth abroad muted this effect.

In sum, a casual look at the aggregate evidence shows extraordinarily weak economic growth, particularly during the so-called economic recovery. The weakness in aggregate demand seems to be fairly evenly distributed among sectors that are sensitive to credit and monetary policy and those that are not. There is little evidence that monetary policy was completely ineffective; relative to their normal cyclical patterns, policy-sen-

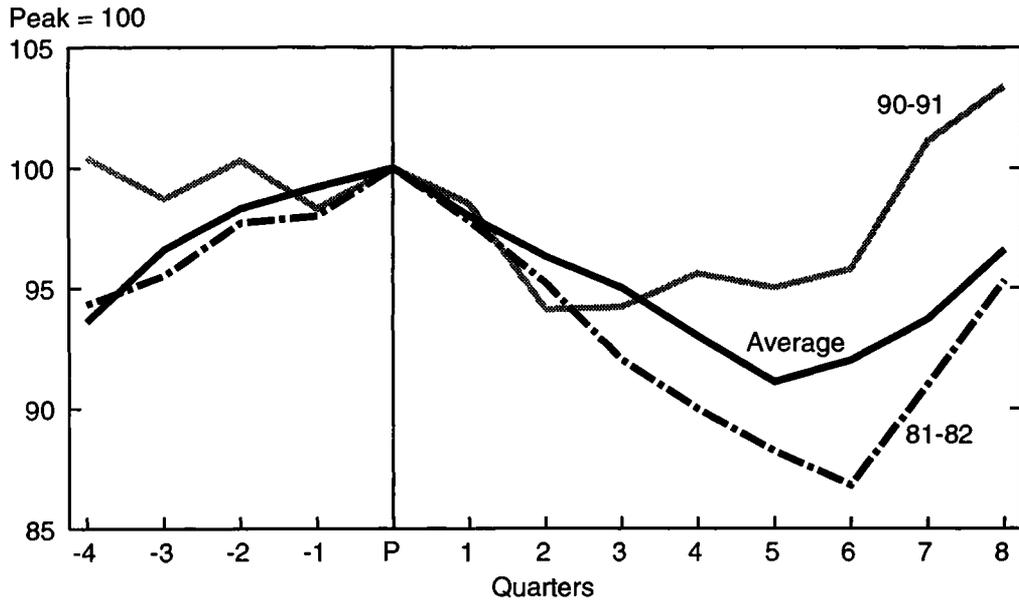
Chart 5: Real Consumer Spending



Note: AVG includes 1960-61, 1969-70, 1973-75, 1981-82 recessions.

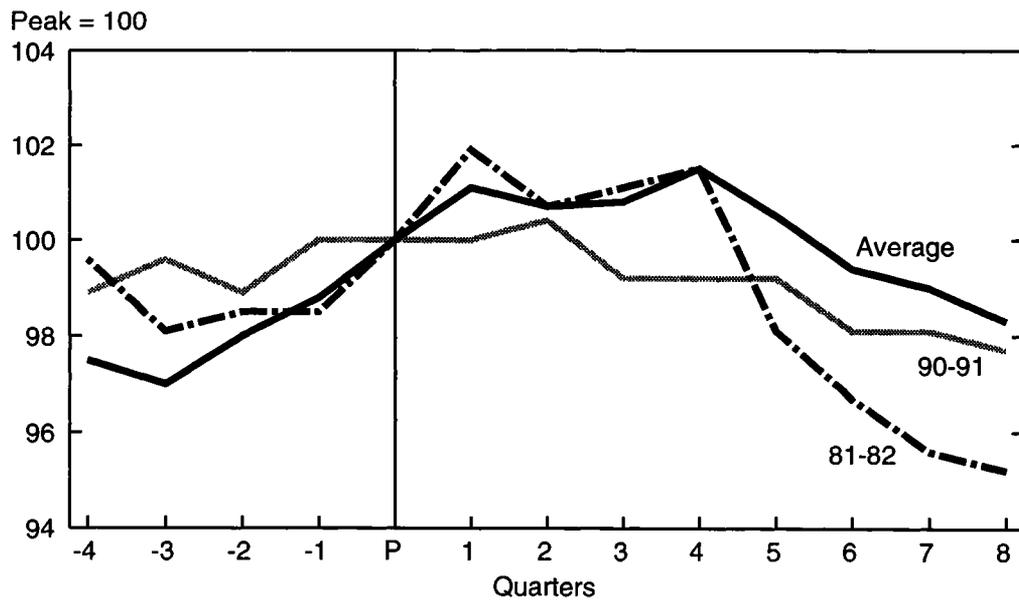
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Chart 6A: Producers' Durable Equipment Investment



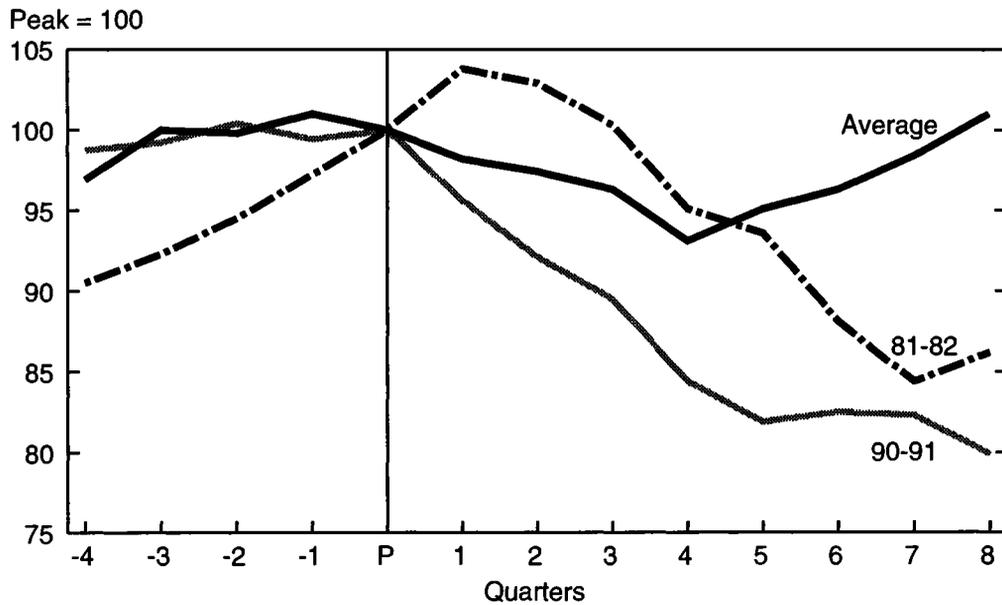
Note: AVG includes 1960-61, 1969-70, 1973-75, 1981-82 recessions.

Chart 6B: Nonfarm Inventory to Final Sales Ratio



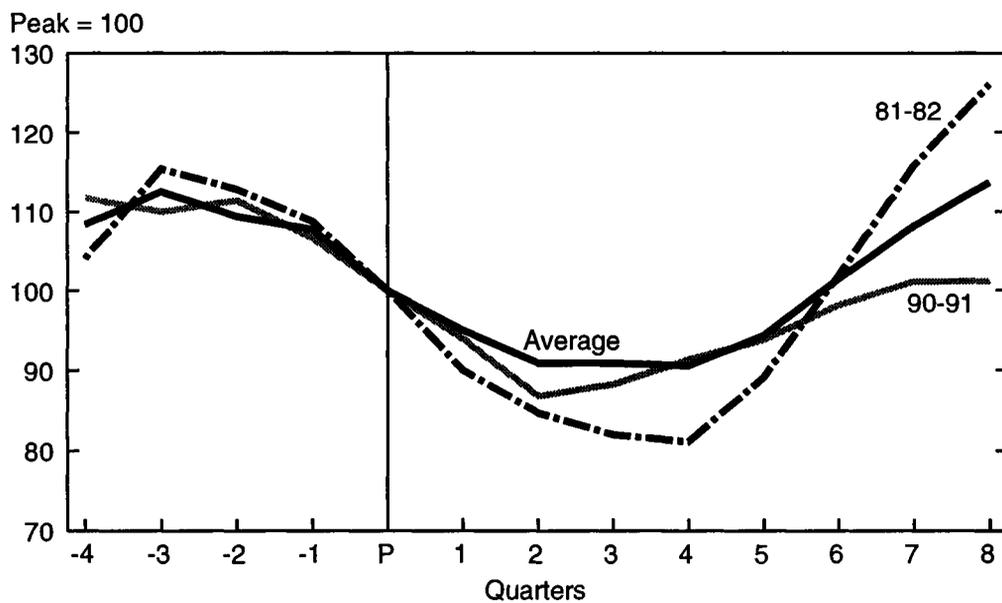
Note: AVG includes 1960-61, 1969-70, 1973-75, 1981-82 recessions.

Chart 7A: Nonresidential Construction Investment



Note: AVG includes 1960-61, 1969-70, 1973-75, 1981-82 recessions.

Chart 7B: Residential Construction Investment



Note: AVG includes 1960-61, 1969-70, 1973-75, 1981-82 recessions.

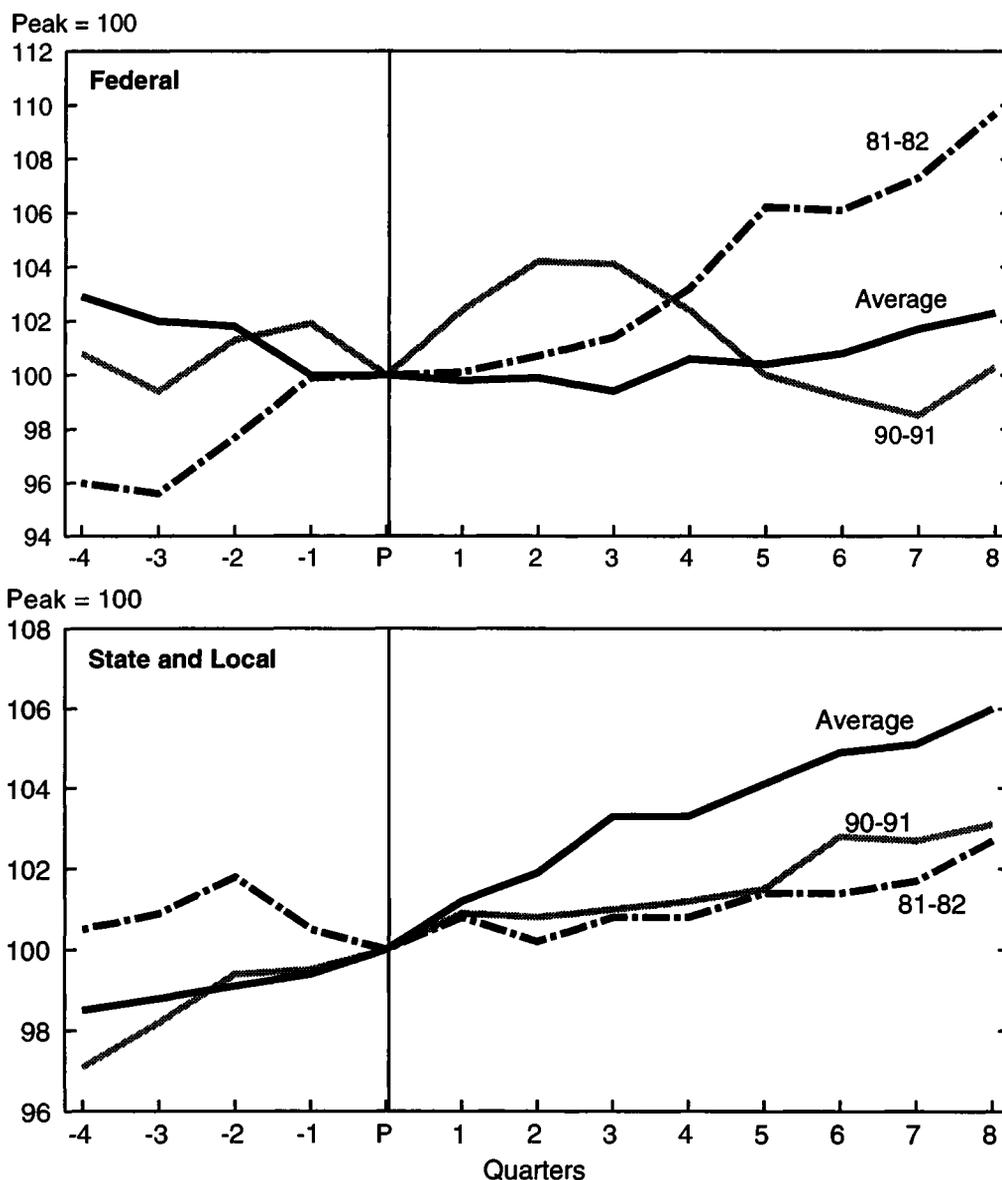
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sitive sectors (with the notable exception of large-scale real estate) may have done a bit better than the rest of the economy. Nonetheless, subpar economic growth in a world of easing monetary policy and falling interest rates suggests that policy probably did not affect the real economy as it had in the past. The next section of the paper begins the discussion of what role the unprecedented slowdown in credit formation may have played in this process.

B. The Credit Slowdown

The basic facts about the credit slowdown from 1989 to 1992 can be seen in Table I.

