Federal Reserve Bank of New York

Quarterly Review

Winter 1986-87 Volume 11 No. 4

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This Quarterly Review *is published by the Research and Statistics Group of the Federal Reserve Bank of New York. Remarks of* E. GERALD CORRIGAN, *President of the Bank, on coping with globally integrated financial markets begin on page 1. Among the members of the staff who contributed to this issue are* RICHARD G. DAVIS, LEON KOROBOW, *and* JOHN WENNINGER *(on bankers on pricing consumer deposits, page 6);* RICHARD G. DAVIS *and* LEON KOROBOW *(on the pricing of consumer deposit products—the non-rate dimensions, page 14);* M.A. AKHTAR *and* ETHAN S. HARRIS *(on monetary policy influence on the economy—an empirical analysis, page 19);* PETER RAPPOPORT *(on inflation in the service sector, page 35); and* JEREMY GLUCK *(on international "middle-market" borrowing, page 46).*

Coping With Globally Integrated Financial Markets

Mr. President, My Lord Mayor, Mr. Governor of the Bank of England, My Lords, Sheriffs, Ladies and Gentlemen, it is a privilege and an honor to have this opportunity to address the London Overseas Bankers Club. The City of London has enjoyed a long history as one of the truly dominant financial centers of the world. While that history has entailed more than a few difficult episodes of economic and financial uncertainty, the current situation is certainly formidable. Sluggish growth in the world economy, massive and unsustainable imbalances in international trade and finance, the rising tide of protectionism, and the continuing—and in some respects more vexing—problems associated with the LDC debt situation constitute major and interrelated points of vulnerability. Simultaneously, financial markets around the world are caught up in a near frenzy of activity. Coming to grips with these problems in an orderly way will not be easy and, under the best of circumstances, will take time and patience—a lot of time and patience. But it will also require that our financial markets and institutions are functioning in a smooth and disciplined way so that they can play their historic and vital role of helping to allocate the world's scarce savings in a manner that best helps to improve productivity and living standards.

Sluggish growth in the world economy, massive and unsustainable imbalances in international trade and finance, the rising tide of protectionism, and the continuing—and in some respects more vexing—problems associated with the LDC debt situation, constitute major and interrelated points of vulnerability.

In the current circumstances, I have a nagging sense of unease about how well financial markets and institutions are serving that basic purpose, in part because they are caught up in an unprecedented wave of change and innovation which makes it very difficult to distinguish ends from means, causes from effects, and actions from reactions. For example, while it is unquestionably true that many new financial instruments and practices gained popularity as devices to protect against unforeseeable changes in credit conditions, interest rates, or exchange rates, it is also true that these same instruments can be the source of instability and risk. In a similar vein, we now see some individual firms incurring the costs and, at times, the risk of commencing new activities or moving into new markets not because they are all that keen to do so but because competitive pressures seem to leave little choice. All of this, of course, takes place in a setting where rapid advances in the application of telecommunications, sophisticated mathematics, and computer technology to banking and finance have introduced new elements of

Financial markets and institutions are caught up in an uprecedented wave of change and innovation which makes it very difficult to distinguish ends from means, causes from effects, and actions from reactions.

Remarks of E. Gerald Corrigan, President, Federal Reserve Bank of New York, before the Overseas Bankers Club Annual Banquet, London, England, on Monday, February 2, 1987.

speed and complexity into the marketplace and in the process have amplified incentives to take advantage of domestic and international differences in laws, regulations, and tax and accounting practices. If it can't be done on the balance sheet, it is done off the balance sheet; if it can't be done onshore, it's done offshore; and if it can't be done with a tried and tested instrument, it is done with a new one.

Globally integrated markets and institutions with round-the-clock trading and position-taking are a tribute to man's creative genius, but they also entail dangers that shocks or disruptions can be more quickly transmitted to markets, institutions, and geographic locations far removed from the initial source of the shock.

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In the light of the force of these events, the recent agreement between the Bank of England and the banking authorities in the United States regarding a comprehensive and consistent approach to capital adequacy standards for U.S. and U.K. multinational banking organizations takes on particular importance.

For one thing, the initiative is a forceful illustration of the fact that meaningful and successful international cooperation in economic and financial policy matters is possible even when the subject matter is laden with highly technical issues. Hopefully we can build on that success, for I am hard pressed to think of any major aspect of economic and financial policy which will not call for greater international understanding and cooperation in the future.

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In more specific terms, the U.S./U.K. initiative strikes a balanced yet flexible approach to judging the adequacy of a banking organization's capital while taking explicit account of balance sheet and off-balance sheet activities. We also recognize that the proposal is complex and will require care in its final implementation. And it is also an approach which can be easily refined and adapted to future developments as they occur. In short, taking this rather large step of applying these common standards to major U.S. and U.K. banks constitutes a major breakthrough in the effort to better rationalize and harmonize the competitive and prudential framework within which our international banks conduct their business. Having said that, I would also want to stress that capital adequacy standards—no matter how well structured—are only one element in an effective overall supervisory process.

I would also want to stress that while this initiative is of great importance, much remains to be done. For example, I would hope that other industrial countries—especially those that have major international financial centers—will move quickly to bring capital adequacy standards into alignment with emerging international norms. Indeed, broadly accepted capital adequacy standards for all internationally active banking organizations is a goal that must be pursued with vigor. Fortunately, considerable groundwork has been laid toward this end through the BIS and other international organizations. Yet despite those efforts, it remains true that in some countries progress will come more easily than in others. But even where the obstacles to be overcome are formidable, progress must be made. The competitive and prudential implications of major international banking organizations operating around the world with distinctly different capital requirements and resources is simply not in the best long-run interests of strong, stable, and appropriately competitive international banking markets.

I would hope that other industrial countries—especially those that have major international financial centers—will move quickly to bring capital adequacy standards into alignment with emerging international norms.

While internationally harmonious bank capital standards are important, they are only part of the task that lies ahead as we seek to better rationalize the structure, operation, and official oversight of international money and capital markets. Let me, therefore, briefly cite four other areas that I believe will require attention in the period ahead:

- First, many of these issues that arise in the context of efforts to achieve a greater degree of harmony and convergence internationally in banking markets also arise in other areas. For example, a case can be made that greater convergence in securities market regulations among countries is a necessary corollary to greater harmony on the banking side.

The case for greater convergence can also be made in regard to specific markets such as foreign exchange and swaps where banks and securities companies compete directly.

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- Second, the international payments system requires, in my judgment, continued attention with a view toward ensuring that we have done all we reasonably can to ensure its reliability and stability. This may be especially true for the vast flows of payments denominated in U.S. dollars, many of which are interbank in nature and almost all of which are associated with financial transactions. These dollar-denominated payments—including those which originate here in London and flash through New York as electronic blips—can aggregate to more than $1 trillion per day. As such, they entail operational, liquidity, and credit interdependencies of very sizeable proportions among virtually every major banking organization in the world.

  There are numerous efforts underway within the Federal Reserve and within and among private banking organizations—foreign and domestic—aimed at strengthening credit and operational characteristics of these payments systems. However, these efforts take time and as time passes the volume of transactions continues to grow very rapidly. In these circumstances, I believe it important that parent organizations of foreign branches and affiliates with major operations in the United States, as well as their central banks, are taking steps to ensure that they understand the risks that can be associated with international payments flows including but by no means limited to dollar payments that are settled in New York.
- Third, fresh questions are arising concerning the powers and privileges granted to financial institutions operating on foreign soil. We in the United States have for some years followed a policy of national treatment whereby foreign banks and securities firms operating in the United States have the same privileges and responsibilities as our domestic institutions. Others follow that same policy, but in some countries reciprocity, or a blend of reciprocity and national treatment, is the rule. However, even where national treatment is the policy, questions arise about whether practices are always consistent with that policy.

  The policy of national treatment is coming under attack in the United States amid perceptions that U.S. firms are not always treated even-handedly in certain other countries. While this has not been a particular problem here in London, we must recognize that protectionism in banking and finance is susceptible to those same insidious forces that we all fear on the trade side; in short, once unleashed, it is very difficult to know where it will stop.
- Finally, and perhaps most importantly, there is a host of questions regarding the implications of efforts underway in a number of countries to reshape the basic legislative and regulatory framework within which banking and financial institutions operate in the face of the changes that have been induced by market forces over the past decade or more. In addition to difficult issues of legal and regulatory philosophy, custom, and tradition, these efforts must also come to grips with differences in data reporting and consolidation requirements, tax policies, disclosure rules, and accounting standards.

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Reflecting the importance of these related issues, the Federal Reserve Bank of New York is in the final stages of establishing an International Capital Markets Advisory Committee. This advisory committee, which will be comprised of leaders drawn from United States and foreign banking and securities firms operating in the United States, will meet with us from time to time for an informal exchange of views on the kinds of issues I spoke of a moment ago. While the Committee will be consultative in nature, I am hopeful that at the very least it can promote better understanding in both private and official circles of these complex and difficult issues.

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On the subject of financial market structure in the United States, I believe it is widely recognized that the current situation is an acutely troubling one. The process of loophole exploitation amid mixed, if not conflicting, signals from the courts, the Congress, and industry representatives has, to date, stifled efforts aimed at legislative reform. This helter-skelter of events, left unchecked, could in subtle but certain ways undermine the strength and independence of the banking system.

All of the problems we face in this regard cannot be overcome in the very near term. However, an essential first step that should be within reach would center on federal legislation that, among other things, would close the so-called "nonbank bank" loophole which, if not done, could be the vehicle that effectively undermines the historic separation of banking and commerce; provide authority for banks to engage in the underwriting of certain classes of securities; facilitate the acquisition of troubled banks or thrift institutions; and provide fresh capital resources for the Federal Savings and Loan Insurance Corporation. Such a legislative package would go a very long way toward alleviating the points of greatest immediate pressure and, at the same time, provide a context in which longer term questions regarding the evolution of the banking and financial system in the United States can be discussed and resolved in an orderly way.

In the expectation that the immediate legislative needs will be addressed, and in anticipation of attention being shifted to those longer term questions, I released last Thursday in New York a rather lengthy essay entitled *Financial Market Structure: A Longer View*. While the essay and its proposals are far too lengthy to go into on this occasion, I do want to stress that my purpose in presenting it was much more to shape the debate—with emphasis on its public policy elements—than to press for a particular legislative or regulatory agenda.

This approach seeks to blend competitive and market realities, together with public policy considerations, in a manner that yields structural arrangements that are market sensitive but also consistent with a stronger and more viable banking and financial system.

This approach seeks to blend competitive and market realities, together with public policy considerations, in a manner that yields structural arrangements that are market sensitive but also consistent with a stronger and more viable banking and financial system. The approach is based on six guiding principles:

- First, the separation of "banking" from commerce should be preserved.
- Second, in the interest of competitive equity and supervisory harmony, the regulatory costs associated with special "banking" functions should, to the fullest extent possible, be neutralized or eliminated across classes of institutions.
- Third, the approach should provide scope for achieving the benefits of greater competition in the marketplace for financial services while preserving the important public benefits growing out of an appropriate degree of supervisory oversight of the system.
- Fourth, supervision should take account of function, not merely institutional form.
- Fifth, the structure of the system should incorporate principles of "volunteerism," whereby individual firms can choose their position on the financial landscape based on their own corporate strategies and their own assessments of the costs and benefits of one form of corporate organization over others.
- Sixth, and most importantly, the approach should strengthen the stability and soundness of the system in part by providing greater room for self- and market-discipline but also by enhancing the strength and flexibility of the official supervisory apparatus where necessary.