Chart 8: Real Government Purchases

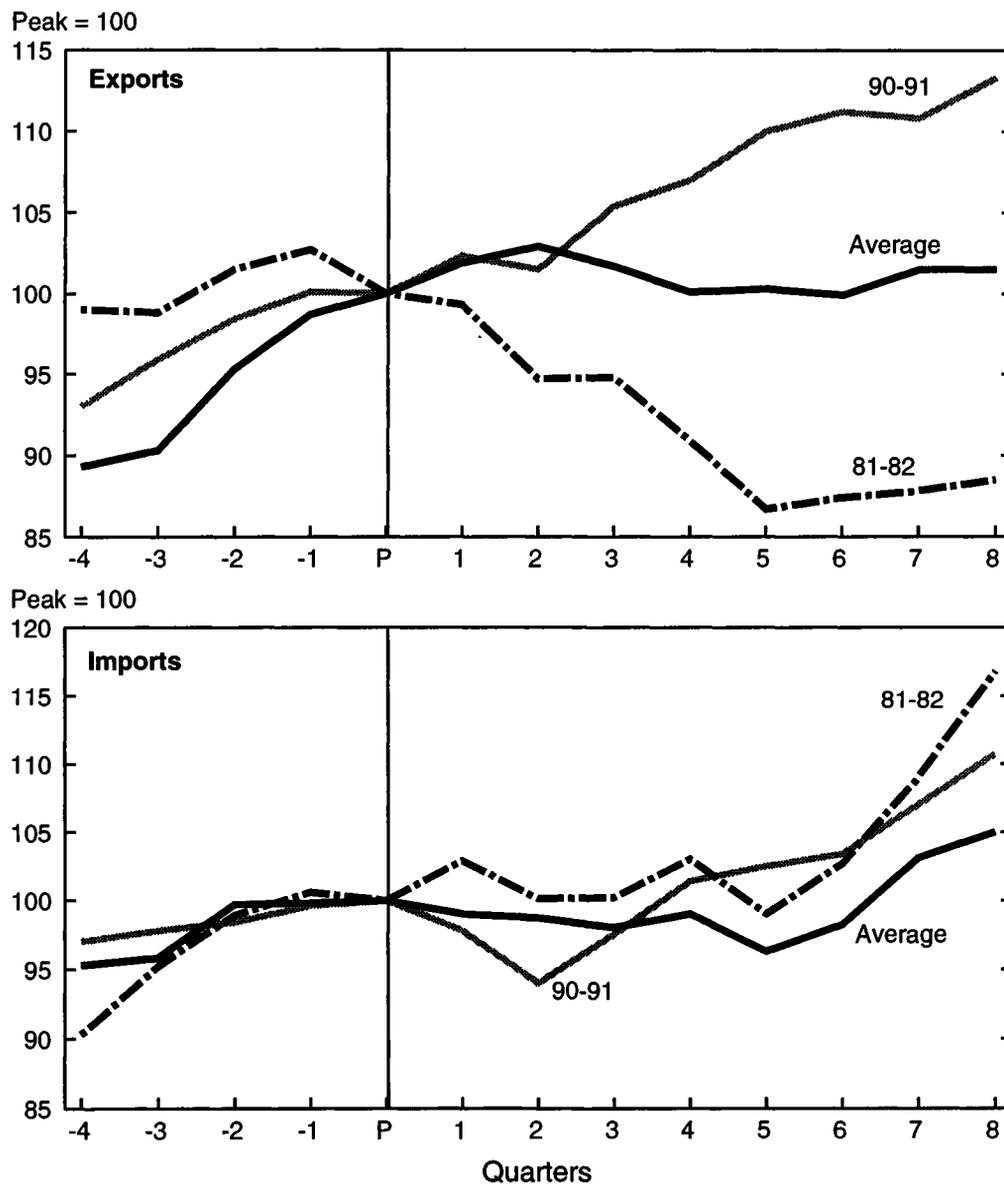


Note: AVG includes 1960-61, 1969-70, 1973-75, 1981-82 recessions

Comparing pre-recession,⁴ recession, and recovery periods, growth of both real output and most credit aggregates was slower than during previous cycles. In particular, non-residential construction and correspondingly, business mortgages were extraordinarily weak, declining through most of the 1989-92 period, in contrast to the strong growth in previous episodes. The performance of equipment and inventory spending was less dramatic, but still was reflected in low growth rates for short-term business credit. Household debt formation was also subpar, mirroring consumption growth. Only residential construction and household mortgages retained their normal cyclical patterns. General-

⁴The pre-recession periods roughly coincide with periods of tight credit. See Eckstein and Sinai (1986), Owens and Schreft (1992), Romer and Romer (1990), and Ryding (1990) for different credit crunch dates.

Chart 9: Real Exports and Real Imports



Note: AVG includes 1960-61, 1969-70, 1973-75, 1981-82 recessions

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Table 1: Growth Rates over Booms, Recessions, and Recoveries

	Booms ^a		Recessions ^b		Recoveries ^c	
	Past Episodes	1989-90	Past Episodes	1990-91	Past Episodes	1991-92
Real growth rates						
GDP	2.2	0.9	-2.9	-0.9	5.6	1.6
Debt-sensitive sectors	2.3	-1.4	-9.4	-2.1	9.4	2.5
Durables consumption	-1.3	-2.9	-6.8	-2.9	19.0	5.0
P.D.E.	4.5	-0.4	-11.7	-3.0	7.8	1.8
Nonresidential structures	8.6	1.3	-8.3	-4.0	-2.5	-10.4
Residential structures	-10.1	-10.8	-13.9	-7.0	32.8	13.4
Inventories (stock)	3.9	2.0	1.1	-0.7	1.3	-0.6
All other sectors	-0.1	2.3	6.5	1.2	-3.8	-0.9
Growth rates						
Private nonfinancial debt	11.8	6.7	10.8	0.6	8.8	2.3
Business debt	13.4	4.1	13.7	0.3	8.2	-0.6
Short-term credit	17.0	5.8	1.0	-1.2	4.7	-0.8
Loans	18.9	4.5	14.1	-0.5	4.3	-4.6
Bank loans	18.2	1.2	14.1	-0.1	1.8	-5.4
Business mortgages	12.5	1.5	12.1	-0.4	11.9	-2.6
Household debt	11.4	9.3	7.6	0.8	9.5	4.6
Mortgages	10.8	11.2	8.0	1.3	9.3	5.8
M1	5.8	4.6	8.3	1.0	7.6	10.9
M2	6.6	5.3	10.3	0.8	13.1	2.8
Differences						
Fed funds	4.28	-0.92	-5.12	-1.73	-0.72	-2.40
Prime rate	3.61	-0.66	-3.49	-0.81	-1.57	-2.69
Inflation rate	3.57	0.94	-1.31	-0.28	-2.69	-2.42
Long-term govt. bond rate	1.60	0.60	-1.28	-0.69	0.09	-0.71

^a Includes four quarters up to NBER peak dates. Past episodes are average of the booms preceding the 1969-70, 1973-75 and 1980 recessions.

^b Past episodes include average of 1969-70, 1973-75 and 1981-82 recessions.

^c Recoveries are NBER trough to four quarters later. Past episodes are average of recoveries after the 1969-70, 1973-75 and 1981-82 recessions.

ly speaking, intermediated credit, particularly bank loans, slowed more sharply than market credit, and the broad money aggregates were correspondingly weak.

Table 1 also points out the most unusual characteristic of the “credit crunch” and the recession: they were not precipitated by a sharp tightening of monetary policy.⁵

Instead, the slowdowns (and eventual declines) in both credit and activity appear to have been more closely related to several credit demand and supply factors: (1) Debt overhang from the 1980s and the associated strain on nonfinancial balance sheets appears to have caused a fundamental downward shift in credit demand and economic activity, particularly in the consumer sector; (2) Structural changes in several areas of business investment, particularly in computers and inventories, caused an exogenous decline in credit demand unrelated to balance sheet positions; (3) Economic activity was also curtailed by credit supply problems, which were largely the result of the poor financial health and balance sheet problems of many intermediaries.

Although much attention has been paid to the third factor, credit supply constraints and their effect on monetary policy transmission, several studies have found a substantive role for balance sheet adjustments and demand shifts in the overall credit slowdown. Because credit supply problems are, in practice, difficult to distinguish from balance sheet restructuring by consumers and nonfinancial firms, the following sections discuss the three credit factors in more detail and introduce several credit proxies that attempt to measure them.

1. Balance Sheet Effects

The deleveraging/balance sheet story is a straightforward one. During the 1980s there was a huge leveraging up by households and businesses. By the late 1980s the increased leverage, combined with relatively high real interest rates, created historically high debt burdens that cut sharply into consumers' discretionary spending and firms' cash flow.

For consumers, increased leverage combined with stubbornly high consumer interest rates resulted in record high debt service burdens by the latter half of the 1980s, leaving less income for discretionary consumption. Changes in the tax treatment of interest payments combined with the generally overburdened household sector led to deleveraging late in the decade, a development that put further downward pressure on consumption. This story emphasizes the income effect of high leverage and is supported by the evidence from the composition of consumer spending in Chart 5 above: sectors that are relatively insensitive to credit, such as nondurables and services consumption, experienced growth just as anemic (relative to historical norms) as that in more credit-sensitive sectors such as consumer durables. Thus, high debt service helped to reduce spending growth in a wide variety of goods, not just those purchased with credit.⁶

Leverage effects on firms created similar problems. Both theoretical (Jensen and Meckling 1976) and empirical (Fazzari, Hubbard and Peterson 1988) studies have shown that the investment and production plans of high-leverage firms respond more strongly to bad demand shocks than do the plans of firms with lower leverage. The macroeconomic implications of these leverage effects for both investment and credit are

⁵ Although policy was tightened in 1988, the tightening was short-lived, and short-term rates were falling by late 1988. Declining short-term rates and the absence of the Regulation Q ceilings mean that the credit slowdown and ensuing recession cannot be attributed to disintermediation-style credit rationing, a common feature of historical credit crunches.

⁶ Further anecdotal evidence suggests that credit supply constraints may have been less important because banks and financial institutions were attempting to expand certain types of consumer lending, particularly credit cards, during this period.

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clear: as the business sector became more highly leveraged over the 1980s, investment and credit demand reacted more strongly to declines in economic activity. As with households, any attempt by firms to deleverage further depressed investment and credit demand.

2. Credit Demand Shifts

In addition to debt overhang problems, several credit- (and policy-) sensitive components of aggregate demand underwent secular changes in the 1980s that kept growth in these components and their related credit demands low relative to historical norms. The paper by Mosser and Steindel in this volume emphasizes two particular sectors, business investment in equipment and inventory investment, that underwent structural changes largely unrelated to credit market developments. As the relative price of computers fell sharply in 1980s, firms shifted expenditure away from production equipment and toward the relatively cheap computers, thus reducing nominal equipment growth and related credit demands.⁷ Similarly, improved inventory management techniques, particularly by manufacturers, helped to keep the inventory cycle and associated credit demands quite small in the 1990-91 recession. Because these structural changes appear to predate the slowdown in credit in the late 1980s, it seems likely that they reduced credit demand and thus contributed to, although by no means completely explain, the slowdown in short-term business credit.⁸

3. Credit Supply Effects

Several recent studies have examined the credit slowdown, attempting to control for shifts in credit demand factors and some of the balance sheet effects noted above. In general, they conclude that credit supply restrictions, particularly from banks, were responsible for a portion of the credit slowdown. For example, Bernanke and Lown (1991) concluded that although deteriorating balance sheet positions of consumers and nonfinancial firms were responsible for most of the slowdown in activity and credit, the supply of bank credit, particularly in certain regions, was an important factor impeding the economy. In this volume, Lown and Weninger estimate that bank loans were significantly weaker than traditional reduced form lending-activity relationships would indicate. Cantor and Rodrigues find similar results for nonbank intermediated credit. Mosser and Steindel show that the long-term relationships between credit flows and economic activity fell apart in the late 1980s, with credit flows nearly 35 percent too low given the pace of economic activity.

More microeconomic studies, such as Johnson (1991), Peek and Rosengren (1992), and Hancock and Wilcox (1992), suggest that bank capital problems, probably related to the real estate collapse, restricted credit supply in excess of what interest rates and demand factors would have predicted. In this volume, Hamdani, Rodrigues and Varvatsoulis use survey evidence to show that credit supply restrictions were particularly important for smaller firms, perhaps because of their almost exclusive reliance on intermediated credit.

Although nearly all of the studies agree that a "capital crunch" story appears to fit the

⁷ In addition, deflating nominal credit by the GDP deflator (as is common practice) makes real credit growth look disproportionately weaker than investment demand.

⁸ In fact, Mosser and Steindel find that fundamental demand factors explain only about 25 percent of the decline in short-term corporate borrowing from 1989 to 1991.

general facts of the credit slowdown, estimates of the size of the credit supply restrictions vary. Most of the macroeconomic studies mentioned above measure credit supply restraints using one or more proxies, including interest rate spreads, measures of credit restrictions for small firms, and regression residuals that measure excessive credit restraint.

In their paper, Lown and Wenninger discuss several proxies for credit supply restrictions from the banking sector.⁹ For example, spreads between bank borrowing rates and market rates appear to have been kept high in an attempt to discourage borrowing. One signal of the reluctance of banks to lend was a 250+ basis point gap between the prime and federal funds rates that persisted over 1991 and 1992. In contrast, during previous recessions and crunches the spread between the prime and fed funds spiked to high levels when inflation was high and monetary policy was tightened, but returned to more normal levels relatively quickly.

Lown and Wenninger also show that reduced form relationships between different components of bank lending, economic activity, and borrowing rates overpredicted lending during the crunch. Although their equations are not, strictly speaking, structural loan demand equations, they largely capture credit demand effects. Below, residuals from their estimates are used as proxies for bank credit supply constraints.¹⁰

Another set of credit "supply" proxies come from the paper by Mosser and Steindel in this volume. They show that long-term relationships between a number of credit aggregates (both bank and nonbank credit), interest rates, and economic activity consistently underpredicted actual credit flows in the mid 1980s and overpredicted flows in the early 1990s. While their regressions are not credit demand relationships in the formal sense, in practice they behave suspiciously like stable, long-term demand relationships. Thus their large residuals reflect either credit supply shifts or some nonlinear credit demand changes perhaps related to deleveraging.¹¹

Finally, Hamdani, Rodrigues and Varvatsoulis suggest proxies for credit supply constraints that focus on small firms. Results from Gertler and Gilchrist (1992) and Oliner and Rudebusch (1992) suggest that because small firms have little or no direct access to capital markets, their activities are harder hit by credit restrictions at financial intermediaries than the activities of large firms. Using survey results from the National Federation of Independent Business, Hamdani, Rodrigues and Varvatsoulis find that even after adjusting for normal cyclical movements in output and interest rates, many small firms had significant difficulty in obtaining credit in the late 1980s. Their proxy essentially measures the amount of nonprice credit rationing faced by small firms.

⁹ Lown and Wenninger offer extensive evidence in favor of this bank capital/credit supply story. They show that virtually all categories of bank lending (excepting home mortgages) were weaker than in past downturns. In addition, bank surveys, changes in lending requirements (for example, higher collateralization) and substantially weaker lending by the lowest capital banks all suggest that constraints on bank credit supply were important. Finally, their econometric estimates of relationships between bank lending, interest rates, and economic activity suggest that the weakness in bank lending (particularly consumer loans and nonresidential mortgages) in the 1990-91 recession was substantially different from that in previous economic downturns.

¹⁰ Of course, Lown and Wenninger's residuals, like those from Mosser and Steindel below, may also reflect some nonlinear credit demand effects. For example, higher leverage may have changed the historical relationship between spending and credit demand. In other words, at high debt levels, cuts in spending may cause proportionally larger declines in credit demand as firms and households deleverage and cut spending simultaneously.

¹¹ More precisely, their residuals measure those balance sheets changes that are uncorrelated with economic activity.

The studies examined here provide ample evidence that shifts in both credit demand and supply played an important role in the credit slowdown. The next question is what effect the credit slowdown, and credit supply restrictions in particular, may have had on aggregate activity. As a first step to answering that question, the next section of the paper measures the statistical relevance of credit variables, including the supply proxies discussed above, in explaining systematic movements in aggregate economic activity. Further econometric evidence is discussed in section III below.