The initial and primary responsibility for ensuring that our banking and financial institutions are fulfilling their role in a safe and stable manner lies not with the authorities but with the managers of these institutions.

While the agenda for public policy initiatives relating to the evolution of our banking and financial system in the United States and around the world is long and formidable, public policy alone cannot and should not bear the full burden of adjustment. To the contrary, the initial and primary responsibility for ensuring that our banking and financial institutions are fulfilling their role in a safe and stable manner lies not with the authorities but with the managers of these institutions. In that regard, I must confess, as I said earlier, that I have a nagging sense of unease that competitive and other pressures are producing patterns of behavior which may not make a great deal of sense in the fullness of time. From my perspective at 33 Liberty Street, let me cite three quick examples of the kinds of things that give rise to that sense of unease.

- Since 1984, the wave of takeovers, buyouts, and buybacks has resulted in a cumulative net retirement of $230 billion in nonfinancial corporate equity in the United States. Over the same period, nonfinancial corporate debt has risen by $480 billion.
- The volume of trading activity and the volatility in financial markets have mushroomed in part because computer-driven program-trading strategies now

unleash huge buy and sell orders that, as far as I can see, have little or no relationship to economic fundamentals.

- Attracted by the "action" and by lofty compensation rates, the best and the brightest from our universities flock to Wall Street while questions about the competitiveness of our manufacturing sector and thus our ability to wind down our massive trade deficit in an orderly way persist.

I could go on, but you know the symptoms as well as I do. And I suspect most of you will agree with me when I say that financial discipline and stability cannot be taken for granted. Indeed, as we continue to seek out lasting remedies to these problems, it seems to me that success will come sooner and surer in a context where we also see a reaffirmation of what I have called "prior restraint"—saying "no" to unduly risky activities and transactions—rather than slipping into a situation in which restraint and discipline are achieved only as a by-product of instability or failure. I, for one, am confident we are up to the task.

Bankers on Pricing Consumer Deposits

As part of a study of the evolving market for consumer deposits in a deregulated environment, the Federal Reserve Bank of New York undertook a series of interviews with senior commercial and savings bankers on pricing these deposits. The interviews took place between November 1986 and January 1987. The bankers were asked to discuss their views of pricing practices in the market generally as well as their own approach to pricing the interest rate and non-rate dimensions of these deposit products. In no sense should these interviews be regarded as a "scientific" sample of nationwide banking practices. The interviews were relatively few in number, were confined to New York State institutions, and were mainly with larger banks. From the general consistency of the responses, however, it seems reasonable to believe that these responses were at least representative of the views at larger institutions in the New York market.

Our primary interest in these interviews was to gain better insight into the ways in which pricing practices for the various types of consumer deposits might be influencing the way deposit rates respond to changes in market rates. These deposit-rate responses, in turn, clearly influence the volume of funds moving into and out of the various types of deposits. Thus they influence the behavior of the monetary measures targeted by the Federal Reserve.

The statistical record of the past two and one-half years, in which market interest rates have fallen some 500 basis points, suggests some interesting differences in the response of interest rates on the various kinds of accounts, and thus of deposit flows, to changes in money market rates.[1] Rates on consumer CDs have tended to respond relatively rapidly and relatively completely to movements in market rates. Rates on MMDAs have responded somewhat less rapidly and less completely, while the response of Super NOW rates has been even slower and less complete than the MMDA response. Savings deposit rates, subject to a 5½ percent ceiling until April of last year, remained generally at that ceiling until recently when there have been declines in some markets.

The overall result of this divergent response to the decline in market rates has been a substantial compression of yields on the various kinds of accounts. As the rate advantage of consumer CDs relative to the other kinds of deposits has contracted, these CDs have gone from rapid growth to outright declines. Similarly, the narrowing rate advantage of MMDAs relative to NOWs and savings deposits seems to have slowed their growth too, though less dramatically. In the meanwhile, inflows to relatively sticky-rate accounts, the savings and NOW accounts, have accelerated as the rate advantage of other kinds of instruments has narrowed. Indeed the sharply declining opportunity cost of holding NOW accounts (included in M1) appears to be a major factor in the recently very rapid growth in that monetary aggregate.

Our interviews suggest that the falling opportunity costs of holding NOWs, in turn, reflect the significant differences in the market's approach to pricing the various deposit products, differences that seem to stem rather naturally from the differences in the nature of the products themselves. The interviews also touched on the question of how the various deposit rates might evolve if market rates were to continue at current levels or decline, as well as on how deposit rates might respond if market rates were once again to move substantially higher. Before reviewing the considerations that enter into the pricing of the various individual deposit products, we turn first to the major components of the general pricing decision.

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[1] See John Wenninger, "Responsiveness of Interest Rate Spreads and Deposit Flows to Changes in Market Rates," this *Quarterly Review* (Autumn 1986), pages 1-10.

Major Components of the Pricing Decision

With some variations in emphasis and in ways of collecting the relevant data, the institutions we talked to tend to focus on similar factors in setting interest rates on consumer deposit products. Rate decisions are apparently reviewed frequently—several mentioned weekly reviews—though of course actual rate changes may be less frequent.

Most banks indicated that their rate decisions begin with estimates of the relevant wholesale cost of funds as a measure of the alternative cost of money. Rates on large CDs were mentioned by several bankers as the measure of wholesale funding costs. These wholesale rates have to be measured in terms of the relevant term to maturity. This is a relatively straightforward matter in the case of consumer time deposits, but is much less clear-cut in the case of MMDAs, NOWs, and savings deposits since they are cashable on demand and therefore have no definite "maturity." In comparing wholesale and retail costs of funds, adjustments also have to be made for any differences in the relevant reserve requirements and for the higher costs of servicing retail accounts.

Some institutions begin the pricing decision with a desired spread under the wholesale cost of money they would like to achieve in setting rates on consumer accounts. However, all institutions mentioned a number of factors that would influence the spread they would actually set, and one or two said explicitly that they often failed to meet their objective because of competitive conditions or other factors.

All institutions indicated that they had to take explicit account of what their competitors were doing in the various markets. With varying degrees of explicitness, they also try to take into account the interest rate elasticity (responsiveness) of their customers' demand for the various kinds of instruments they offer—though this is obviously hard to estimate in quantitative terms. Most bankers also mentioned as decision inputs their own deposit flow data for the various kinds of consumer accounts (sometimes differentiated by maturity category for consumer CDs) and the schedule of maturing deposits they faced over the coming period. Some banks indicated that the rates they offered at different branches or regions might differ depending upon local competitive conditions. With one partial exception, the banks indicated that they did *not* take variations in the bank's short-term funding needs into account in setting consumer deposit rates, preferring to make such adjustments in the wholesale market.

Most of the institutions we talked to obviously go to considerable lengths to collect and organize the relevant input data—the cost of money, deposit flows, rates offered by competitors, etc.—needed to make rate decisions. But this input seems much more directly relevant in pricing some kinds of products, notably consumer CDs, than it does for others such as savings and NOW accounts where additional considerations, discussed further below, are also very important. Most bankers emphasized, moreover, that no matter how sophisticated the mechanism for collecting and organizing information may be, actual rate decisions cannot be reduced to formula. Instead they must rely heavily on experience and judgment.

Setting Rates on Consumer CDs

As noted earlier, the national data indicate that consumer CD rates have responded most consistently and fully to changes in money market rates. Several comments by the bankers we interviewed suggested reasons why this should be so. One banker argued that the quick adjustment of CD rates to market rates, relative to the slower adjustment of other consumer deposit products, reflected differences in interest rate elasticity, with CD demand highly responsive to rates and other products less so. This seems highly plausible since rates would seem to be by far the most important determinant of consumer CD demand in contrast to other deposit products where non-rate considerations may also be important. And if customers are in fact highly rate-sensitive with respect to CDs, banks would stand to lose (or gain) market share relatively rapidly if the rates they offer fail to adjust quickly to changing market conditions.

Some bankers confirmed that they did try to respond relatively quickly to changes in the wholesale cost of money in pricing consumer CDs. One banker argued that wholesale banks, especially, tend to price these CDs in relation to wholesale funding costs. He also argued, however, that thrifts and regional banks tend to price more in relation to relatively slower changing asset yields and therefore tend to adjust their CD rates more slowly.

The savings bankers we talked to did say that the CD offering rates of thrifts tend to be somewhat higher than those of their commercial bank competitors.[2] While no full explanation was given for this phenomenon, one savings banker commented that the thrifts "may be a little paranoid" about the risks of losing deposits. One commercial banker, also noting a tendency for thrift CD rates to exceed rates paid by commercial banks, said he thought this spread had remained about constant as the overall level of rates has come down, but that the spread has become more important to consumers at the lower absolute level of rates. Another commercial banker argued that some thrifts were "pricing well above the market and can't sustain this over time."

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[2] The available data supports this contention. See "Responses to Deregulation: Retail Deposit Pricing from 1983 Through 1985,"

Money Market Deposit Accounts

Bankers offered a number of explanations for the fact that MMDA rates have tended to respond somewhat more slowly and less fully than CD rates to changes in money market interest rates. Several bankers suggested that MMDA demand was less interest-sensitive than CD demand, arguing that MMDA accounts were often used simply as "parking lots" for excess funds awaiting decisions to reinvest the funds in other instruments. The fact that spreads of money market rates over MMDA rates were larger than the spreads of money rates over consumer CD rates was also cited as a reason for feeling "less urgency" to move MMDA rates when market rates changed. One banker noted that when a bank changes its offering rates on CDs, only new money and rollovers are affected in the short run. When a change in MMDA rates is made, however, it affects the entire outstanding volume of deposits at once, making banks more cautious about changing MMDA rates.

These various considerations would clearly help explain why bankers might be relatively slow in adjusting MMDA rates upward in response to rises in market rates. However they are less clearly relevant in explaining why MMDA rates might be slower than CD rates to decline in the face of reductions in money market rates. One banker offered the explanation that as market rates have declined, banks have been reluctant to breach successive single digit "floors" (such as an even 6.00 percent) and have been particularly slow to cut MMDA rates below the old ceiling rate on regular savings deposits even though such cuts might be justified on cost of money grounds. Such a line of argument would suggest that the bankers believe that at least at some critical points, the rate elasticity of demand for MMDAs may be fairly high, so that they fear losing market share by cutting rates at such points. In any event, at the time of these interviews, MMDA rates at the banks we talked to—mostly at 5 percent or somewhat higher—were at or below statement savings account rates at the same institutions.

MMDAs were originally conceived largely as a response to the rapid growth of the money market mutual funds. Through late 1982, when the new MMDAs first became available, these money market funds had grown to some $185 billion. Certainly a significant part of this money had come out of consumer deposits at banks—though much of it may have been ultimately recycled in the form of purchases by the money funds of wholesale CDs and bank-related commercial paper. In any case, only two bankers in our recent interview program mentioned competition from the money funds in connection with MMDA rate decisions. One banker acknowledged that rates offered by the money funds were initially "very important" in pricing, but he argued that they were much less important currently. Another banker said that the MMDA could not compete fully with money fund accounts, especially "central asset accounts," because of the limitation imposed on the number of third-party checks that can be written on MMDAs. But he went on to say that for most smaller savers, the presence of FDIC insurance on MMDAs made it possible to market them competitively at 50 basis points below rates being offered by the money funds.

Savings Deposits

Savings deposits come in two forms, the traditional passbook account and the statement account. At the time of the interviews, most banks we talked to offered both kinds of accounts, but a minority no longer offered passbook accounts. Moreover, one banker expressed a desire ultimately to eliminate his bank's passbook account, which, he said, entailed significantly higher maintenance costs than do statement accounts. Most of the banks we talked to were continuing to offer statement savings accounts at the old ceiling rate of 5½ percent (deregulated at the end of March 1986) while a minority offered somewhat lower rates. Of those banks we talked to that continued to offer both kinds of savings accounts, a majority were offering passbook rates below the rate offered on the statement savings account.

In one way or another, all the bankers we talked to expressed the view that the time had come to cut savings account rates because of declines in the cost of money. Nevertheless, they all expressed great caution about taking such a step. Most noted that depositors had continued to hold funds in these accounts during periods when other rates were far above the old 5½ percent ceiling. In various ways, the bankers conveyed the feeling that this had imposed on them an implicit obligation not to cut the savings rate when market rates had fallen. Bankers used terms like "moral commitment" and "implicit contract" to express their reluctance to cut

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Footnote 2 continued
Patrick I. Mahoney, Alice P. White, Paul F. O'Brien, and Mary M. McLaughlin, Board of Governors of The Federal Reserve System, Staff Study Number 151, January 1987.

rates on depositors who had held savings accounts in earlier years when other rates were far above the 5½ percent ceiling. Thus some bankers expressed the fear that these account holders would feel "cheated" if the rate were cut now. Moreover, they were reluctant to "sensitize" such account holders to rate considerations since these depositors might then very well expect savings deposit rates to move up if market rates were to climb once again. In effect, the bankers seemed to prefer the rate-sensitive savings customers to stay in the MMDA accounts rather than in savings accounts—although with MMDA rates below regular savings rates at a majority of the institutions we talked to, some thought there was evidence that the rate-sensitive money was in fact moving into savings accounts from the MMDAs.

Some of the bankers we talked to referred to savings accounts as being, along with NOW accounts, "core" accounts—that is, accounts that tend to tie the holder's overall banking business with the bank at which the core account is maintained. This consideration would mean that the customer's entire banking business, and not just his savings account business, might be at stake if the savings account rate were to be cut.

Despite all these considerations, many bankers argued, as noted, that the savings deposit rates prevailing at the time of the interviews were "too high" given the current money market rates, even while expressing considerable reluctance to be the first to move to a lower rate themselves. Some bankers mentioned that they had recently sent written notice to their savings account customers that in the future they might need to adjust their savings account rate if market conditions warranted. However, they had not actually lowered the rate as of the time of the interviews. Moreover, several bankers suggested that any future changes in savings accounts rates would be made only infrequently and only in response to significant and sustained changes in interest rates generally.

NOW Accounts

Until January 1986, Federal regulation distinguished between two types of NOW accounts, "regular" NOWs subject to no balance requirements but subject to a maximum interest rate of 5¼ percent, and "Super NOWs," subject to a minimum balance requirement but with no interest rate limitation. Currently, depository institutions may offer interest rates without restriction on any NOW account, regardless of balance. Even after the rate restriction on "regular" NOWs was removed, many banks continued to offer two types of accounts, one paying a rate fixed at or close to the old 5¼ percent ceiling and another paying a higher rate adjusted from time to time in light of changing market conditions. By the time we conducted our interviews, however, the decline in market rates had compressed NOW rates so that most of the banks we talked to either no longer offered a "Super NOW" product or offered one with a rate equal to or only slightly above the old regular NOW ceiling rate of 5¼ percent. As one banker put it to us, the Super NOW had become "a product without much meaning" in current market conditions. Thus in his view, the pricing of Super NOWs as such had become a "non-issue" in the market.

Nevertheless, it was clear from our conversations that the pricing of NOW accounts, however distinguished, presented some difficult issues. There are clearly problems in measuring both the costs and the net revenues arising from such accounts, making rational pricing a complex problem. Some bankers, for example, mentioned the difficulty of estimating accurately the costs of account maintenance, both the "brick and mortar" fixed costs and the variable costs. Some also cited the difficulty of getting a realistic handle on the appropriate opportunity cost of funds for deposits that have no fixed maturity. As one banker put it, it is very hard to know what "notional" term to maturity to put on these funds in measuring opportunity costs, "not the Federal funds rate, but not 10-year money either." Another intangible cited by one banker was the relative stability of NOW account deposits, a feature that is attractive to banks but for which it is hard to establish a precise numerical value.

For all these reasons, it appears to be difficult for the banks to measure the profitability of NOW accounts, even on a "stand-alone" basis. Most who discussed the subject did believe that at interest rates above 5 percent, NOW accounts were not in fact currently profitable on such a basis. But the most important complication in pricing these accounts arises from the fact that most bankers do *not* look at them on a stand-alone basis. Instead, they view them as a "core" product, the centerpiece of a complete banking relationship where the value of the NOW account as such cannot be meaningfully separated from the total value of the customer's dealings with the bank.

Several of the institutions we talked to seek to reinforce the "relationship" aspect of NOW accounts by permitting balances in other accounts to be used to satisfy the minimum balances in NOW accounts required to avoid fees and/or by offering reduced loan rates to NOW account customers. One banker noted with some irony that at the very time that the corporate banking business is moving toward unbundled pricing, consumer banking seems to be moving in the opposite direction. As some bankers pointed out, the "relationship" aspect of NOW accounts makes it doubly difficult to assess their profitability. It is difficult not only because their current profitability has to take into account the collateral banking business they are currently attracting, but also because accepting current losses on NOW accounts may retain a customer whose total business *over the long run* may make the account profitable when viewed over that longer time horizon. Given all these problems, one banker said quite frankly that you could make such accounts look profitable or unprofitable depending upon just what alternative plausible cost and revenue assumptions were used in the calculation.

In expressing reluctance to lower NOW account rates even at a time when they seemed "too high" in terms of current money costs, some bankers voiced the same kinds of reservations they had mentioned in connection with possible cuts in savings deposit rates. Thus they noted that regular NOW customers had maintained balances at times when market rates were far above the old 5¼ percent ceiling. Moreover, they feared that "sensitizing" such account holders to interest rate movements could lead to significant reductions in NOW balances in response to any subsequent increases in other rates. One banker argued that customers' decisions in choosing NOW accounts were determined more by convenience and service considerations and thus were in fact rather *in*sensitive to small or moderate interest rate differences. But, he added, if the NOW rate were to become so far off the market that the customer were induced to move his account to another institution, the original bank would lose not only the deposit, but all the customer's other banking business as well.

The savings bankers we talked to suggested that NOW accounts play a somewhat different, and lesser role for thrifts than they do for commercial banks. One savings banker said that NOW accounts at thrifts are often secondary checking accounts and are viewed like savings accounts by their holders. Another savings banker noted that NOW accounts constitute only a small fraction of his institution's total deposits so that the concept of "relationship pricing" of such accounts as a means of attracting other business is of little or no consequence to them.

The Non-Rate Dimensions of Pricing

In addition to setting interest rates, banks must set terms on a wide array of non-rate dimensions of the total deposit package. These include minimum balances to earn interest and/or avoid monthly fees, fee schedules covering per-account fees, per-check fees and other types of fees, as well as methods of computing balances and of computing and crediting interest and other matters. In the following article, we report the results of a survey of commercial bank practices as of late 1985 regarding these non-rate dimensions of consumer deposit pricing.[3] Our conversations with bankers yielded a few additional insights on the issue of setting non-rate terms on such deposit products.

Several bankers said that the balances in most of their NOW accounts were above the minimum levels needed to avoid monthly account fees. For this reason, one banker said that these minimum balance levels were "a small issue" for him. He noted, however, as did others, that they serve the purpose of making below-minimum-balance accounts at least cover account maintenance costs through the fees charged. One banker made the point that while fees enable low balance accounts to pay their way, and while high balance accounts are also profitable even without such fees, accounts with balances only a little above the minimum needed to avoid fees may *not* be profitable. However, he said that the alternative pricing approach of charging fees on *all* accounts regardless of balance to ensure that all accounts at least cover cost would "irritate" the higher balance customers, the value of whose deposits are alone sufficient to cover costs.

Another banker said that establishing different minimum balance levels to avoid fees was a way of establishing "product distinction," with the different accounts also differentiated with respect to fees, interest rates paid, and collateral benefits offered. One banker suggested that crediting balances in all the customer's accounts toward the minimum balance requirement for his transactions account did cost the bank some fee income. But he thought the approach was nevertheless worthwhile as a means of building a total banking "relationship" with the customer. In general, decisions about the non-rate terms offered on accounts appear to be made relatively infrequently—several banks mentioned once a year—in contrast to rate decisions, which, as noted earlier, appear to be reviewed at least weekly at most institutions.

Future Prospects in Pricing Consumer Deposits

We asked the bankers whether they thought the price-setting process in the industry had had time to settle down following the completion of the deregulation process or whether some further evolution was likely. The answers we got varied considerably, in part because the various bankers tended to focus on different aspects of the problem.

There seemed to be general agreement that the market had not yet reached an "equilibrium" with respect to the relatively fixed rate accounts, the NOWs and savings accounts. As noted earlier, most felt that these rates were too high relative to money rates and would be under downward pressure. Indeed, there were some rate reductions on these products in the New York City market after our round of interviews was completed. But with all the potential, hard-to-quantify risks of cutting rates on these accounts, few bankers were prepared to suggest where the market would ultimately settle, even in the absence of significant further changes in interest rates generally. One banker, saying that the whole area of consumer deposit pricing is "still evolving," emphasized that banks were still trying to get a good feel for the fixed and variable costs of the various kinds of accounts—implying that absent such a feel, they would remain uncertain as to just what an appropriate "equilibrium" price might be at any particular level of money rates.

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[3] See "The Pricing of Consumer Deposit Products—The Non-rate Dimensions," this *Quarterly Review*, pages 14-18.

Apart from the obvious continuing uncertainties surrounding NOW and savings deposit rates, there was a fairly general feeling that pricing practices *had* settled down, at least to some extent. One banker noted, for example, that the rates set by his competitors seemed to be responding to changes in money market rates "in a pretty predictable way," suggesting to him that their decision-making processes, at least on consumer CD and MMDA rates, had stabilized. At the same time, some bankers suggested that there would always be a tendency for "rate wars" to break out from time to time as some banks sought to increase their market share at the expense of competitors.

There was some disagreement as to whether deposit rates would respond more slowly to a sustained rise in money market rates than they had to the declines of the past two and one-half years. One banker thought that deposit rates *would* respond relatively more slowly to the rise in market rates, with thrifts moving up even more slowly than the commercial banks. Several bankers, however, suggested that while banks might try to lag more on the upside, competitive forces would undermine any such effort. Thus if banks did lag, some institution would see an opportunity to gain market share by raising deposit rates and the others would then be forced to follow.