C. Granger-Causality Tests of Credit and Aggregate Demand

This section of the paper looks at the time series relationship between credit and economic activity during the 1980s. Specifically, it reports Granger-causality tests of whether overall credit aggregates or credit supply proxies are statistically significant predictors of future economic activity. These statistical tests are based on data from 1980 to 1992, and thus are useful indicators of systematic links between credit, credit supply proxies and future activity over that period. To the extent that the 1989-92 credit slowdown was a unique episode, however, these tests may inadequately measure the impact of credit on activity. Thus these tests should be viewed as only an introduction to the linkages between credit and activity.

Following the previous literature on the relationship between credit and economic activity,¹² Tables 2 and 3 present Granger causality tests statistics from regressions of economic activity (real GDP and debt-sensitive real GDP) on lagged credit variables and lagged activity. The F-statistics test whether all the coefficients on lagged credit variables are significantly different from zero. Figures in parentheses are significance levels of the F-tests (percentiles of the F-distribution). Table 2 reports tests for regressions with eight lags of activity and credit; regressions in Table 3 also include eight lags of the federal funds rate.

Several results stand out from the tables. Aggregate credit (and money) variables were generally poor predictors of activity, although M2 was the best of a bad lot.¹³ In general, the proxy variables did a better job of explaining economic activity in the 1980s than credit or money aggregates. The bivariate results show that the prime rate-federal funds rate spread, small firm borrowing constraints, and residuals from Mosser and Steindel debt regressions all Granger-cause activity. In light of the emphasis on bank behavior and the real estate sector in the credit slump, the only surprising result is that residuals from business mortgage regressions and from Lown and Wenninger's bank residuals were generally insignificant in explaining activity. In addition, all money, credit, and proxy measures were less important in explaining activity if the federal funds rate was also used as an explanatory variable.¹⁴ Even so, the credit proxies in the three variable regressions were substantially more important in explaining economic activity than were the corresponding credit aggregates.

Overall, this formal econometric evidence using Granger causality tests is somewhat

¹² These tests are closely related to those used by Bernanke and Blinder (1992), Friedman and Kuttner (1989), Romer and Romer (1990) and Kashyap and Stein (1992), to determine if monetary policy affected real activity more through a "money" channel (interest rates) or through a "credit" channel. See footnote 2.

¹³ All money and credit variables are worse predictors of activity in the 1980s than during earlier periods, probably as a result of the massive structural changes in financial market and intermediaries during the decade.

¹⁴ This finding has been standard since Sims (1972).

Table 2: Granger Causality Tests: Credit, Credit Proxy, and Real Activity^a
Differences, 1980 to 1992

	Real GDP	Debt-sensitive GDP
Bivariate		
Nonmortgage debt	1.05 (0.39)	1.47 (0.23)
Short-term credit	1.65 (0.18)	2.47 (0.06)*
Loans	0.94 (0.45)	1.04 (0.49)
Consumer credit	1.45 (0.24)	2.64 (0.05)**
M1	1.11 (0.36)	1.41 (0.25)
M2 ^a	2.02 (0.10)*	2.21 (0.09)*
Mosser/Steindel residuals^b		
Nonmortgage Corp. Debt	2.96 (0.03)**	2.30 (0.08)*
Short-term	2.68 (0.04)**	5.35 (0.00)***
Loans	1.13 (0.35)	0.81 (0.52)
Business mortgages	0.99 (0.42)	1.07 (0.38)
Consumer credit	1.28 (0.29)	1.52 (0.21)
Household mortgages	1.46 (0.24)	1.93 (0.12)
Lown/Wenninger residuals^c		
Consumer loans	0.23 (0.92)	0.49 (0.74)
C&I loans	1.51 (0.22)	2.82 (0.04)**
Business mortgages	1.20 (0.33)	0.32 (0.86)
Hamdani/Rodrigues/Varvatsoulis residuals^d		
All firms	2.10 (0.10)*	1.85 (0.14)
Regular borrowers	2.69 (0.04)**	2.54 (0.05)**
Bank spread ^e	2.34 (0.07)*	3.64 (0.01)***

a. Debt-sensitive real GDP is consumer spending on durables, business fixed investment and inventory investment. Statistics reported in the table test the null hypothesis that all lags of credit proxies have zero coefficients in explaining real GDP. Numbers in parenthesis are percentiles of appropriate F-distributions.

b. Residuals from Mosser and Steindel regressions of the long-term relationships between debt and economic activity.

c. Residuals from Lown and Wenninger reduced-form regressions relating bank loans to economic activity and interest rates.

d. Residuals from Hamdani, Rodrigues and Varvatsoulis reduced-form regressions relating small business borrowing constraints (as measured by survey data from the NFIB) to economic activity and interest rates.

e. Prime rate minus federal funds rate.

* Statistically significant at 10 percent level.

** Statistically significant at 5 percent level.

*** Statistically significant at 1 percent level

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Table 3: Granger Causality Tests: Credit, Credit Proxies, and Real Activity^a
Differences (1980-92)

	Real GDP	Debt-sensitive GDP
Trivariate with federal funds rate		
Nonmortgage debt	0.78 (0.54)	1.00 (0.42)
Short-term credit	0.61 (0.66)	0.84 (0.51)
Loans	0.48 (0.75)	0.58 (0.68)
Consumer credit	1.11 (0.36)	2.36 (0.07)*
M1	1.16 (0.35)	0.86 (0.49)
M2 ^a	0.31 (0.87)	0.45 (0.77)
Mosser/Steindel residuals^b		
Nonmortgage Corp. Debt	2.96 (0.03)**	2.43 (0.07)*
Short-term	0.51 (0.73)	1.76 (0.16)
Loans	0.77 (0.55)	0.49 (0.74)
Business mortgages	0.17 (0.95)	1.08 (0.38)
Consumer credit	0.45 (0.77)	0.34 (0.85)
Household mortgages	0.99 (0.43)	1.89 (0.14)
Lown/Wenninger residuals^c		
Consumer loans	0.54 (0.71)	0.03 (0.99)
C&I loans	0.49 (0.75)	1.62 (0.19)
Business mortgages	1.25 (0.31)	0.81 (0.53)
Hamdani/Rodrigues/Varvatsoulis residuals^d		
All firms	1.92 (0.13)	1.56 (0.20)
Regular borrowers	1.86 (0.14)	1.70 (0.17)
Bank spread ^e	1.18 (0.33)	1.50 (0.22)

^aDebt-sensitive real GDP is consumer spending on durables, business fixed investment and inventory investment. Statistics reported in the table test the null hypothesis that all lags of credit proxies have zero coefficients in explaining real GDP. Numbers in parenthesis are percentiles of appropriate F-distributions.

^bResiduals from Mosser and Steindel regressions of the long-term relationship between debt and economic activity.

^cResiduals from Lown and Wenninger reduced-form regressions relating bank loans to economic activity and interest rates.

^dResiduals from Hamdani, Rodrigues and Varvatsoulis reduced from regressions relating small business borrowing constraints (as measured by survey data from the NFIB) to economic activity and interest rates.

^ePrime rate minus federal funds rate.

* Statistically significant at 10 percent level.

** Statistically significant at 5 percent level.

disappointing. Although credit supply proxies are more important in explaining activity than credit aggregates, few of the credit variables are statistically significant, particularly when the federal funds rate is included. Taken at face value, the Granger-causality tests suggest that the quantity and composition of credit had little or no independent effect on output during the 1980s. In contrast, the informal evidence on aggregate demand presented earlier suggested a very close relationship between credit and activity.

One reason for the ambiguous econometric results may be that aggregate regressions and statistical tests mask a number of important sectoral differences in the interaction between credit formation and economic activity. Both institutional details and the large differences across the aggregate demand components in Charts 5-9 suggest that relationships between activity, credit and policy for real estate, households, and businesses should be examined individually. Section III below does this, using the credit proxies to help explain the weakness in different demand components from 1989 to 1992.

Before turning to sectoral evidence, however, a second problem associated with the statistical tests above needs to be discussed. Both the simple recession comparisons and the Granger-causality tests abstract from a number of important structural differences between the 1990-91 business cycle and its predecessors. In addition to the extraordinary conditions in credit markets, these differences include the stance of monetary policy, financial innovation and deregulation that have changed the transmission of monetary policy, fiscal policy stance, and other "exogenous" shifts in aggregate demand. Section III below looks at the role of these factors (in conjunction with the credit slowdown) in curtailing economic growth, with particular emphasis on monetary policy transmission.

II. Factors Influencing Monetary Policy Effectiveness

This section of the paper looks at the linkages between monetary policy and the real economy, giving particular attention to those factors, including the credit crunch, that may have disrupted or changed these linkages. Section A compares monetary policy stance during the 1990-91 cycle and earlier cycles. Section B reviews how financial market problems in the early 1990s, particularly the credit slowdown, may have made monetary policy less effective. Section C summarizes the long-term changes in monetary policy transmission mechanisms that may have altered the policy-credit-output linkages. Section D discusses other exogenous factors that may have offset monetary policy easing.

A. Monetary Policy Stance

Before discussing the interaction of monetary policy, activity and the credit slowdown in the early 1990s, some comparison of monetary policy stance with that in earlier cycles is necessary. Although the 1990-91 recession began with monetary policy easing rather than tightening, sluggish growth in both credit and the real economy might have occurred because monetary policy did not ease enough to stimulate activity. One reason for confusion about the "tightness" of policy is that the two traditional measures of monetary policy stance, M2 and the interest rate on federal funds, gave conflicting signals in the early 1990s.

M2 growth suggested a tight policy stance (Chart 10A). The slow growth in M2, however, was due to sharp declines in small certificates of deposit, and appears to have been a conscious choice on the part of financial institutions to reduce managed liabilities in the face of capital problems. Thus, M2 behavior reflected the capital crunch at de-

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Chart 10A: Real Money Growth

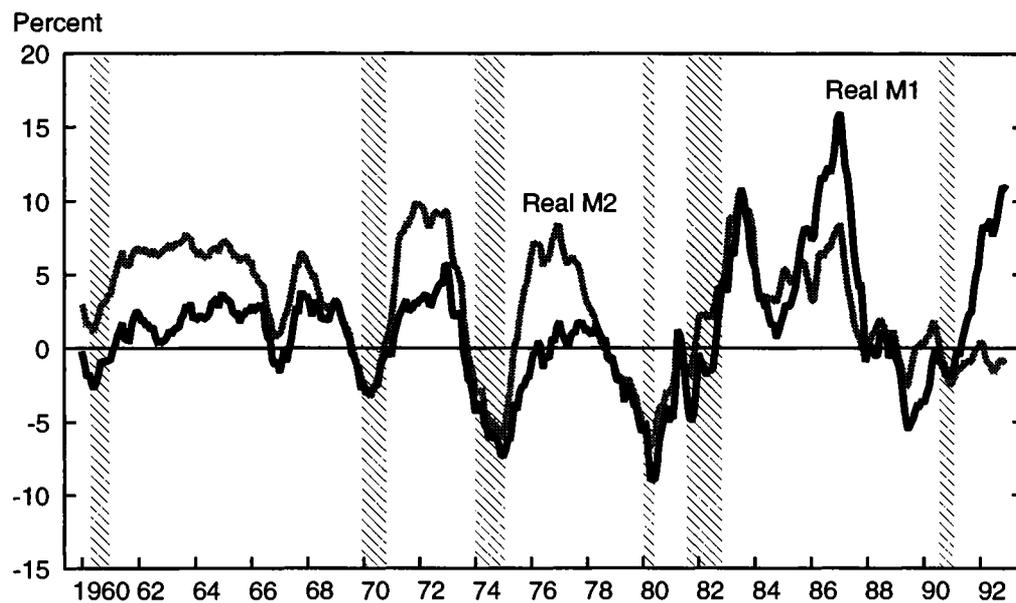
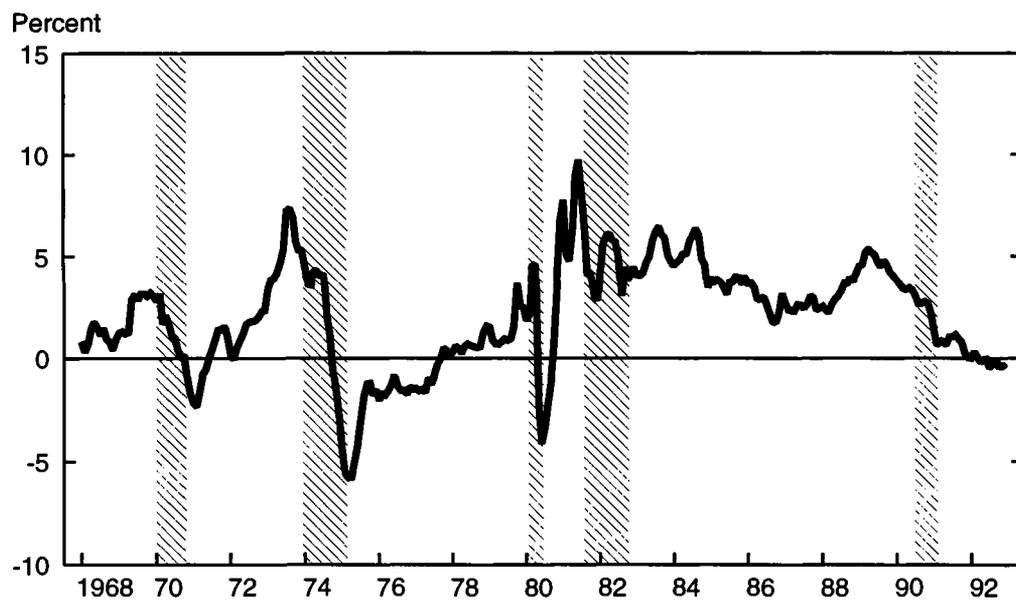


Chart 10B: Real Federal Funds Rate



Note: The real Federal funds rate is calculated as the nominal rate minus the previous twelve months inflation in the core CPI.

pository institutions but was not a clear signal of monetary policy.