A few bankers noted that the *relative* speed of response of the various kinds of accounts on the upside would be similar to the pattern observed when rates had fallen. Thus consumer CD rates could be expected to move relatively rapidly, with little or no increase in the gap between money market rates and CD rates. On the other hand, rates on the relatively fixed rate types of accounts, NOWs and savings deposits, would respond only slowly. Hence the rate gap on these accounts relative to market rates would widen once again as market rates rose, much as this gap had narrowed when market rates were falling.

Some Tentative Conclusions and Unresolved Questions

Obviously no firm inferences can be drawn from a small-scale survey of bankers in a geographically limited portion of the consumer deposit market. But some tentative conclusions about this market are at least suggested by the survey results.

For one thing, the evidence suggests that consumer CD rates are likely to continue to respond reasonably promptly and fully to changes in money market interest rates. To banks, consumer CDs are an alternative to funding through wholesale deposits. And since consumers' demand for these CDs appears to be quite rate-sensitive, the volume of funds a bank can raise from this source will be responsive to changes in offering rates. Thus whenever wholesale funding costs rise above currently prevailing consumer CD rates (allowing for differences in reserve requirements and other costs), banks will have a strong motive to push up offering rates to increase their takings from this source. Conversely, should wholesale rates decline, banks have a strong motive to bring consumer CD rates down into line with the wholesale rates. It was not completely clear whether this adjustment process would move as rapidly when market rates are rising as it does when they are falling—our interviewees differed on this point. In any case, the actual speed of adjustment in any given local market will depend on the extent of competition in that market.

With respect to money market deposit accounts, their nature makes it likely that they will continue to respond less rapidly than CD rates to changes in market rates. On the downside, there is the apparent reluctance of bankers to break visible psychological barriers posed by even-numbered interest rate levels and by rates offered on slow-adjusting accounts such as savings and NOW accounts. On the upside, the likelihood that MMDA money is less rate-sensitive than CD money, coupled with the fact that a change in the MMDA rate applies immediately to the entire outstanding stock of MMDA deposits, suggests that bankers will tend to delay in raising MMDA rates at least until they feel reasonably sure the rise in market rates is likely to stick.

Given the variations that have occurred in the spread between MMDA rates and money market rates generally (including money fund rates), the question arises as to what the long-run "equilibrium" rate on MMDAs for given levels of market rates may be. Econometric work suggests that over periods of up to three months, the MMDA rate makes only a partial adjustment (about 60 percent) to movements in money market rates.[4] But over a somewhat longer period, the response of MMDA rates to market rates may well be fairly complete, and indeed that is what one banker we talked to asserted. Moreover, since money fund rates, by their very nature, must also respond fully to changes in market rates over a period long enough for their portfolios to turn over, it seems likely that over time MMDA rates and money fund rates should tend to move more or less in tandem even though bankers may not regard them as closely competitive in the short run.

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[4] See Wenninger, *op. cit.*, page 7.

The savings deposit product is clearly designed to be marketed to relatively rate-insensitive customers. The banks' approach to pricing this product suggests that they seek to preserve this role for the savings deposit account by responding only slowly and reluctantly to the recent sharp declines in money market rates in setting rates on saving deposits. As a result, the profitability of these deposits to the banks has been much reduced in the recent period. To the extent that the savings account can be preserved as a repository for rate-insensitive funds, however, it could once again become quite valuable to the banks should market rates rise.

From the point of view of monetary policy, perhaps the most interesting—and most perplexing—question raised by our interviews is the likely course of NOW account rates over time. Alone among the types of interest-bearing accounts discussed in this article, NOWs represent a component, and an important component, of M1. This narrow money measure was, for a period, the monetary aggregate most closely watched by the markets and the policymakers. More recently, its importance has been substantially downgraded because of its highly aberrant behavior relative to earlier experience—a change in behavior that is clearly related in part to the pricing approach banks have adopted to consumer deposits.

When it first became apparent that deregulation would make possible a transactions deposit whose rate could fluctuate in line with market rates, many analysts suggested that the responsiveness of M1 to market rates would decline sharply. Their reasoning was that the opportunity cost of holding these deposits need no longer be affected by changes in market rates. Experience suggests, however, that deregulation has had just the opposite effect on the responsiveness of M1 to changes in market interest rates. On the one hand, the creation of market-rate-sensitive alternatives to M1 accounts has made it much easier for the average depositor to adjust his transactions balance levels in line with changes in the opportunity costs of holding them. All he needs to do is to shift money between different deposit accounts—accounts that are more often than not held in the same institution.

At the same time, it has turned out in practice that the rates paid on NOW accounts respond only slowly and incompletely (except perhaps in the very long run) to changes in market rates. So the ability of depositors to respond to changing rate spreads has increased. And because NOW rates adjust slowly, these spreads have continued to fluctuate substantially with fluctuations in the general level of interest rates. Moreover, everything we have learned in the course of our talks with bankers suggests that the sluggish response of NOW rates is likely to be a persisting feature of these accounts. So on balance, it appears that even though these transactions deposit rates are now theoretically free to move in line with market rates, the overall interest-rate sensitivity of NOW accounts, and hence of M1, has probably been significantly increased as a result of deregulation.

One perplexing and potentially important question is where the long-run "equilibrium" spread between money market rates and NOW rates may turn out to settle. In the last half of 1983 and most of 1984, when market rates were much higher than they are now, market rates (as measured by the six-month bill rate, for example) tended to run from 2 to 3 percentage points above the then-prevailing rates on Super NOWs. In recent months, this spread has been much smaller, ranging between roughly zero and one-half percent.

Clearly the bankers we talked to do not think the current level of NOW rates represents a long-run "equilibrium." They obviously think there is downward pressure on the NOW rate at current levels of money market rates. But how far below current levels would NOW rates have to fall to reach such an equilibrium? If the 1983-84 range of spreads in fact did represent an equilibrium position, NOW rates would ultimately have to fall to within a 2.5 to 3.5 percent range, far below their current levels. On the other hand, the high spreads prevailing in the 1983-84 period may also have been abnormal—abnormally high. Thus they may *not* be a reliable guide to where market rate/NOW rate spreads may ultimately settle given today's lower level of market rates.

Most likely, the "true" long-run equilibrium spread between money rates and NOW rates lies somewhere between the very high 1983-84 levels and the very low to negligible levels prevailing recently. But just exactly where it may lie within this range is far from clear—especially in view of all the uncertainties, even for the bankers themselves, about both the costs and the revenues associated with NOW accounts.

In any case, if there is currently pressure for the NOW account rate to fall, even absent further declines in money market rates, this pressure poses a new problem for the use of M1 as an indicator of monetary stimulus. By itself, a downward drift in the NOW rate would clearly reduce the demand for NOWs and thus for total M1. If M1 growth were left unchanged under such circumstances, the downward drift in money demand would tend to put downward pressure on market rates and would thus provide additional stimulus to the economy. If the additional stimulus were undesired from a policy perspective, it would be necessary to reduce the target rate of M1 growth by a sufficient amount to offset the impact on market rates of the reduction in the demand for M1.[5] The problem is that it is very hard to say how rapidly any downward movement in NOW rates might occur, if it happens at all, and how far it might go. Consequently, the needed allowance for this factor in setting monetary targets is equally hard to determine. Consideration of such questions makes it clear that the behavior of the narrow money supply has become much harder to analyze under deregulation than it was in the old days when it consisted only of non-interest-bearing demand deposits and currency.

Richard G. Davis
Leon Korobow
John Wenninger

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[5] To the extent that the slower growth of NOW accounts reflects a shift of funds from NOW accounts into consumer CDs, M2's growth would not be affected since NOW accounts and consumer CDs are both M2 components.

The Pricing of Consumer Deposit Products— The Non-rate Dimensions

The process of deregulating interest rate ceilings on consumer deposits with transactions features began in late 1982 and early 1983. By the end of March 1986, all restrictions had been removed except the zero rate limitation on demand deposits. Deregulation has ushered in a new era of explicit pricing of the services provided by consumer accounts offering transactions features. Before deregulation, banks tended to compete for these accounts by offering account services free or below cost. Since the rate ceilings have been eliminated, banks have been free to compete by offering more attractive interest rates while charging explicitly for account services when and as needed to make the overall cost of funds from these accounts competitive with alternative bank funding sources.

The way in which banks have adjusted interest rates on the various types of consumer deposit accounts under deregulation in response to changes in market rates was explored in an earlier issue of this *Review*.[1] In this article we present the results of a recent survey of the non-interest-rate features of pricing by commercial banks on four types of accounts: money market deposit accounts, which provide limited transactions services, consumer demand deposits, "regular" NOW, and Super NOW accounts.[2] Until January 1, 1986, regular NOW accounts were subject to a 5¼ percent interest rate ceiling while Super NOW accounts were free to pay a market-related rate. This regulatory distinction, in effect at the late 1985 date covered by our survey, no longer exists. Nevertheless, many institutions continued to offer NOW accounts whose rates change only infrequently alongside other NOW accounts whose rates are, at least in principle, more frequently adjusted in line with market conditions.

The problem faced by banks in determining appropriate pricing policies for consumer deposit accounts with transactions features is extremely complex. These accounts involve certain fixed costs associated with setting up and maintaining the account as well as variable costs related to the account's activity level. On the revenue side, the account has value to the bank as a source of funds that can be re-lent at a profit and, in many cases, it is also a source of fee income. As noted elsewhere in this issue,[3] it may be very difficult for banks to place an overall value on the funds gathered in these accounts. Bankers tend to view transactions accounts as an important focus of a complex "customer relationship." Thus the holder of a transactions deposit account may tend to borrow and to purchase other banking services at the same institution. Indeed, the pricing of the various banking services, including transactions accounts, may be designed to give customers an incentive to do *all* their banking business with the institution where they maintain a transactions account. This relationship value of the transactions account is difficult to measure and greatly complicates the problem banks face in pricing such accounts appropriately. And of course the competitive situation any particular bank (or any branch of that bank) faces is a further major complicating factor in determining appropriate pricing policy.

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[1] See John Wenninger, "Responsiveness of Interest Rate Spreads and Deposit Flows To Changes In Market Rates," this *Quarterly Review* (Autumn 1986), pages. 1-10. See also Michael C. Keely and Gary C. Zimmerman, "Deposit Rate Deregulation and The Demand For Transactions Media," *Economic Review*, Federal Reserve Bank of San Francisco (Summer 1986).

[2] The survey data were obtained from the Trans Data Corporation, 530 Riverside Drive, Salisbury, Maryland, 21801. Trans Data developed figures as of year-end 1985 covering a range of pricing characteristics for traditional demand deposits owned by consumers and for the various interest-bearing accounts having transactions features that have become available over the last several years. The data were obtained from a survey of 195 respondent banks across the nation conducted early in 1986. Nearly all the survey respondents had at least $500 million in total deposits and were major participants in their respective markets. The total deposits of the surveyed commercial banks amounted to approximately $600 billion in the aggregate, and they held close to 30 percent of the nation's total domestic deposits.

[3] See "Bankers on Pricing Consumer Deposits" this *Quarterly Review*, pages 6-13.

The result, at least in the larger and more competitive banking markets, is a rather bewildering array of available combinations of interest rates, fee structures, balance requirements, and interconnections with other banking services. The survey results reported here cannot begin to capture all this complexity. Nevertheless, a few generalizations about the products being offered depositors can be gleaned from the survey that have almost certainly retained their validity.

Survey results

First, most respondents require that interest-bearing accounts with transactions features maintain some minimum balance if any interest is to be earned. This is the case for the overwhelming number of MMDA and Super NOW accounts and is true for a majority of NOW accounts (Table 1). Demand deposit accounts of course pay no interest, but *all* the institutions surveyed required that some minimum balance level be maintained, generally around $500, if a monthly account fee is to be avoided. For the two types of accounts paying "market-related" rates, MMDA and Super NOW accounts, the minimum balances required to earn interest tend to cluster either at $1000 or at $2500. Not surprisingly, the minimum balance levels required to earn interest for regular NOWs are almost always smaller amounts, usually under $1000.[4]

Table 1

Minimum Balances Required to Earn Interest at Commercial Banks

December 31, 1985
Percent of respondents

Balance Requirements	MMDA	NOW	Super NOW	Demand Deposit*
$0	4.6%	44.4%	3.8%	
1-999	2.1	43.2	1.6	100%
1-500		18.5		
501-999		24.7		
1,000	51.3		31.3	
1,001-2,499	1.0	10.1	4.4	
2,500	40.5		46.7	
2,500 and greater	0.5	2.2	12.1	
Number of respondents	195	178	182	111

*Minimum to avoid a monthly fee at commercial banks that waived the monthly fee if a minimum balance was maintained.

Source: Trans Data Corporation.

Table 2

Monthly Fees on Commercial Bank Accounts with Balances Below the Minimum Required to Earn Interest

December 31, 1985
Percent of respondents

Charge a Fee?	MMDA	NOW	Super NOW	Demand Deposit*
Yes	67.7%	96.0%	95.5%	100.0%
No	32.3	4.0	4.5	0.0
Number of respondents	186	99	156	177
Size of Fee Where Charged				
Less than $4.00	15.0	15.8	8.1	54.3
$4.00 to $5.99	38.6	35.8	27.5	33.3
$6.00 to $7.99	15.0	28.4	21.5	7.9
$8.00 to $9.99	6.3	9.5	9.4	
$10.00 and above	24.4	10.5	32.2	4.5
Number of respondents†	127	95	149	177

*Refers to minimum balance required to avoid a monthly fee.

†Includes a few banks that did not reply to all questions.

Source: Trans Data Corporation.

For most accounts, balance levels determine not only whether interest will be paid (in the case of interest-bearing accounts) but also whether a per-account monthly fee will be charged. Virtually all NOW account holders were charged a monthly fee if their balances fell below levels required to earn interest, both for the NOWs and Super NOWs, while two-thirds of MMDA account holders were assessed a fee when balances fell below the minimum required to earn interest (Table 2). The size of these monthly fees, where charged, varied over a wide range. Generally speaking, however, they tended to be less than $8 per month, although a sizeable minority of MMDA and Super NOW fees were as much as $10 or more. Demand deposit account holders whose balances fell below levels needed to avoid fees tended to be charged the lowest monthly fees, less than $4 in a majority of cases.

A slim majority of institutions charge a monthly fee on NOW accounts even where balances are *above* minimum levels required to earn interest, as is also the case for a sizeable minority of Super NOW accounts (Table 3). A very small minority of MMDA accounts were charged fees even where balances were above those required to earn interest. For *all* types of accounts where fees are charged at balance levels above the minima required to earn interest, these fees are nevertheless waived in most cases if some still higher balance requirement level is met (Table 4). In the case of Super NOWs, to be sure, a sizeable minority of accounts had to pay a monthly fee regardless of the level of balances.

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[4] A majority of institutions defined the required minimum balance in terms of the lowest balance on any given day during the accounting period. Further, a majority of institutions compounded and credited interest monthly.

In the case of demand deposit accounts, about two-thirds of respondents waive the monthly fee if balances are above some minimum (clustering, as noted earlier, around $500) while roughly one-third of the holders of such accounts have to pay fees regardless of balance levels.

The logic of setting minimum balance levels in order to earn interest, and/or to avoid fees, seems fairly straight-forward. The deposits gathered by the bank in these accounts are a source of profit because they can be reinvested at an interest rate spread. But if the volume of deposits in a given account falls below a certain level, the net interest revenues generated will not even cover the fixed cost of maintaining the account. Therefore, minimum balance requirements to earn interest and/or avoid fees are needed to weed out unprofitable accounts, or to make them profitable through the collection of fee income. On the depositor's side, the burden, if any, of these minimum balance requirements will depend on how the balances are computed, on the depositor's normal balance needs and on the alternative investment options. It is important to note that a sizeable minority of institutions allow customer balances in other accounts to help fulfill the minimum balance levels needed to earn interest and/or avoid fees on regular NOW and consumer demand deposit accounts (Table 4). Such an approach is of course in line with the "relationship" pricing of consumer banking products and greatly reduces or eliminates any burden of balance requirements for depositors who hold other accounts in banks where they maintain a transactions account.

While monthly per-account fees can compensate the bank for the fixed costs of account maintenance, where balances would not otherwise be large enough to make the account profitable, banks also incur per-check costs that may or may not be covered by the value of balances and per-account fees. Thus many banks impose per-check charges under certain conditions. In the case of regular and Super NOW accounts and demand accounts, about a third of the institutions in the survey assessed per-check charges regardless of the levels of balances in the accounts (Table 5). In addition, about 20 percent of NOW and Super NOW accounts and about half of demand accounts are assessed per-check

Table 3

Monthly Fees on Commercial Bank Accounts with Balances Above the Minimum Required to Earn Interest

December 31, 1985
Percent of respondents

Charge a Fee?	MMDA	NOW	Super NOW	Demand Deposit
Yes	9.2%	51.7%	38.0%	37.5%
No	90.8	47.8	62.0	62.5*
Number of respondents†	195	178	163	177
Size of Fee Where Charged				
Less than $4.00	22.2%	9.8%	12.9%	90.5%
$4.00 to $5.99	27.8	46.7	32.3	8.0
$6.00 to $7.99	5.6	27.2	29.0	0.10
$8.00 to $9.99		9.8	8.1	0.4
$10.00 and above	44.4	6.5	16.1	0.0
Number of respondents†	18	92	62	66

*Indicates percentage of banks that waived monthly fee if minimum balance was maintained.

†Includes a few banks that did not reply to all questions.

Source: Trans Data Corporation.

Table 4

Balances Required to Waive Monthly Fee Where Balances Were Above the Minimum Required to Earn Interest

December 31, 1985

	In percent of respondents*			
Is Fee Waived Above A Specified Amount?	MMDA	NOW	Super NOW	Demand Deposit*
Yes	83.3%	97.8%	61.3%	62.5%
No	16.7	2.2	38.7	37.5
Number of respondents	18	92	62	177
	In dollars			
Average Balance Required To Waive Fee	$3,299	$1,410	$5,487	$500†
Are Fees Waived Based on Balances In Other Accounts?	In percent of respondents			
Yes	n.a.	35.6%	n.a.	46.1%
Number of respondents		90		177

*Refers to respondents that charged fees on accounts with balances above minimum required to earn interest except that in the case of demand deposits, the figures shown are for the entire sample.

†Estimated.

Source: Trans Data Corporation.

charges whenever balances are below the minimum levels required to earn interest and/or avoid per-account fees. Roughly 50 percent of institutions, however, charge *no* per-check fees on NOW and Super NOW accounts *regardless* of balance levels, while about 20 percent assess no per-check fees on demand deposit customers regardless of balance. Average per-check charges vary according to type of account (Table 6). Here too, these charges are waived in many cases if balances are maintained at or above specific levels (Table 7).

The status of per-check charges on MMDA accounts is a little complicated. These accounts were designed to have only a limited transactions account capability. Federal Reserve Regulation D requires that all institutions offering MMDAs have procedures in place to monitor account activity, which cannot exceed a total of six pre-authorized, automatic and telephonic transfers per month, of which no more than three can be by check to third parties. When excessive activity is detected, the regulation requires the offering institution to take follow-up action to prevent further violation of Regulation D. Since MMDAs retain their exemption from reserve requirements only when the regulatory limits are observed, many banks have priced per-check charges to discourage account holders from writing more than three checks. Only a small minority of institutions assess per-check charges for the first three checks written in a given month on these accounts (Table 5). Fully 47.2 percent, however, assess per-check charges beyond the first three, in amounts averaging about $4.75 per check—compared to per-check charges averaging only $0.24 or less on other kinds of accounts (Table 6).

Table 5

Per-Check Charges Versus Balance Requirements at Commercial Banks

December 31, 1985
Percent of respondents

Is There A Per-Check Charge?	MMDA*	NOW	Super NOW	Demand Deposit
Yes, regardless of balance	4.6%	31.5%	29.4%	30.5%
Yes, if balance below minimum†	4.1	18.5	18.4	51.5
No, regardless of balance	83.1	50.0	52.1	17.9
Do not offer checks	8.2			
Number of respondents	195	178	163	177

*In the case of MMDAs, the charge relates only to the first three checks.

†Minimum required either to earn interest (MMDAs, NOWs and Super NOWs) or avoid a monthly fee (demand deposits).

Source: Trans Data Corporation.

As the results reported above indicate, fee schedules at most institutions are designed to recover costs in accounts where average balance levels are not high enough, taken by themselves, to make the account profitable. A significant minority of institutions actually offer interest-rate incentives to increase the size of account balances by presenting a "tiered" interest rate structure where higher rates are paid on successively higher threshold levels of balances. Thus some 29 percent of the respondents offered tiered rate structures on MMDAs, and 17 percent offered such rate structures on Super NOW accounts. However, the rate incentives offered in these tiering arrangements were modest. Thus in no case would increasing balances over a given threshold level raise the rate paid by more than 50 basis points, and in most cases the differential between successive tiers ranged between 20 and 35 basis points.

Table 6

Check Charges at Commercial Banks

December 31, 1985

Average charge per check:	MMDA		NOW	Super NOW	Demand Deposit
	$1.16*	$4.73†	$0.24	$0.22	$0.18‡
Number of respondents reporting the charge	17	84	54	63	177

*First three checks.

†Beyond three checks.

‡Partly estimated.

Source: Trans Data Corporation.

Table 7

Minimum Balance Requirements for Waiver of Per-Check Charges at Commercial Banks

December 31, 1985

	NOW	Super NOW	Demand Deposit
Average Balance To Waive Charges:*	$1,356	$4,792	$500†
(1) Total number of respondents that waived check charges	47	24	91†
(2) Line 1 as a percent of respondents that charged a fee*	83.9%	50.0%	51.5%

*For banks that imposed a charge when the balance was above the minimum required to earn interest.

†Estimated

Source: Trans Data Corporation.