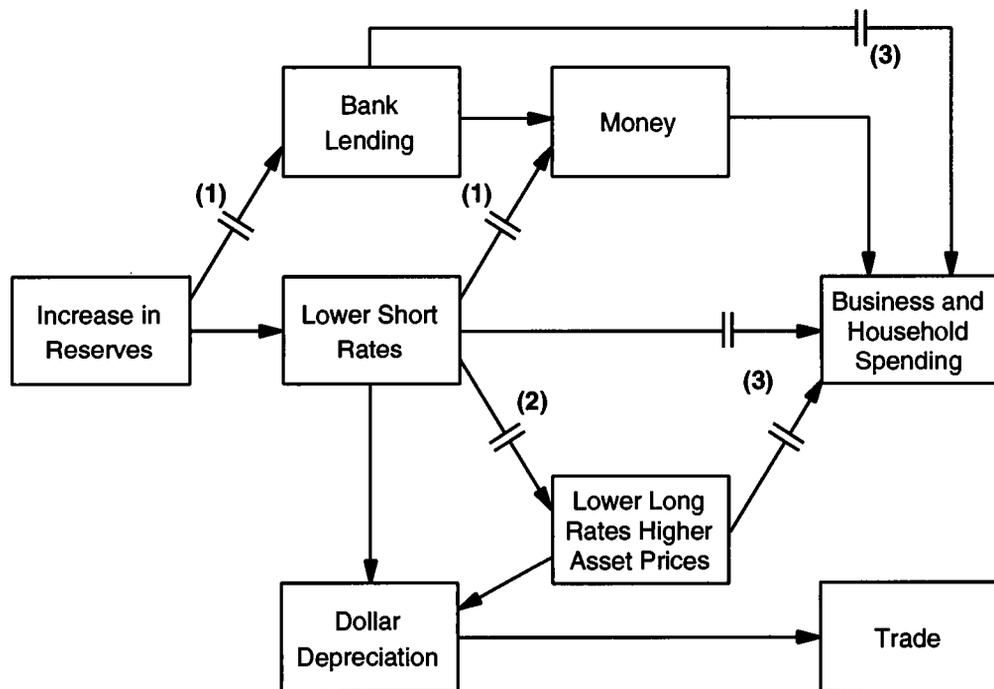
In contrast, the real, or inflation-adjusted federal funds rate (Chart 10B) fell to near zero by mid-1992, suggesting policy was looser than it had been in the 1981-82 recession, but a bit tighter than at the end of earlier recessions. Nonetheless, the real funds rate did rise more than 150 basis points in 1991 when nominal rates were flat and inflation slowed sharply. This “induced” tightness, which resulted from the Fed’s policy of very gradual easing, suggests that monetary policy stimulus only slowly worked its way through the economy.

B. “Blockages” in Monetary Policy Transmission

Although monetary policy stance from 1989 to 1992 was somewhat different from past cycles, policy stance alone cannot completely explain the extraordinarily slow growth in real activity and intermediated credit. Indeed both the credit supply and demand stories outlined above suggest that during this period the transmission of policy changes via financial markets and institutions was weaker than in past episodes.

Some of the channels through which policy should affect the economy, but which may have been blocked because of financial system fragility, are shown in Figure 1. Blockage (1) suggests that the capital crunch and banking crisis did not allow reductions in short-term market interest rates to be transmitted to bank lending rates or credit

Figure 1: Channels of Monetary Policy



Possible “Blockages”

- (1) Large writeoffs, new capital requirements, poor asset quality (balance sheet problems).
- (2) Uncertainty, inflation concerns, long-term budget deficit.
- (3) Deleveraging and balance sheet problems of firms and households.

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growth. Evidence of this shift seems quite overwhelming: credit growth, particularly at depository institutions, was well below economic fundamentals and bank lending rates relatively high.¹⁵

Blockage (2) suggests that the channels to long-term bonds and other assets were blocked by inflation fears or by a high level of investor uncertainty—perhaps related to credit problems or to concerns about long-term federal deficits. Certainly, long-term rates fell substantially less than short-term rates, making the term structure quite steep, but the term structure is usually steep when the economy is weak and monetary policy is loose (Chart 11). How important the credit slowdown and banking crisis were in the steep yield curve is unclear however, since the medium-term spread between three months and three years was within historical norms, but the long-term yield curve (three to ten years) was extraordinarily steep.

Blockage (3) suggests that deleveraging and debt restructuring by households and firms depressed spending and credit demand, making them less responsive to easing monetary policy. For example, lower interest rates due to easy monetary policy may have induced firms and consumers to deleverage more quickly, while keeping spending growth modest.¹⁶ Although easing monetary policy may have “worked” by averting a deeper and more prolonged recession, this pattern is in sharp contrast to historical experience, when declining interest rates encouraged increases in economic activity. Thus the normal pattern of easing monetary policy followed by a strong rebound in economic activity appears to have been interrupted by shifts in both credit supply and credit demand.

C. Long-Term Changes in Monetary Policy Transmission

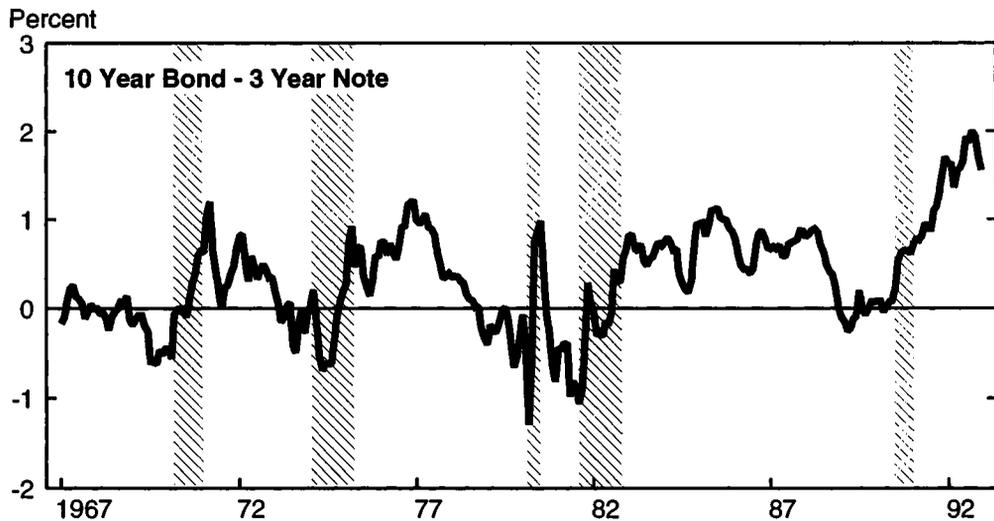
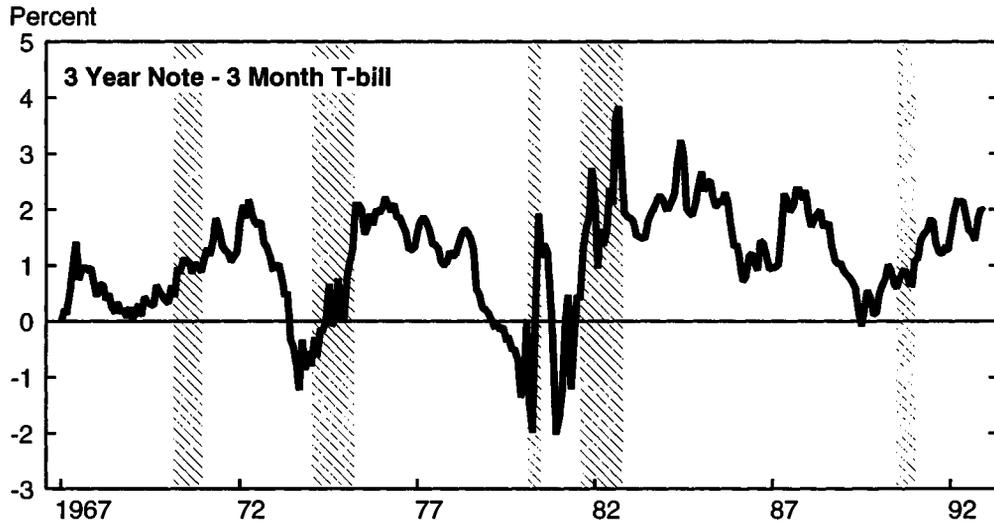
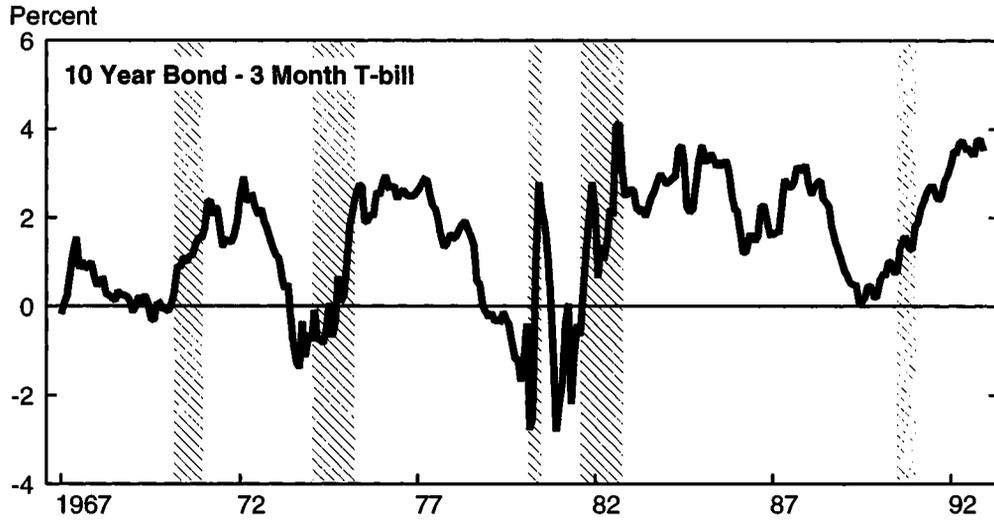
The short-run impediments to policy discussed above are only part of the reason that the relationship between monetary policy, credit, and economic activity in the early 1990s was so different from historical experience. Since the late 1970s, both financial innovation and deregulation have not only changed the behavior of financial institutions and markets, but they have also fundamentally altered the relationship between financial markets and economic activity. Even in the absence of the credit “crunch,” these long-term changes in the channels of monetary policy transmission would have altered both the size and speed with which policy affected various sectors of the economy.

Tables 4 and 5 summarize by sector and by study some of the major findings on long-term changes in monetary policy transmission. Overall, these studies conclude that monetary policy today is transmitted less through Regulation Q-type quantity rationing of credit and more through interest rates and their effect on balance sheets and the ex-

¹⁵ See the paper by Lown and Wenninger and Table 1. There is a small caveat to this story. Although bank rates remained high relative to market rates in 1991 and 1992, in fact bank lending rates (with the notable exception of consumer credit rates) did decline steadily from late 1990 to the middle of 1992. It appears that the way in which monetary policy was “working” was to allow banks sufficient liquidity to improve their balance sheet positions in a relatively short period of time. While this outcome of monetary policy did not lead directly to strong growth in real activity, tighter policy might have led to large-scale bank failures and financial distress, and certainly to a deep and prolonged recession.

¹⁶ Tighter monetary policy and higher rates would have forced further cuts in discretionary purchases as agents attempted to lower their debt burdens. This argues that easy monetary policy prevented a short-run collapse in spending and sped up deleveraging at the same time. This process seemed to be particularly clear in the household sector. There, lower interest rates led to a record volume of mortgage refinancing, freeing up funds for both discretionary spending and for further retirement of debt. In addition, lower rates stimulated housing investment and related consumer durables spending.

Chart 11: Treasury Spreads



Note: Shaded areas represent recessions.

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change rate.¹⁷ Roughly speaking, the empirical evidence suggests that a smaller response of housing to monetary policy has been offset (by some measures, more than offset) by a stronger exchange rate and net export response to policy. Although the studies in Tables 4 and 5 differ in their estimates of the overall size of the change in monetary policy effectiveness, they agree that the speed with which monetary policy affects the real economy is slower, and the impact of policy in any particular month or quarter is probably more unpredictable.

From the perspective of the 1990-91 cycle, longer and more uncertain policy lags make it very difficult to distinguish between short-run blockages to policy caused by credit supply and demand shifts and the longer term changes in transmission mechanisms. For example, monetary easing in 1991 and 1992 may have weakened the dollar, eventually giving a boost to U.S. exports; however, other long-term structural changes and the recent credit crunch may have conspired to make monetary policy less effective in stimulating domestic demand. Furthermore, if policy is now transmitted via interest rates and their impact on balance sheets, then balance sheet restructuring by consumers and firms could short-circuit monetary policy easing. In addition, credit supply shifts caused by bank capital problems could still keep easier monetary policy from affecting those sectors most dependent on intermediated credit despite wider capital market access for many firms and households. Large-scale real estate appears to be one such sector.

D. Other Factors Offsetting Monetary Policy

While changes in transmission mechanisms and short-term credit problems may have muted monetary policy effectiveness in the latest cycle, economic growth was also re-

¹⁷ This conclusion does not mean that credit rationing by intermediaries would not affect the transmission of monetary policy, only that Regulation Q-type interest rate ceilings, which induced systematic credit rationing under very tight monetary policy, are no longer important.

Table 4: Summary of Empirical Studies
Changes in the Transmission of Monetary Policy

Final Demand Components	Innovation/Deregulation	Monetary Policy Influence
Housing	Remove Reg. Q Mortgage securitization Variable rate mortgages	Less for large shocks; maybe more for small changes
Business investment	Increased leverage Greater access to commercial paper and loan commitments	Likely larger, but few studies using aggregate data
Inventory investment	Greater access to commercial paper and loan commitments	Possibly larger, but few studies
Consumption	Increased leverage Greater credit access/info. Wider menu of saving instruments	No discernible change
Trade	Reduced capital controls Swaps and futures "Internationalization" of capital markets	Larger impact of interest rate differentials on the dollar

strained by “headwinds”—negative factors largely unrelated to monetary policy stance. These headwinds include relatively tight fiscal policy or rather lack of any significant fiscal stimulus, and low confidence or “animal spirits”, particularly by households¹⁸

Chart 12A makes clear that discretionary fiscal policy, measured by the full employment budget deficit, eased much less than in previous recessions. There was about a quarter of the discretionary fiscal pump priming done in previous recoveries and only one-sixth of the discretionary stimulus done in 1981-82. This lack of fiscal stimulus is unique: the U.S. did not have a single sustained economic recovery in the preceding

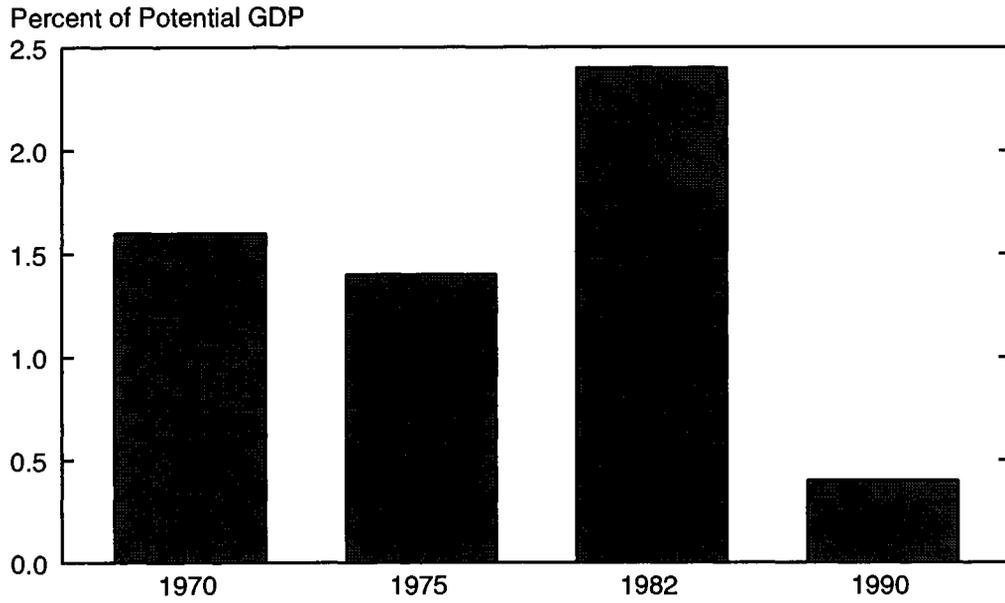
¹⁸ In addition, the two previous recessionary periods, 1973-75 and 1980-82, were preceded by extremely large (negative) supply shocks (mainly large energy price increases). The subsequent easing of these supply shocks was a factor in the economic recoveries that followed. In the latest episode, the energy price shock was small and brief, playing a modest role in recession and recovery.

Table 5: Empirical Studies of Monetary Policy Transmission

Study	Sector	Major Conclusions
Akhtar & Harris: FRBNY	Aggregate	Interest sensitivity of private spending has risen, credit rationing less and exchange rate effects are greater
Bernanke & Campbell: Brookings	BFI	Serious risk to real economy (investment) from leveraging up in 1980s
Bosworth: Brookings	Housing ;consumption; trade	Housing less sensitive; others perhaps more, but policy lags are longer
Cantor: FRBNY	BFI	Investment of highly leveraged firms more closely tied to sales and cash flow
Fazzari et. al.: Brookings	BFI	Financial structure of firms very important in short-run investment decisions
Friedman: FRBKC	Aggregate	Less housing sensitivity; greater BFI sensitivity; little change in consumption
Hirtle: FRBNY	Aggregate	Change in relationship between GNP and interest rates that can be related to loan commitments
Kahn: FRBKC	Aggregate	GNP slightly less sensitive to Fed funds rate; longer and uncertain policy lag
Mauskopf: FRB	Aggregate	MPS model reestimation confirms less sensitive housing, more sensitive trade sector, but little overall change in policy sensitivity
Mosser: FRBNY	Aggregate	Large macroeconomic models are more sensitive to policy than in the 1970s; policy lags are longer; housing slightly less sensitive, trade much more
Ryding: FRBNY	Housing	Less sensitivity to policy due to decline in disintermediation
Throop: FRBSF	Housing	Less sensitive to policy, but size of the effects are small

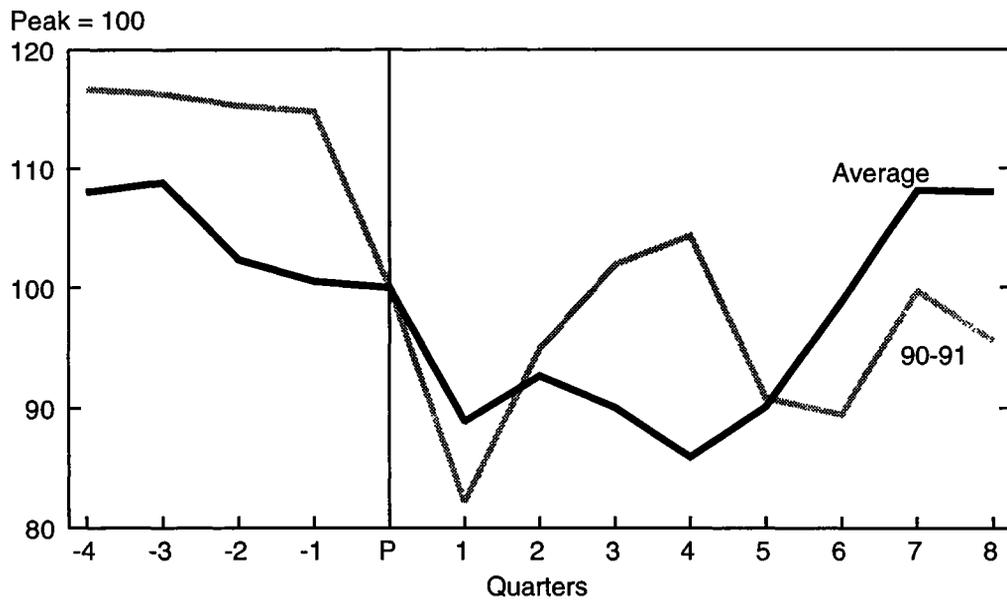
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**Chart 12A: Change in the Full Employment Budget Deficit
Business Cycle Peak to Eight Quarters Later**



Source: Federal Reserve Board.

**Chart 12B: Consumer Sentiment
Michigan Survey**



Note: AVG includes 1969-70, 1973-75, and 1981-82 recessions.

thirty years without significant fiscal stimulus. Indeed, a fiscal stimulus package comparable to that implemented in the early 1980s might have added a full percentage point to GDP growth in 1991 and 1992.¹⁹

Economic activity also appears to have been hurt by low consumer sentiment. Chart 12B shows that consumers were very pessimistic in late 1991 and 1992, more so than in previous economic recoveries. The low confidence readings may have been partly related to the credit slowdown, however, pessimistic confidence readings also stemmed from long-run changes in consumer prospects. In particular, corporate restructuring and downsizing have made future permanent income (and benefits) more uncertain, and a decade of relatively slow income growth and increasing income inequality (with no end in sight) probably contributed to the gloomy outlook.

Low confidence and the lack of any fiscal stimulus make the slow-growth recovery discussed in section I more understandable, regardless of the role of the credit slowdown and any long-term changes in monetary policy effectiveness. Because monetary policy, for the first time, was “going it alone” in trying to stimulate the economy, the simple historical comparisons with previous cycles presented above may be misleading indicators of whether the economy was “on track” in the late 1980s and early 1990s. To evaluate monetary policy efficacy and the role of credit in the downturn more rigorously, the next section presents evidence from several econometric models of aggregate activity.

III. Econometric Evidence on Monetary Policy Effectiveness and the Role of Credit Restraint

One way to pull together many of the factors affecting economic growth is to ask whether final demand equations, which relate spending to economic fundamentals such as income, wealth, interest rates and relative prices, adequately captured the weakness in the real economy from 1989 to 1992. On the one hand, if the slow economy was largely due to excessively high long-term interest rates or to relatively tight fiscal policy, or if balance sheet effects on aggregate demand are reflected largely through interest rates, these equations should predict economic activity fairly well. On the other hand, if factors left out of the models—for example, credit supply problems or an exogenous shift in demand for both goods and credit (such as a desire to deleverage)—were responsible for the weakness, then these equations will perform badly and consistently overpredict real activity.

This section looks at the performance of a number of different final demand models during the credit slowdown. In general, both reduced-form estimates and structural equations from large econometric models overpredicted real spending from 1989 to 1992. Adding the credit supply proxies from section I helps to explain some, but not all, of the overpredictions in policy-sensitive sectors. In addition, the overpredictions are not restricted to those sectors most sensitive to policy.

Chart 13 shows that aggregate reduced-form equations generally overpredicted output from 1989 to 1992.²⁰ While policy-sensitive sectors underperformed relative to model predictions, so did the sectors less directly sensitive to monetary policy. These models suggest a general malaise in aggregate demand, policy-sensitive or not, which

¹⁹ This calculation assumes a fiscal multiplier of 1.

²⁰ Separate prediction models for policy-sensitive and insensitive sectors of real GDP were estimated by regressing each on four lags of the long-term government bond rate, inflation, monetary policy (federal funds rate and M2) and a measure of discretionary fiscal policy (the full-employment budget deficit) from 1967 to 1992-II. Prediction errors are static: actual expenditure less that predicted by the model equation, using actual historical values for all right hand side variables.

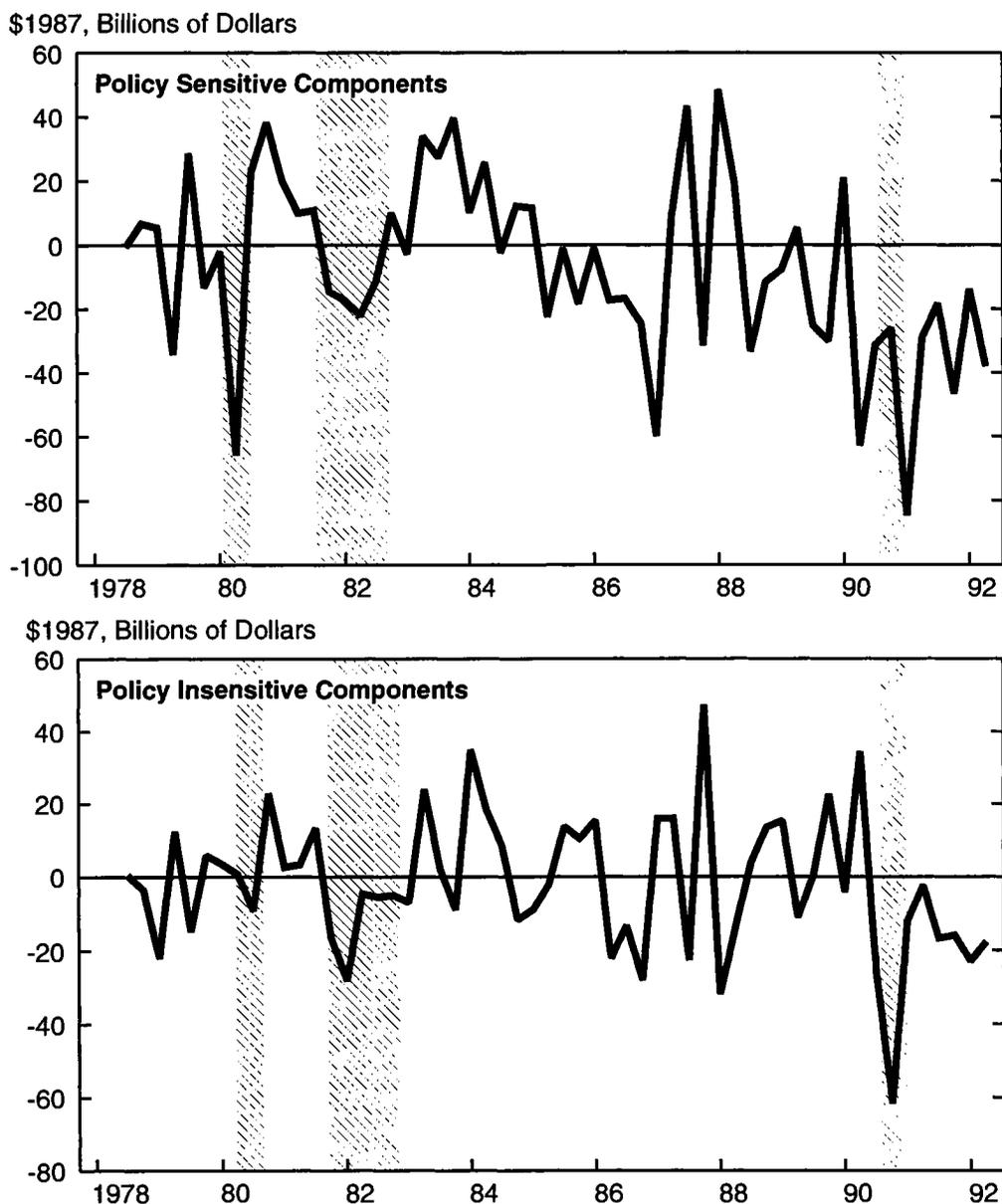
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was not well described by economic fundamentals.

The general malaise in demand is particularly clear in the consumer sector. Charts 14 and 15 show prediction errors from equations for consumer spending from the DRI and MPS/Federal Reserve Board models.²¹ According to the Board model, actual spending on durables and on nondurables and services was very weak in 1991 and 1992, well below what income, wealth, and interest rates would indicate. In contrast, DRI's

²¹ Both DRI and the Board use income, interest rates and relative prices to predict durables spending. In addition, the Board model uses the stock of durables and the unemployment rate. For nondurables and services, the Board equation emphasizes household wealth (including the stock market) and permanent income. DRI uses recent income changes and relative prices.