Conclusion

Clearly the process of setting non-interest-rate terms on consumer transactions accounts cannot be reduced to a simple formula. As mentioned earlier, we should expect to see minimum balances to earn interest and/or avoid fees set to permit earnings from low-balance accounts to cover costs. At the same time, we might expect competitive forces to discourage charging fees on high balance accounts that would be profitable without such fees. By and large, the survey results are consistent with these expectations to the extent that most accounts do require minimum balances to earn interest, while fees do tend to be eliminated above this or some other level of balances. Nevertheless, the survey also shows that some institutions pay interest regardless of balance levels and that a few charge no fees. On the other side, some institutions charge fees regardless of balance levels. Neither situation seems consistent with any simple theory of account pricing. Moreover, the wide variety of options offered by different institutions and the significant differences among them in setting specific balance levels and fee schedules suggests that the market for these accounts has yet to settle down to any uniform set of prices and approaches.

There are some obvious reasons for this. They include the fact that the strength of competition and the composition of the depositor base may differ widely from institution to institution, or even between branches of the same institution. Moreover it is difficult to compute the true costs and, especially, the true net revenues of transactions accounts and therefore to compute what balance levels and fee schedules might be appropriate to them. For one thing, it is difficult for banks to know what notional "term-to-maturity" to assign to consumer transactions balances in comparing them to the costs of funding alternatives in a world where the yield curve is rarely flat. Another major imponderable, already noted, is how to value the net revenues earned by banks from these accounts when they represent the lynchpin of a full banking relationship. Given all the imponderables, it is not surprising to find a wide diversity of practices and some instances that seem to contradict what a pure, and rather simplistic, theoretical approach to pricing might imply.

Finally, it needs to be emphasized that the survey from which the data in this article were taken represents practices only as of a single date, late 1985. While it appears that banks review the non-rate dimensions of their consumer pricing policies only relatively infrequently, it is likely that there has been some further evolution since this survey was taken. In particular, there are signs of an increasing move toward relationship pricing, a dimension of the problem not explicity covered in the survey.

Changes in the non-rate dimensions of consumer pricing could have some impact on the levels and growth rates in the monetary aggregates as measured and targeted by the Federal Reserve. For example, the widespread use of minimum balances on transactions accounts and changes in the levels of these minimums are likely to affect the overall levels of these balances because consumers may have an incentive to move funds from other assets to meet the balance requirements. Thus the level of M1 could be affected. It could also be affected by changes in the willingness of banks to allow deposits in other accounts to count towards balance requirements in transactions accounts. Indeed the overall structure of non-rate terms on transactions accounts could have long-run effects on the response of these accounts to changes in consumer income and wealth. But in the short- to medium-term, the movements of interest rates paid on transactions accounts—relative to rates paid on other consumer accounts and relative to market rates generally—are clearly far more important influences on their behavior.

Richard G. Davis
Leon Korobow

Monetary Policy Influence on the Economy—An Empirical Analysis

Some economists and policy makers are concerned that the ability of monetary policy to influence economic activity has been seriously weakened by developments in the financial system during the 1970s and 1980s. The main argument is that financial innovations and the deregulation of interest rates have led to a breakdown of non-price credit rationing barriers that were important in transmitting monetary restraint to particular sectors, such as housing and small business. Without those credit availability effects, monetary policy must rely largely on the response of private spending to interest rates. This shift in the channels of monetary policy influence implies that interest rates may have to rise to much higher levels than in the past to attain a given degree of restraint on private demand.[1]

There is not much doubt that the role of credit rationing has been reduced greatly. Whether this implies a significant decline in the effectiveness of monetary policy, however, is not clear. The channels of monetary policy transmission to the economy remain complex, operating through interest rates, exchange rates, asset values, and expectations about these and other variables. The same forces of innovation and deregulation that reduced or eliminated credit availability effects may have strengthened interest rate and wealth effects. For example, in the deregulated financial market environment, economic agents may be more aware of, and more sensitive to, changes in market interest rates, i.e., the interest and wealth elasticities of private demand may have increased over time. Perhaps even more importantly, the generalized floating exchange rate environment and the growing link between the U.S. economy and the rest of the world suggest a larger potential effect of exchange rates on economic activity.

All these developments are relevant for assessing the overall effectiveness of monetary policy, which depends on the link between policy instruments and financial variables as well as on the relationship between financial variables and real economic activity. These broad linkages may be viewed as the two major steps in the transmission of monetary policy influence to the economy. In this article, we look at the second step in the transmission by focusing on the key interest and exchange rate-sensitive sectors of the economy: consumer durable goods, producers' durable equipment, and residential construction. Together, these sectors account for nearly a third of total private expenditures and more than half of the recent business cycle fluctuations in those expenditures. More broadly, these sectors are of fundamental importance to the economy in that their direct and indirect (or spillover) effects are large and far reaching, extending to all sectors.

Based on a fairly standard framework we estimate interest and exchange rate effects on demand and explore the possibility of significant shifts in the estimated effects. Our main findings are as follows:

- Interest and exchange rate effects on private spending have been substantial and significant at least since the mid-1970s, suggesting that the long-run monetary policy influence on the economy remains powerful.

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[1] See, for example, Lyle E. Gramley, "Financial Innovation and Monetary Policy," *Federal Reserve Bulletin* (July 1982); Richard G. Davis, "Recent Evolution in U.S. Financial Markets—Implications for Monetary Policy," *Greek Economic Review* (December 1981); and William R. Keeton, "Deposit Deregulation, Credit Availability and Monetary Policy," Federal Reserve Bank of Kansas City *Economic Review* (June 1986).

- The interest sensitivity of private expenditures seems to have risen over time, and together with the strong exchange rate effects, has served to offset the reduced role of credit rationing. On balance, therefore, the long-run monetary policy influence on the economy is likely to have been as strong in recent years as in the earlier period.
- The short- to medium-term monetary policy influence seems to be quite uncertain and difficult to estimate. It may have become less predictable over time, presumably reflecting increased uncertainty about the relationship between policy instruments, and interest and exchange rates.

Given the complexity of issues involved and the difficulties of estimating relationships in the face of on-going financial and economic changes, these findings should be viewed as tentative.

Changing Channels of Monetary Policy Influence

In the 1960s and early 1970s, monetary policy relied on two principal channels to moderate private aggregate demand: interest rates and credit rationing. Increases in interest rates affected spending in interest rate-sensitive sectors directly by raising the opportunity cost of financing. At the same time, high interest rates triggered credit rationing when they collided with institutionally determined interest rate ceilings, restraining spending especially in the housing and small business sectors.

Credit rationing took two general forms. First, during periods of high interest rates, banks and thrift institutions experienced a decline in deposits and a loss of liquid assets because of Regulation Q ceilings on deposit rates. As a result, they were forced to reduce their lending to households and small businesses. Second, a variety of limits on lending rates—usury laws, and interest rate ceilings on government-insured loans and on local government borrowing—acted to block credit to various sectors through reduced availability or tightening of non-price terms. Together these restrictions created substantial, though frequently short-lived, credit shortages.[2]

Since the early 1970s credit rationing mechanisms have been weakening. In 1973, Regulation Q ceilings on all large negotiable certificates of deposits were removed, and during the next six years or so there was a substantial easing of interest rate ceilings on various types of deposit instruments. The Deregulation and Monetary Control Act of 1980 phased out Regulation Q ceilings at all depository institutions. Although the phase-out lasted until April 1986, the bulk of deregulation occurred in the early 1980s. In the late 1970s and early 1980s, usury ceilings on various types of loans were either eliminated or substantially eased.

These regulatory changes, together with financial innovations and the growth of financial markets, have led to greater interest-rate competition, more integrated credit markets, and a freer flow of funds. The increased role of market forces on the domestic scene has been reinforced considerably by globalization of financial markets, i.e., enhanced integration of domestic and international financial markets. In these circumstances, credit rationing no longer appears to be a significant channel of monetary policy influence on the economy.

The breakdown of credit rationing mechanisms and the greatly increased role of market forces and interest rate competition in determining credit flows clearly imply a significant shift in the manner of monetary policy transmission to the economy. For example, interest rate effects on spending are more gradual and less disruptive than those of credit rationing. A more important question, however, is whether the financial changes also imply a significant weakening of the magnitude of policy influence on non-financial sectors. A case for weakening rests on at least two major assumptions: first, interest elasticities of final demands have remained unchanged at their earlier low levels, and second, developments in the 1970s and 1980s have not opened new policy channels or made existing channels more important.

Some features of the new financial environment suggest that private spending may now be more sensitive to interest rates.[3] With an unprecedented rise in the 1970s, interest rates may have reached a threshold where they start to have a stronger effect on spending. It may be that financing costs are an important influence on profits and investment decisions only at high rates.

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[2] A necessary, but sometimes unstated, assumption in this argument is that credit lost to one sector was not simply added to credit in other sectors. This would be true if the alternatives were not perfect substitutes. Implicit also is the notion that restrictions on the quantity of credit are more effective in curbing spending than increases in the price. For a more detailed discussion of the credit rationing mechanism, see A.M. Wojnilower, "The Central Role of Credit Crunches in Recent Financial History," *Brookings Papers on Economic Activity*, 2 (1980); "Private Credit Demand, Supply, and Crunches—How Different are the 1980's?" *American Economic Review* (May 1985); Davis, *op. cit.*; B.M. Friedman, *Monetary Policy in the United States: Design and Implementation*, a study prepared for the Trustees of the Banking Research Fund Association of Reserve City Bankers, June 1981, Chapter 2; and A.W. Throop, "Financial Deregulation, Interest Rates and the Housing Cycle," Federal Reserve Bank of San Francisco *Economic Review* (Summer 1986).

Footnote 2 continued

[3] For a detailed discussion, see M.A. Akhtar, "Financial Innovations and Their Implications for Monetary Policy: An International Perspective," *BIS Economic Paper*, No. 9 (December 1983); and M.A. Akhtar and G.E.J. Dennis, "Financial Innovations and the Interest Elasticity of Private Expenditures," Federal Reserve Bank of New York Research Paper No. 8422 (October 1984).

Once such cost considerations become a more important part of investment decisions, they are likely to remain so even after rates come down. This would be particularly true if, as some economists have argued, deregulation of rates and other changes in the financial environment have pushed up the average level of interest rates permanently.

Other forces more directly related to the process of deregulation and innovation may also lead to greater sensitivity of private demand to interest rates. The increased market competition implies that any changes in interest rates are more quickly transmitted to a larger number of assets and economic agents than before. Similarly, financial innovations may increase substitution among various types of financial assets without any significant alteration in the degree of substitution between financial assets, as a group, and physical assets. If so, changes in interest rates would tend to have a greater impact on investment in physical assets by immediately altering the rate of return on the whole range of financial relative to physical assets. The increased dependence on short-term and adjustable rate loans may also increase interest sensitivity since changes in interest rates will affect the cost of both existing and new investments. On the other hand, the adjustable rate environment may reduce the impact of higher interest rates because borrowers have less incentive to wait for lower rates.

The experience since the early 1970s suggests that other monetary channels may have developed as well. Floating exchange rates and the increased openness of the U.S. economy have made the external sector an important channel of monetary policy. Our international transactions—both trade in goods and services, and financial flows—have expanded greatly over the last fifteen years or so. The total of exports and imports of goods and services relative to gross national product (GNP) is now about 60 percent above the 1970 level; the ratio of imports to GNP is 90 percent above its 1970 level. The expansion of financial transactions is even larger and is evident in virtually all measures of private financial transactions. For example, U.S. bank claims on foreigners in 1985 were more than 30 times greater than they were in 1970.