Chart 13: Reduced-Form Prediction Errors



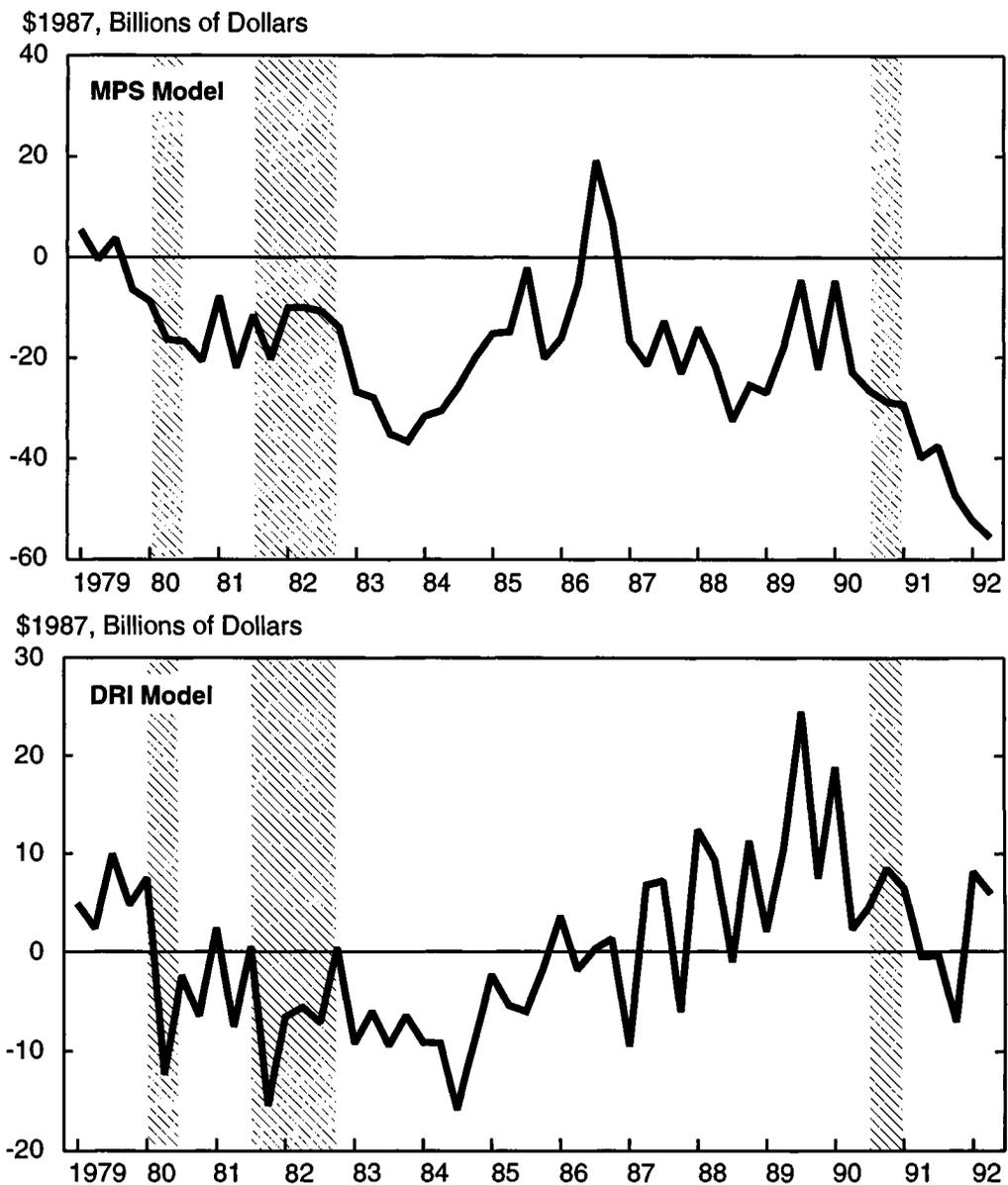
Note: Shaded areas represent recessions.

equations show consumer spending was about on track because DRI uses consumer sentiment to forecast consumption, while the Board does not. Indirectly, these charts imply that consumers were more pessimistic than their income, interest rates and wealth levels warranted.

Chart 16 shows that general reduced-form equations for consumer durables and for nondurables and services also overpredicted.²² Notably, prediction errors for nondurables and services were, by historical standards, even larger than those for durables. The

²² Both were predicted using disposable income, long-term interest rates, relative prices, inflation, fiscal policy, M2 and the federal funds rate. Four lags of all variables were included in the regression, which was estimated from 1967 to 1992-II.

Chart 14: Prediction Errors — Durables Consumer Spending



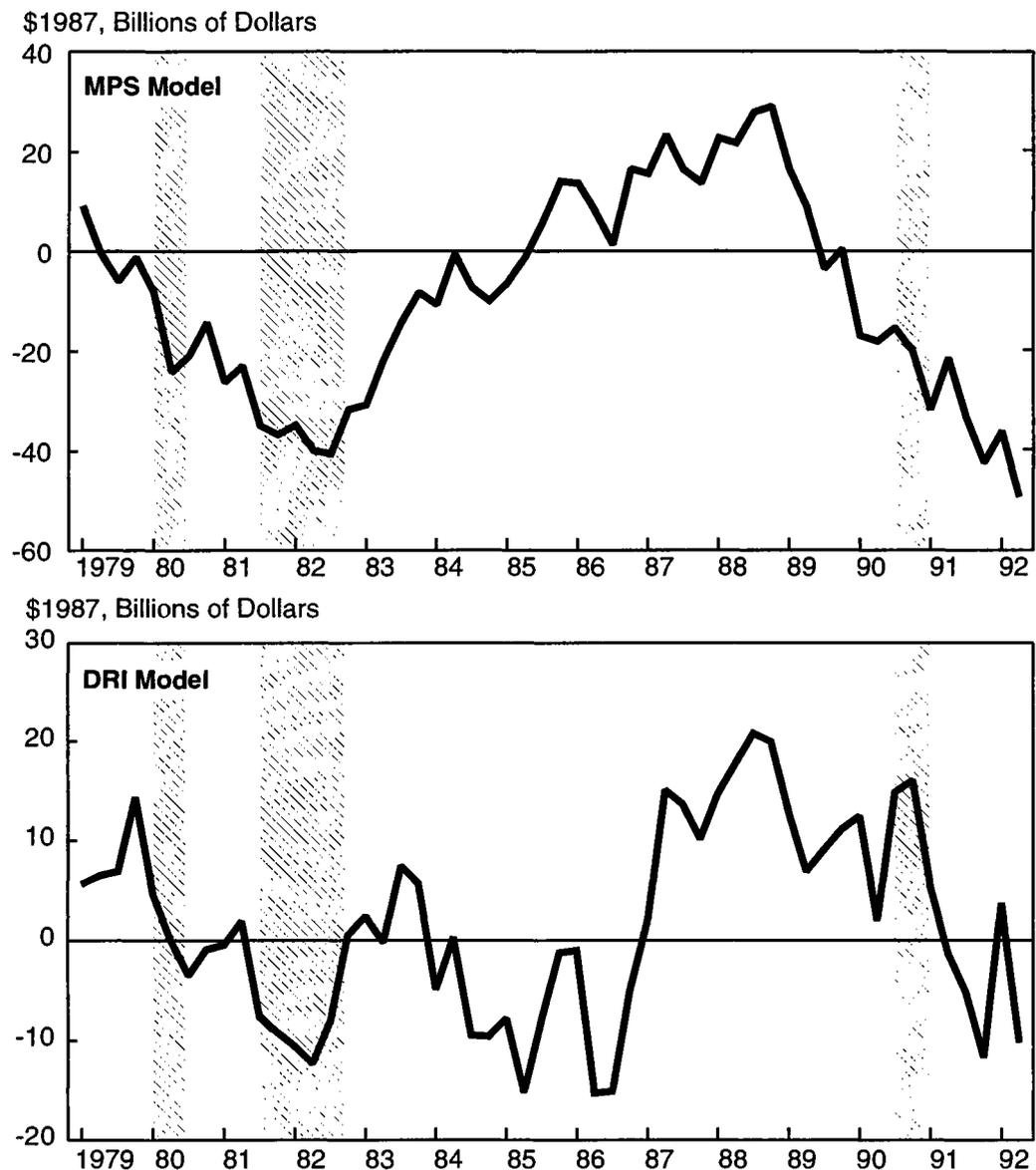
Note: Prediction errors are actual spending minus model prediction.

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widespread weakness in consumption suggests that some exogenous factor such as high debt service burdens or depressed prospects for future income growth caused consumers to reduce expenditure across the board.

Econometric estimates for the investment sector generally support the informal evidence from Section I. For example, both a reduced-form model and DRI's flexible accelerator equation for nonresidential construction spending overestimated actual spending substantially (Chart 17). Standard housing equations, both structural and reduced form, also overpredicted slightly (Chart 18). Housing, which was one of the few areas that appeared to be having a normal recovery in 1991 and 1992, was actually weaker than what economic fundamentals (demographics, interest rates, income and

Chart 15: Prediction Errors — Nondurables and Services Consumer Spending



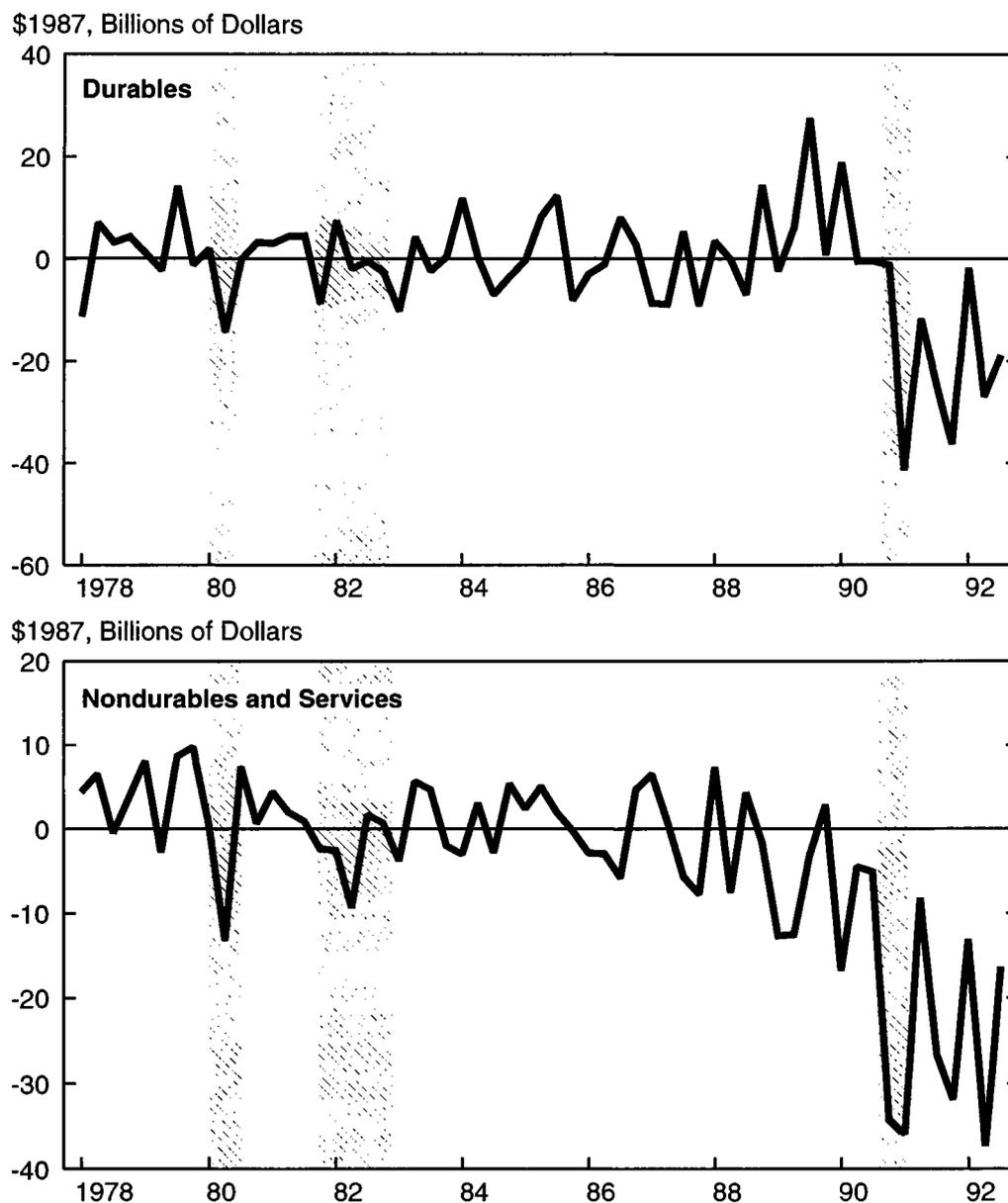
Note: Prediction errors are actual spending minus model prediction.

housing prices) would have indicated after mid-1990.

The evidence on producers' durable equipment is mixed. DRI's structural estimates overpredicted actual levels (Chart 19, top panel), despite the relatively strong performance of this sector in the early 1990s. However, the reduced-form prediction errors (Chart 19, bottom panel) suggest that equipment spending in 1991-92 was slightly stronger than what the fundamentals predicted.

Only for exports and imports were traditional model predictions (from DRI and FRBNY in Chart 20) either too low or on track. Taken together, the relative strength of the trade sector and the relative accuracy of trade equations are noteworthy because long-term changes in policy transmission appear to explain the strong trade perfor-

Chart 16: Prediction Errors — Reduced-Form Equations for Consumer Spending



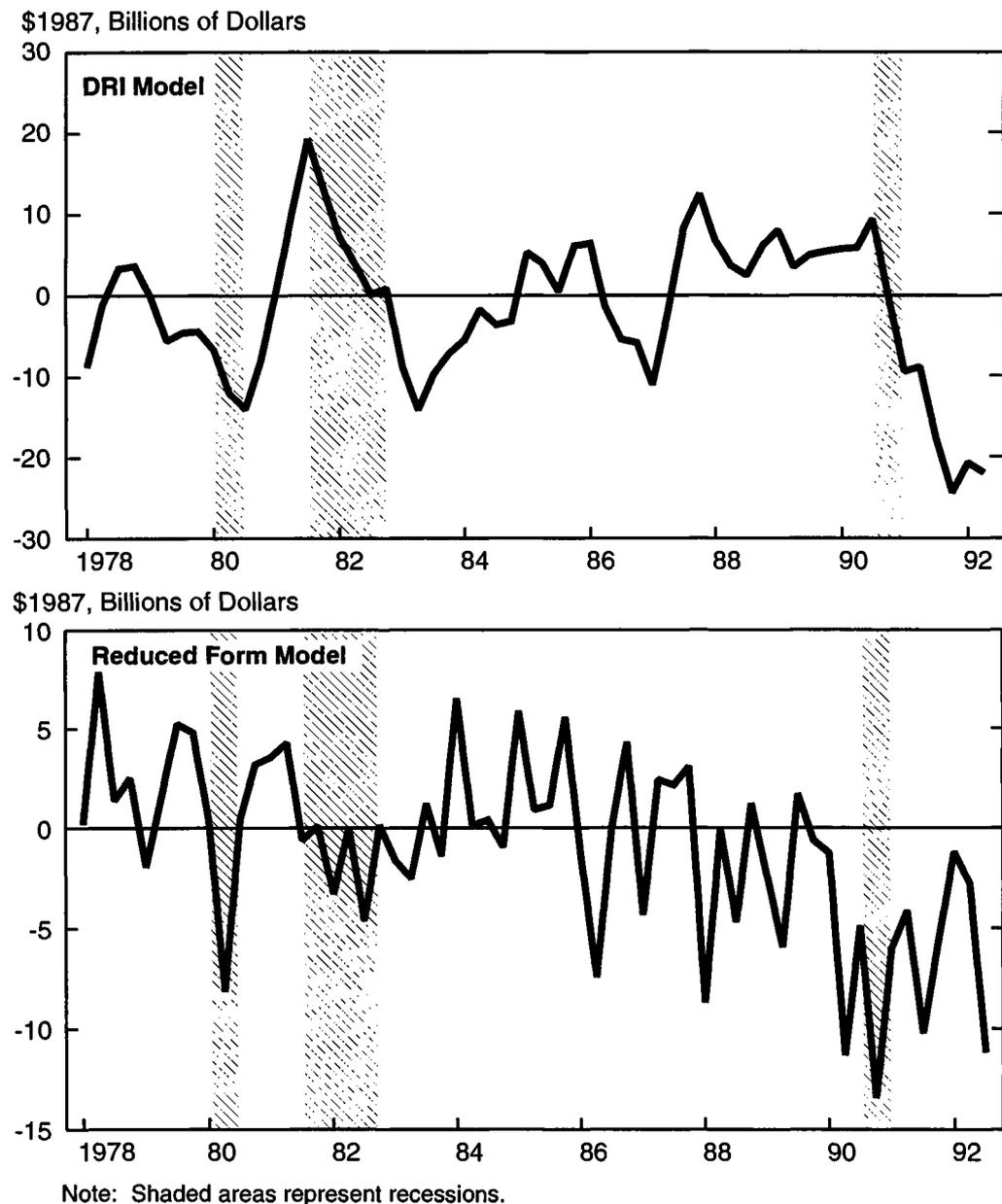
Note: Shaded areas represent recessions.

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mance, while domestic credit constraints appear to have had little significant effect in this sector.

To evaluate the role of the credit slowdown in the unexplained weakness in activity, reduced-form equations for several policy-sensitive sectors were reestimated, this time including the credit supply proxies discussed in section I above. Comparisons of equations for consumer durables and several investment components, both with and without the Lown and Wenninger bank loan residuals, are shown in Chart 21. While the business mortgage residuals do improve the performance of the nonresidential structures equation (particularly in 1990), other Lown and Wenninger residuals make very little difference in the prediction errors. Both anecdotal and microeconomic studies are consistent with these results: real estate lending (and activity) were most affected by chang-

Chart 17: Prediction Errors — Nonresidential Structures

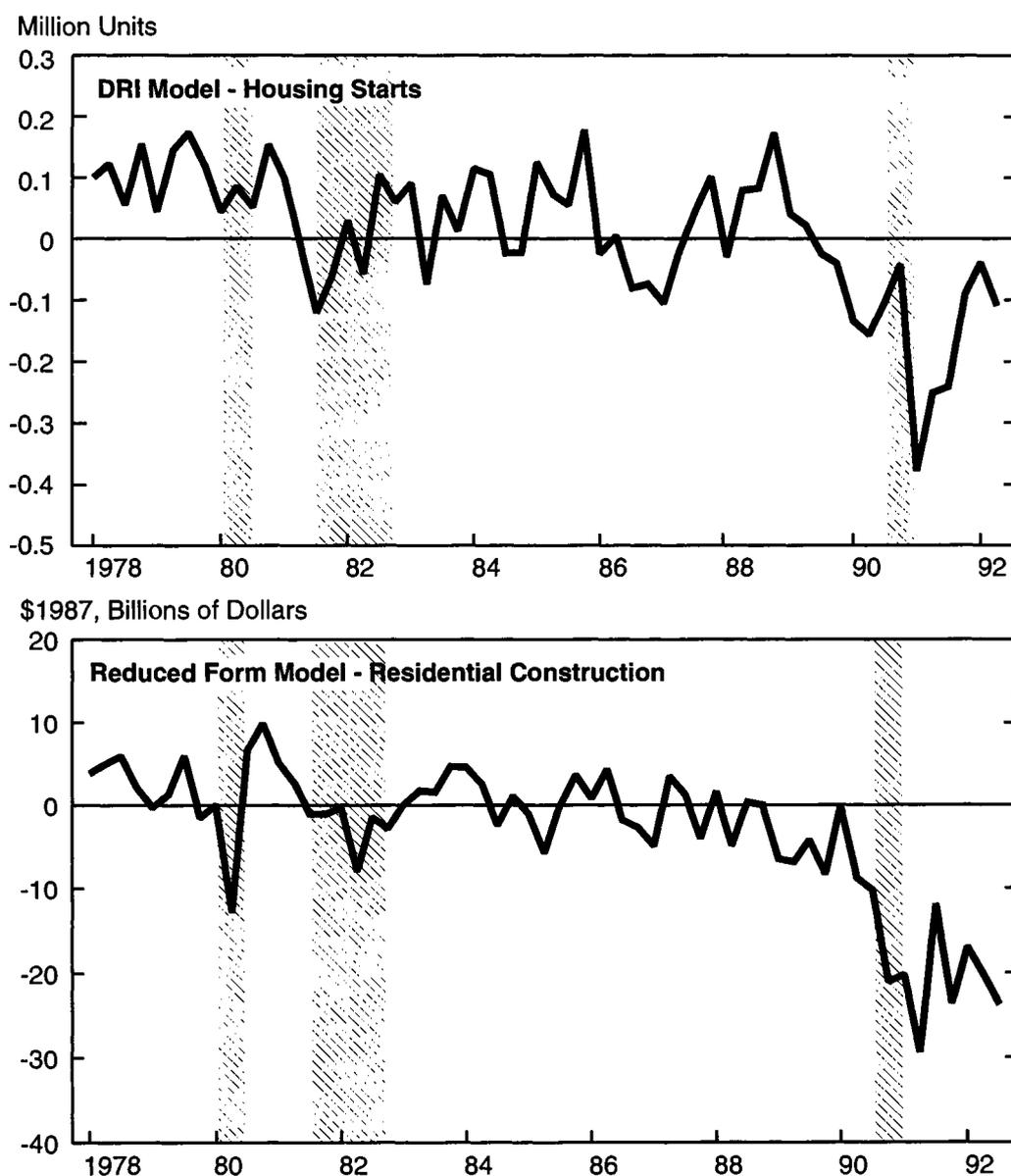


es in credit supply, while evidence of credit supply restrictions for home mortgages and consumer lending is harder to find. Furthermore, bank credit constraints may have been important for large-scale real estate spending because borrowers in this sector had few alternative sources of credit.

Similarly, business mortgage residuals from Mosser and Steindel can explain some of the overprediction in nonresidential construction (Chart 22). However, the generally positive household mortgage residuals make the overprediction of residential structures even worse. Like the bank loan residuals, consumer and short-term business credit residuals make very little difference in predicting consumer durables and equipment investment.

In contrast, the spread between the consumer loan rate and the federal funds rate

Chart 18: Prediction Errors — Housing

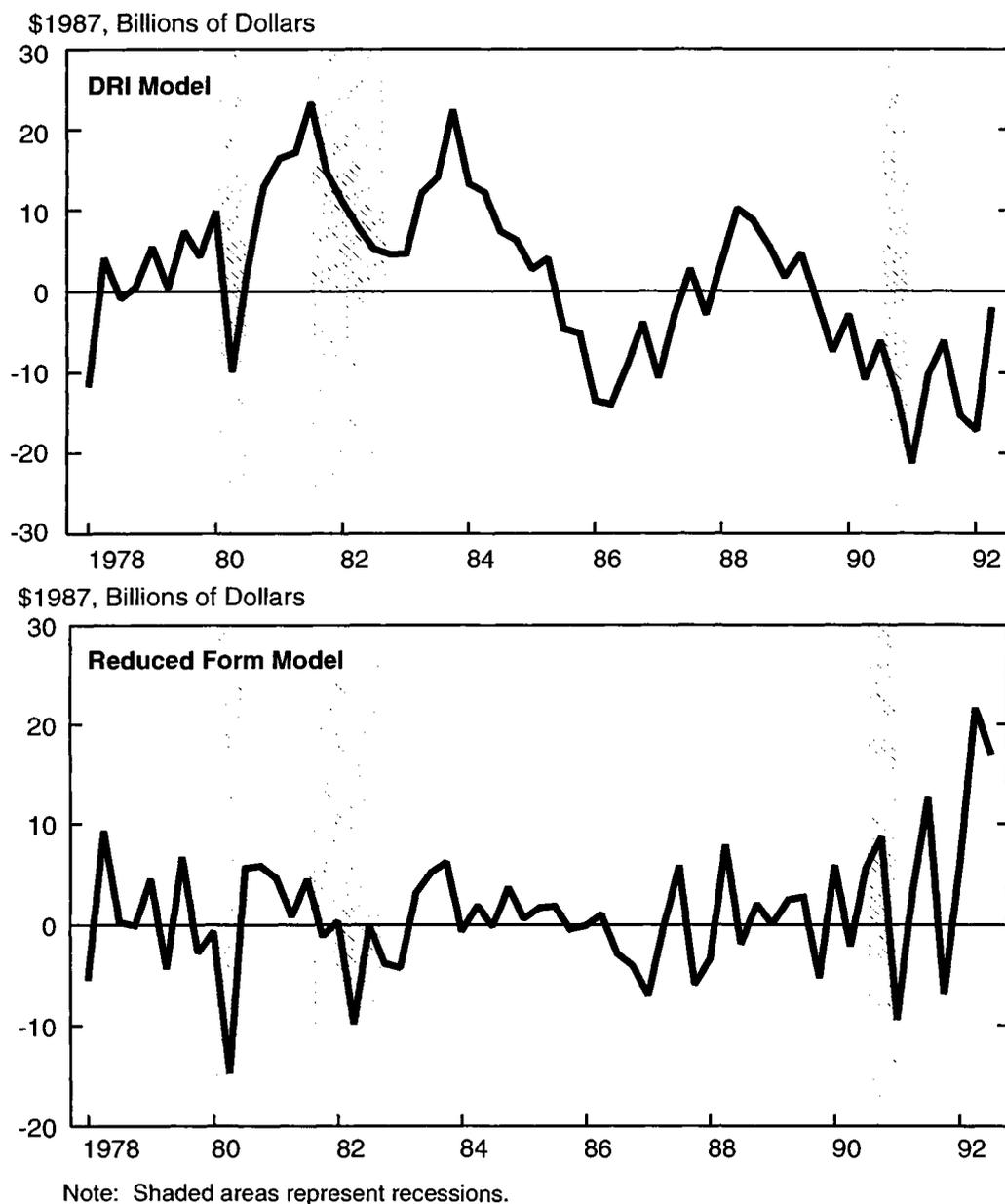


Note: Shaded areas represent recessions.

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more than explains the weak consumer durables behavior from 1989 to 1992 (Chart 23). This finding is clearly the result of ever-widening and record high spreads between consumer interest rates and market rates. However, the changing risk composition and tax treatment of consumer lending (particularly credit cards) during the second half of the 1980s makes the widening of this spread difficult to interpret as a pure shift in credit supply. For example, the normal cyclical behavior of the spread between credit card rates and the federal funds rate was to increase from about 5 percent at the peak to about 10 percent at the trough. In the latest recession, the spread started at 10 percent and rose steadily to over 14 percent by the end of 1992. Chart 23 also shows that the prime rate spread over fed funds had no additional predictive power for equipment investment.

Chart 19: Prediction Errors — Producers' Durable Equipment

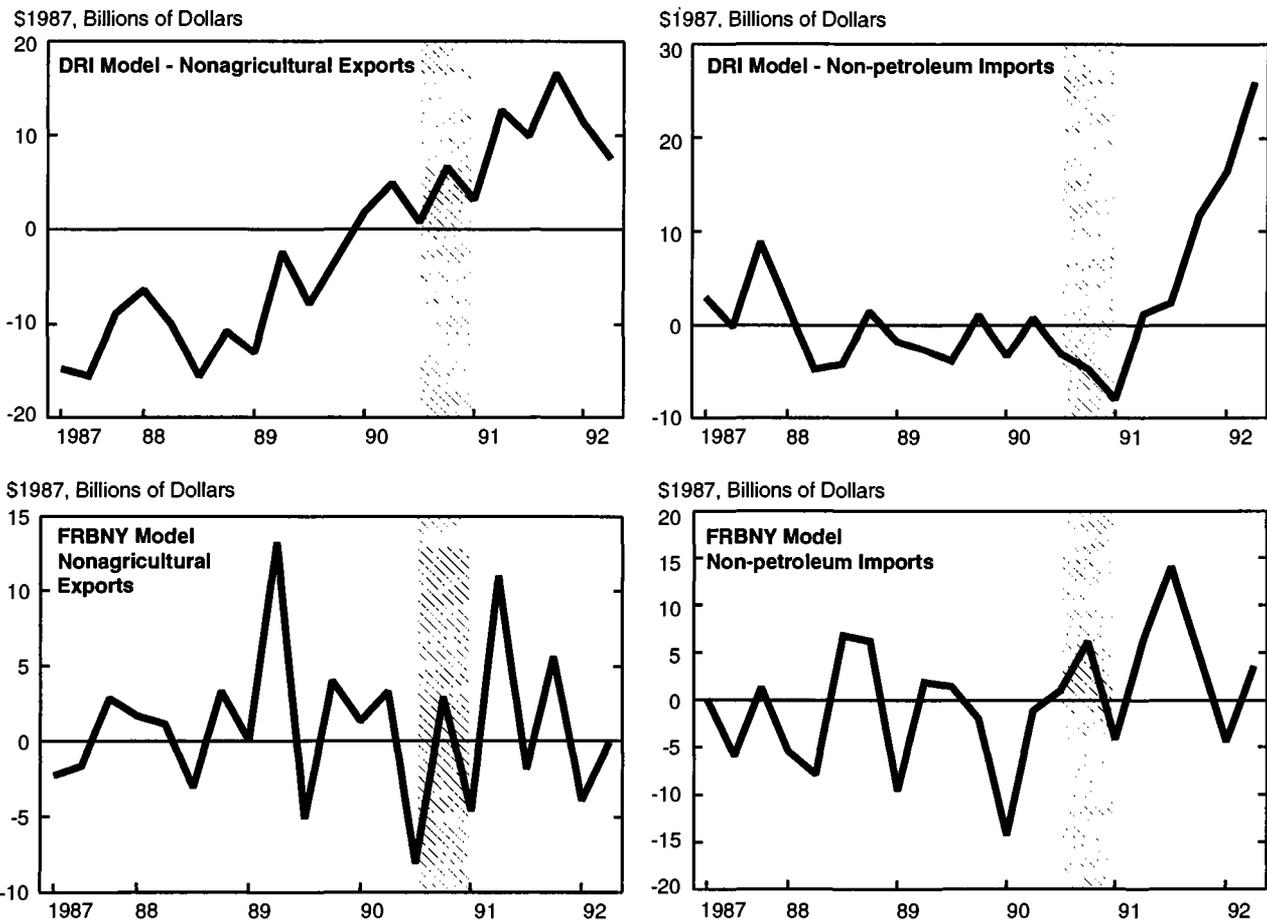


Residuals measuring small firm borrowing constraints from Hamdani, Rodrigues and Varvatsoulis have the largest impact on predictions of business investment components (Chart 23). When these small-firm effects were included in reduced-form equations, they generally lowered predictions of both nonresidential construction and producers' durable equipment. In fact, the equations for nonresidential construction switched from overprediction to underprediction when the small-firm credit supply residuals were included. These may be more powerful predictors of business spending during this period because they were constructed to measure pure (nonprice) credit rationing for small firms (as opposed to shifts in the credit supply curve).