With the increased scale of international transactions, the exchange rate is an important influence on domestic economic activity. The principal exchange rate effect tends to reinforce, on balance, the more direct interest rate effect. A tightening of monetary policy, for example, not only drives up interest rates but also may lead to an appreciation of the dollar exchange rate. This reduces the competitiveness of domestically produced goods, causing our demand for those goods to shift abroad and exports to fall.

The workings of the exchange rate channel are quite complex, however. The timing and extent of exchange rate changes associated with monetary policy actions are hard to predict, and together with uncertain lags in the effect on relative prices of domestic versus foreign goods, do not allow us to estimate reliably the exchange rate influence on the economy, especially over a time horizon of up to 2 or 3 years. To some extent, these uncertainties reflect the more general problems of predicting exchange rates in an environment of high capital mobility across national borders. Exchange rate movements are subject to a large number of diverse influences—including expectations about the economy, future exchange rates, and economic policy—and empirical models have not been able to capture these influences well enough to predict exchange rates systematically.

Another complicating factor in assessing the exchange rate influence is that monetary policy actions lead to changes in exchange rates partly through alterations in interest rates. For this and other reasons, movements in the two variables are closely associated over time. Thus, it is very hard to separate the interest rate effect on the economy from the exchange rate effect.

The complexity of the exchange rate channel arises as well from the fact that not all the exchange rate effects on economic activity work in the same direction. While the primary effect of exchange rate appreciation is to reduce the demand for domestic goods, it may also have an offsetting influence on the economy. The latter could happen, for example, if appreciation leads to significant capital inflows, thereby putting downward pressures on interest rates. Similarly, appreciation may increase domestic demand through higher expected wealth induced by the lower level of general prices. These effects, which apply to domestic expenditures on foreign as well as home produced goods, may be small but they are difficult, if not impossible, to separate from other interest rate and wealth effects.

Lack of Empirical Evidence

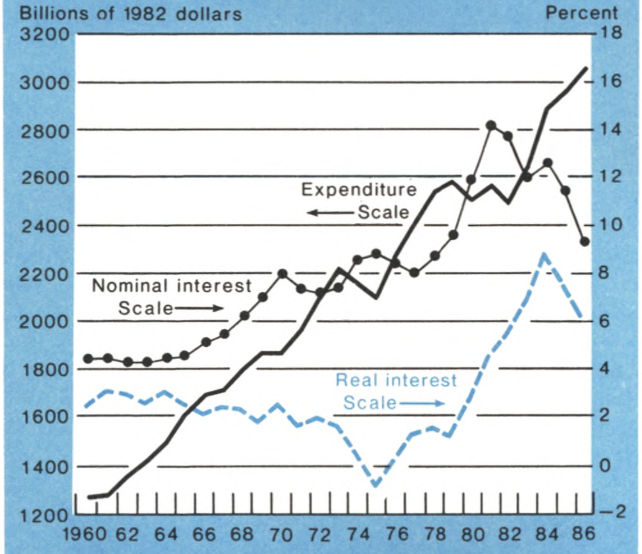
It is obvious from the preceding discussion that the demise of the credit rationing mechanism does not necessarily imply a weakening of monetary policy influence on the economy. Whether developments in the 1970s and 1980s have made monetary policy more or less effective, however, can only be resolved empirically. Unfortunately, the literature has very little to offer on this subject. The bulk of the evidence does not deal with the experience of the last ten years or so; a few studies analyze the recent experience in some sectors but usually consider one sector at a time and differ greatly in empirical methodology. To be sure, the evidence does point to significant exchange rate effects on tradeable goods, and a few studies, e.g., on inventories, also suggest that interest rate effects may be stronger in more recent periods. But none of these studies simultaneously considers internal and external sector channels of monetary policy influence on all the major sectors of the economy, and none systematically examines the possibility of a shift or drift in the impact of monetary influences over time.

It is also not possible to discern a change by comparing estimates of the policy influences from earlier studies to estimates from more recent studies. Over time the objectives of research and statistical techniques have changed so dramatically that the results from the recent period are only remotely related to those from the earlier period.

The present study focuses on the main interest and exchange rate-sensitive sectors. Our presumption is that the results for these sectors would give us some sense of the broader trend in monetary policy influence on domestic economic activity. Two caveats should be mentioned at the outset. First, a comprehensive empirical analysis covering all important non-financial sectors would be needed to reach a more complete judgment on the effectiveness of monetary policy. Second, final quantitative judgments on the issues involved may prove elusive, not only because the financial and economic environment is continuously changing but also because some important aspects of the policy channels can not be modeled empirically in a satisfactory manner.

Chart 1

Private Expenditures and Real and Nominal Interest Rates*

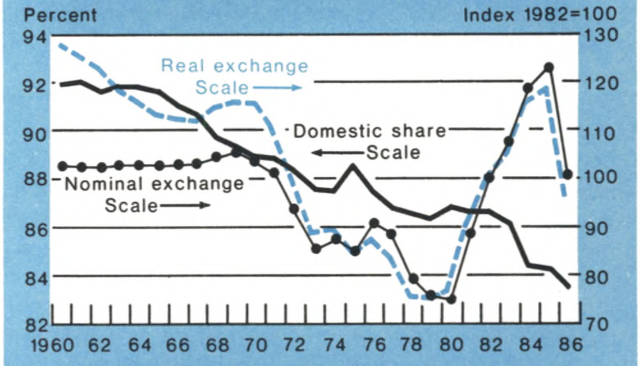


*The nominal interest rate is Moody's AAA corporate bond rate, and the real interest rate is constructed by subtracting the eight-quarter percent change in the implicit GNP deflator.

Sources: U.S. Department of Commerce, National Income and Product Accounts; Moody's Investor Service.

Chart 2

Domestic Share of Expenditures and Nominal and Real Exchange Rates*



*Domestic share is total private expenditures minus imports, divided by total private expenditures. The exchange rate variables are in units of foreign currency per dollar. Precise definitions are given in Appendix 2.

Sources: U.S. Department of Commerce, National Income and Product Accounts; Federal Reserve Board, Federal Reserve Bulletin, Table A68, various issues.

Evidence on Monetary Influences

A cursory look at the data reveals no systematic relationship between private spending and interest or exchange rates. For example, movements of total private spending appear to be only loosely related to nominal and "real" interest rates (Chart 1). The same is true for private spending on domestic goods and the dollar exchange rate (Chart 2). The influence of both interest and exchange rates is somewhat more visible when private spending is defined to include only the three most policy-sensitive sectors—producers' durable equipment, housing, and consumer durables (Charts 3 and 4). Even so, neither of the two variables shows a systematic and strong link to economic activity.

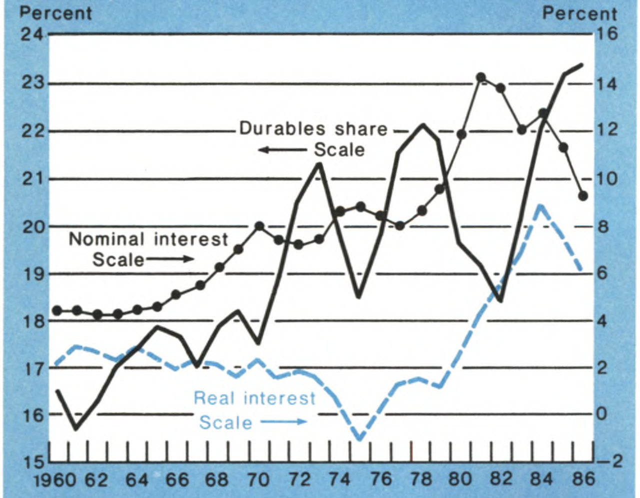
Further disaggregation at the sectoral level makes it somewhat easier to see the effects of interest and exchange rates. But their quantitative significance remains in doubt. This is not particularly surprising since many policy and non-policy influences operate simultaneously, making it difficult to identify the role of any one of them at an impressionistic level. It is therefore necessary to utilize a more elaborate framework to examine monetary policy influence on the economy.

Our formal empirical analysis is based on a general open economy macroeconomic framework, the main features of which are described in Appendix 1. This framework is consistent with a broad range of policy and non-policy influences on the economy. Accordingly, our estimated equations for each of the three sectors under consideration include one or more policy-channel variables, such as interest rates, exchange rates, or credit rationing, as well as measures of overall economic activity. At a theoretical level, all these influences are well understood, but there are no unique or even generally accepted empirical proxies for them. In fact, many proxies are plausible for each variable, regardless of the form of estimated equations. In Appendix 2, we discuss various proxies used in the present study.

In what follows, we use two related empirical approaches. First, we estimate total domestic expenditures in the three sectors: residential construction, consumer durable goods, and producers' durable equipment. These estimates allow us to focus on interest rate effects, but they can not be used to examine the demand shift between domestic and foreign goods—the principal influence of exchange rates and openness on domestic economic activity.[4] Total expenditures obscure the exchange rate effect because they include domestic spending on both domestic and

Chart 3

Expenditures on Consumer Durable Goods, Producers' Durable Equipment, and Housing as a Share of GNP, and Nominal and Real Interest Rates*

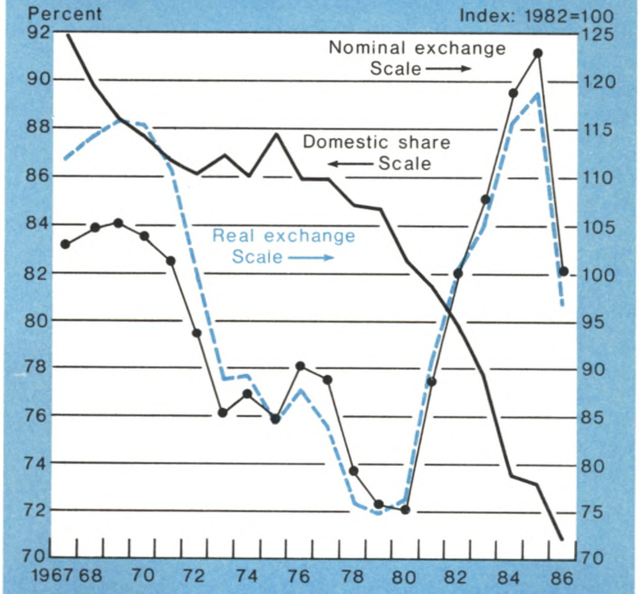


* The nominal interest rate is Moody's AAA corporate bond rate, and the real interest rate is constructed by subtracting the eight-quarter percent change in the implicit GNP deflator.

Sources: U.S. Department of Commerce, National Income and Product Accounts; Moody's Investor Service.

Chart 4

Domestic Share of Expenditures on Durables, and Nominal and Real Exchange Rates*



*The domestic share is the percent of total expenditures on domestically produced consumer durable goods and producers' durable equipment. The exchange rate variables are in units of foreign currency per dollar. Precise definitions are given in Appendix 2.

Sources: U.S. Department of Commerce, National Income and Product Accounts; Federal Reserve Board, Federal Reserve Bulletin, Table A68, various issues.