Table 6 summarizes the usefulness of different credit supply proxies in predicting final demand components. Generally speaking, credit supply proxies appear to explain some of the weakness in investment, particularly in nonresidential construction, where the largest credit imbalances occurred and where the fewest substitution possibilities exist. However, proxies were less helpful in explaining widespread weakness in other sectors, notably consumption and housing, where the supply proxies were either unimportant or increased the prediction error (sometimes with the opposite sign).

Unfortunately, the unexplained weakness in the household sector remains a puzzle. If noncredit factors such as an increase in desired saving or lower expected future income growth are responsible, then slower growth of spending relative to fundamentals and policy may be permanent, and the final demand relationships estimated above (in-

Chart 20: Prediction Errors — Exports and Imports



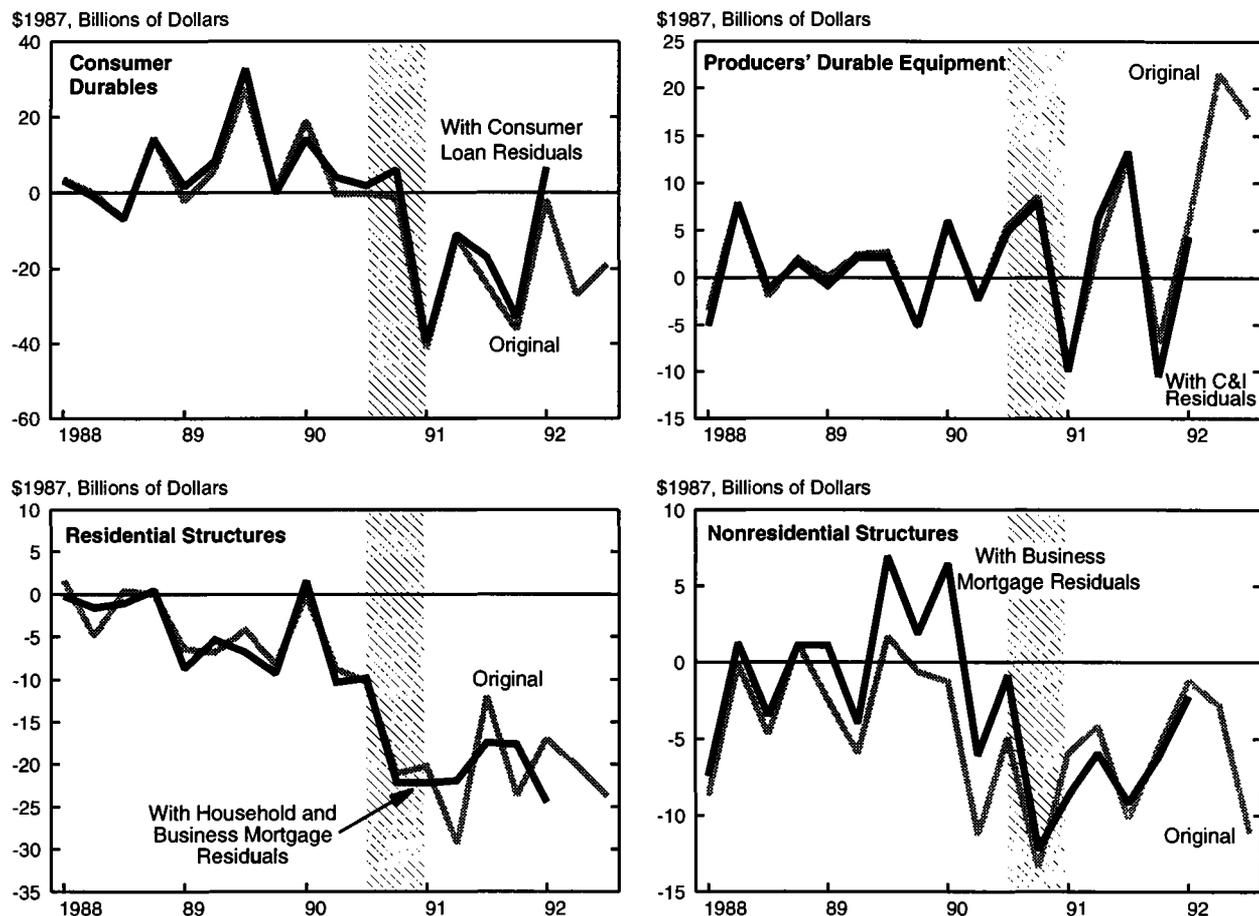
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cluding links from monetary policy to the real economy) may have permanently changed. Nonetheless, the timing of the weakness in spending seems too coincidental for credit factors, particularly balance sheet restructuring, not to have played a role. If the overpredictions of consumption and housing are the result of "missing" balance sheet effects, then the shift in aggregate demand may be either permanent or temporary. For example, if monetary policy now influences activity largely through its effect on household balance sheets, and if these new balance sheet effects are a result of structural changes during the 1980s, it seems likely that the relationship between spending, monetary policy, and credit has been changed permanently. Alternatively, if balance sheet restructuring is simply a onetime adjustment to the debt "bubble" of the 1980s, the shifts in spending may be temporary. Unfortunately, it is simply too soon to tell which hypothesis is true.

IV. Conclusions

This paper has looked at the relationship between credit, economic activity and monetary policy over the 1989-92 period. Its main conclusion is that the weakness in aggregate demand was more widespread than the weakness in credit. Furthermore, the

Chart 21: Reduced-Form Prediction Errors Including Low and Weninger Loan Residual Actual Less Predicted



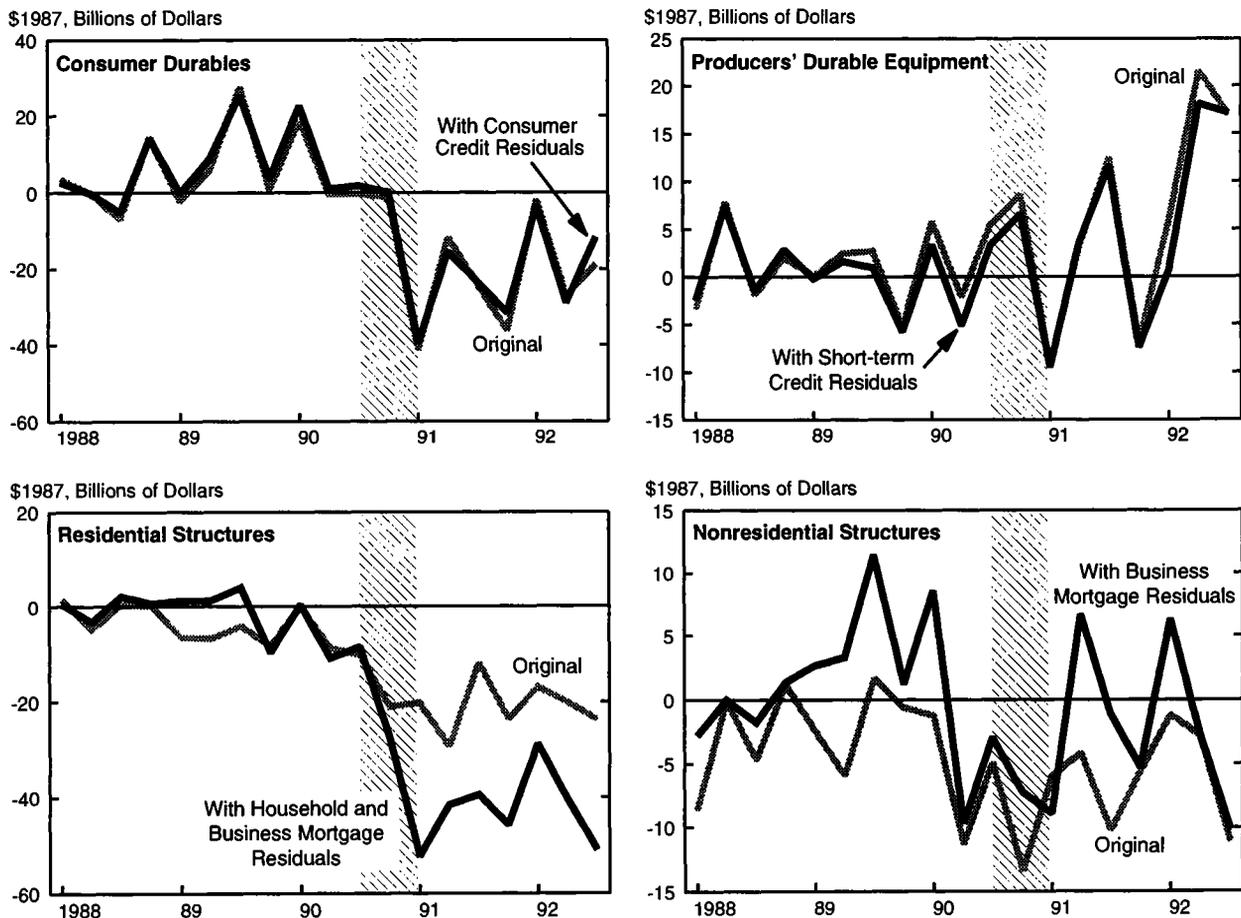
Note: Shaded areas represent recession.

evidence suggests that moves to ease monetary policy were fairly effective in sustaining spending in some policy-sensitive sectors, such as trade, but completely ineffective in others, notably large-scale real estate, where credit supply proxies appear to be important in determining the level of activity. In other sectors, particularly consumer spending, activity was unusually weak, but credit supply restrictions appear to be less important.

Ultimately, the paper leaves an empirical puzzle: why was aggregate demand, particularly household spending, so weak overall? While lower expected future income growth could have produced this weakness, the timing of the spending slowdown suggests that credit factors, particularly balance sheet effects, played a role. Indeed, balance sheet restructuring by consumers and firms (perhaps combined with long-term changes in financial structure) may be able to account for what econometrically appears as a large nonlinear shift in the relationship between credit and activity.

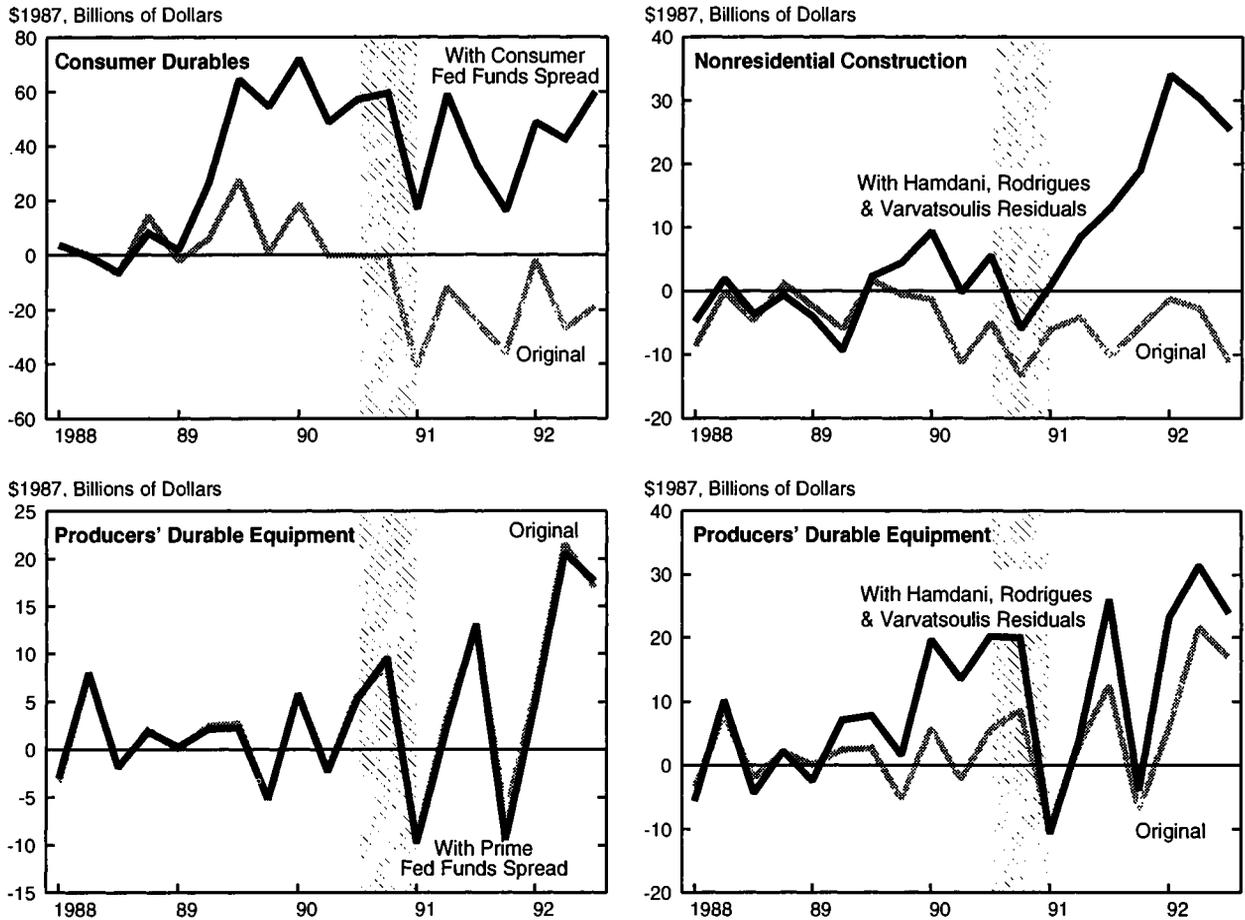
Finally, structural changes over the 1980s may have made the credit-output-policy link impossible to estimate accurately. Because of the large changes in financial structure since the last crunch and recession, historical relationships between credit, activity, and other financial variables may no longer be valid. Estimating relationships over just

Chart 22: Reduced-Form Prediction Errors Including Mosser and Steindel Residuals
Actual Less Predicted



Note: Shaded areas represent recession.

**Chart 23: Reduced-Form Prediction Errors
Actual Less Predicted**



Note: Shaded areas represent recession.

Table 6: Summary Prediction Errors with and without Credit Supply Proxies^a

	Sectors			
	Consumer Durables	Residential Structures	Producers' Durable Equipment	Nonresidential Structures
Reduced form prediction errors 1990-1991	-3.0	-9.0	0.6	-4.3
Prediction errors with credit proxies from:				
Lown and Weninger	-2.3	-8.6	0.5	-4.3
Mosser and Steindel	-4.8	-16.4	0.2	-1.5
Interest rate spreads	10.5		0.5	
Small firm proxies			0.0	0.1

^a Prediction error (actual-predicted) as a percent of actual spending.

the 1980s may also give inaccurate readings, because much of the transition in financial structure was in progress during the decade. If this is the case, any measurement of the "new" credit-output-policy link will only be possible with more data and more time.

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