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[4] Estimates of total domestic expenditures as opposed to expenditures on domestically produced goods are preferable for evaluating the role of interest rates for at least two reasons. First, buyers' (or users') financing cost considerations are independent of the supply source. Second, since domestic output and import components of total domestic demand for all goods are difficult to identify, especially at the sectoral level, estimates of demand for domestic goods are subject to greater measurement errors.

foreign goods and exclude foreign spending on domestically produced goods. We do attempt to test for the offsetting effects of exchange rates which, as noted above, apply to domestic demand for all goods and may offset a part of the principal influence of exchange rates.

The second approach drops the non-trade housing sector and explores the exchange rate influence on the demand shift between domestic and foreign goods in the other two sectors. For this purpose, we consider three different definitions of the dependent variable: domestic demand for home produced goods; domestic demand for foreign goods (i.e., imports); and foreign demand for domestically produced goods (i.e., exports).

Interest Rate Effects

Estimates of total expenditures in each of the three sectors are based on quarterly data, and cover several different specifications and a range of sample periods over 1960-86. Details of these estimates as well as the results for the full sample period and two subperiods are reported in Box 1.

Expenditures in all three sectors show a significant long-run response to interest rate movements over the full sample period, 1960-86 (Table 1). This finding is immune to moderate changes (up to three years) in the investigation period, at the beginning or the end point of the sample. More generally, the estimated equations appear to be quite reliable in terms of both the standard statistical criteria and theoretical considerations about

Table 1

Long-Run Interest Rate Sensitivity*

	Weight†	1960-86	1960-74	1975-86
Consumer Durable Goods	9.59	−1.36‡	−0.85	−1.66‡
Producers' Durable Equipment	8.62	−2.44‡	−1.72	−2.37‡
Residential Construction	4.94	−8.10‡	−9.28‡	−8.72‡
Total§	23.16	−3.20 (−26.6)	−2.97 (−24.7)	−3.43 (−28.5)

*Percent change in private spending in response to a 10 percent change in interest rates (see Appendix 2 and Box 1). The minus sign refers to the direction of change in expenditures.

†Share of total private expenditures in 1985.

‡The underlying elasticity estimates are significant at the 95 percent or higher levels of confidence.

§Average of the three component elasticities, weighted by their shares in 1985 total private expenditures. The numbers in parentheses are changes in billions of 1982 dollars.

Box 1: Regression Estimates for the Expenditure Equations

In the text we have concentrated on the long-run interest elasticities and their policy implications. This box presents details of the empirical models. Specifically, we compare the elasticities of the non-policy variables, present tests for robustness to changes in the sample period or explanatory variables, and report formal tests of structural shift.

The elasticities reported in the text are based on regression models developed with two general criteria in mind. First, they are consistent with the theoretical framework outlined in Appendix 1. In particular, they are part of a Keynesian style "IS" curve, which allows policy variables such as interest and exchange rates to play a direct role in determining real expenditures without an explicit consideration of changes in the price level. Second, considerable specification search was done to ensure "reasonable" estimates. By reasonable we mean: (1) the coefficients are statistically significant and are consistent with economic theory, (2) the equations explain a large amount of the variation in the dependent variable, and (3) the reported results are representative of the broader body of work done.

The expenditure equations for consumer durables (CON), residential structures (HOUSE), and producers' durable equipment (PDE) are of the following form:

$$(1)\ \mathrm{CON} = a_0 + a_1\,\mathrm{INCOME} + a_2\,\mathrm{CHUN} + a_3\,\mathrm{INTER} + a_4\,\mathrm{DUM1} + a_5\,\mathrm{CON(\text{-}1)},$$

$$(2)\ \mathrm{HOUSE} = b_0 + b_1\,\mathrm{INCOME} + b_2\,\mathrm{CHUN} + b_3\,\mathrm{INTER} + b_4\,\mathrm{DUM2} + b_5\,\mathrm{HOUSE(\text{-}1)},$$

$$(3)\ \mathrm{PDE} = c_0 + d_i\,\mathrm{INCOME} + e_i\,\mathrm{INTER} + f_i\,\mathrm{PRICE},$$

where all variables except CHUN are in log form. The variables are defined as follows: INCOME is a measure of total activity relevant to each sector; CHUN is the change in the unemployment rate; INTER measures the interest or cost-of-capital effect; DUM1 and DUM2 are dummy variables which account for, respectively, the credit controls of 1980 and credit rationing in housing; PRICE is the relative price of investment goods; and HOUSE(-1) and CON(-1) are lagged dependent variables. The precise empirical proxies for each of these variables are reported in Appendix 2. In line with previous research, the equations account for adjustment lags in two ways: the housing and consumer durables equations include lagged dependent variables, whereas in the producers' durable equipment equations each explanatory variable enters as a distributed lag.

Table A reports the regression estimates for these equations for the full sample, 1960-I to 1986-II, as well as two sub-samples, 1960-I to 1974-IV and 1975-I to 1986-II. All equations are corrected for serial correlation

Box 1: Regression Estimates for the Expenditure Equations *(continued)*

using the Cochrane-Orcutt procedure.* Since the variables enter in log form, the elasticities can be read directly off the table. In the producers' durables equations, the reported coefficients are the sum of the polynomials, and therefore they should be interpreted as long-run elasticities; in the consumer durables and housing equations the long-run elasticities can be calculated by dividing each coefficient by one minus the coefficient on the lagged dependent variable.

On the whole, the full sample estimates are consistent with previous results reported in the literature. Each equation explains a large portion of the variation in the dependent variable, with adjusted R-squares close to one. This good fit reflects in part the use of lagged dependent variables and long distributed lags. Apparently, spending in these sectors responds slowly to changes in the underlying determinants. Spending in each sector is income-elastic: in the long-run a one percent change in the income variables results in more than a one percent change in spending for each of these cyclically sensitive sectors.† Both credit rationing variables are highly significant. President Carter's credit controls reduced consumer durables purchases by an estimated average of 4 percent in the spring and summer of 1980. Similarly, the immediate effect of credit crunches in the mortgage market in this period was a decline of 5 percent in housing expenditure. The most important result for our purposes, however, is that each equation shows significant and economically large interest rate effects. Not surprisingly, the most interest-sensitive sector in our sample is housing. The lowest interest sensitivity is for consumer durables, but even that sector plays an important role in the monetary transmission mechanism because of its large share in GNP.

When we split the sample in the mid-1970s, the results remain strong for the second half, but become weaker for the first half. The overall fit continues to be good, with high adjusted R-squares and low standard errors. The long-run income effect is larger in the second half for all three sectors. All else equal, this suggests that the income multiplier has increased over time. The interest rate is insignificant in the first half for both consumer durables and producers' durables. For the second half, however, the interest elasticities are large and highly significant for all three sectors.

This impressionistic review of the results suggests that there have been small but economically significant changes in the regression coefficients over time. Formal tests show that some of these changes are also statistically significant. "Chow" tests were used to detect shifts in the overall structure of each model. Although these results are only approximate because of overlapping lags in the models, they provide marginal evidence of a structural shift in the early to mid-1970s for both consumer durables and housing.‡

We also used "dummy variables" to explore the possibility of a shift in the individual coefficients. These tests show only a marginally significant increase in interest sensitivity for consumer durable goods and producers' durable equipment, and no clear pattern for housing. They also show that shifts in interest sensitivity are not the only source of structural change in these sectors. In particular, income elasticity has increased in all three sectors. Comparing samples before and after 1975, there is a significant increase in income elasticity for both consumer durable goods and producers' durable equipment.

Are the results robust? Most important, how sensitive are the interest elasticity estimates to changes in the sample, the choice of interest rate proxy, and the inclusion or exclusion of other variables? The general finding is that the results are not sensitive to changes in the start or end point of the samples, but in some cases they are sensitive to what variables are used. For example, the interest elasticity of producers' durable equipment appears to be quite sensitive to the particular proxy used for the interest rate. Complicated cost-of-capital variables, such as the proxy used in the MPS model, did not yield significant results, and measures of the real interest rate were only significant if inflation expectations were modeled as a long distributed lag. Similar considerations apply for consumer durables.

One final note: in addition to testing for interest rate effects we explored the role of exchange rates in our expenditure equations. Exchange rates may affect total expenditures through several indirect channels. Theoretical models suggest that most of these effects are small and ambiguous. It is not surprising, therefore, that our empirical tests of the exchange rate effect yielded insignificant coefficients with changing signs. As Box 2 shows, however, the exchange rate does have consistently strong effects through its more traditional channel—substitution in demand between domestic and foreign goods.

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*When the equation includes a lagged dependent variable, more complicated correction procedures are needed to ensure consistent parameter estimates. This is not a serious problem for our estimates, however, because the serial correlation is relatively small for all of our equations.

†In housing the long-run income elasticity is less than one, but the overall sensitivity to the business cycle is quite high, as reflected in the coefficient on CHUN.

‡As an added check, we examined each model for structural shift using the cusum squares methodology. This approach looks for structural change by estimating the model recursively over the sample to see if successive one-quarter ahead forecast errors "pile up" over time. These tests show no evidence of structural shift for housing and consumer durables, but some evidence of a shift for producers' durables in the early 1980s.

Box 1: Regression Estimates for the Expenditure Equations *(continued)*

Table A

Regression Results for the Expenditure Equations*

	Consumer Durables			Housing			Producers' Durable Equipment†		
	1960-86	1960-74	1975-86	1960-86	1960-74	1975-86	1960-86	1960-74	1975-86
Constant	−1.49	−1.28	−2.32	0.33	0.17	−0.56	−9.14	−7.88	−8.30
	(6.7)	(3.4)	(5.4)	(2.0)	(0.5)	(1.4)	(17.21)	(6.1)	(6.3)
Income	0.37	0.32	0.53	0.16	0.29	0.28	1.92	1.74	1.81
	(6.7)	(3.3)	(6.2)	(6.5)	(4.2)	(4.3)	(23.6)	(9.0)	(10.2)
Interest	−0.03	−0.02	−0.05	−0.20	−0.34	−0.21	−0.24	−0.17	−0.24
	(4.0)	(1.1)	(5.2)	(4.5)	(2.8)	(4.6)	(4.8)	(1.5)	(4.6)
Lagged Dependent	0.77	0.80	0.70	0.76	0.64	0.76	—	—	—
	(21.0)	(11.6)	(15.9)	(22.6)	(7.9)	(26.4)			
Chunemp	−0.05	−0.07	−0.04	−0.06	−0.05	−0.08	—	—	—
	(8.1)	(6.5)	(5.8)	(4.1)	(2.3)	(5.3)			
Other‡	−0.03	—	−0.04	−0.05	−0.06	−0.04	0.41	0.88	0.32
	(2.2)		(3.2)	(4.0)	(3.5)	(2.5)	(2.4)	(1.8)	(1.8)
Long-run Interest Elasticity§	−0.136	−0.085	−0.166	−0.810	−0.928	−0.872	−0.244	−0.172	−0.237
$\bar{R}^2$	.998	.995	.990	.962	.931	.978	.987	.973	.980
SEE	.025	.025	.022	.040	.038	.036	.018	.017	.019
Rho	−.346	−.260	−.491	.078	.211	−.314	.585	.645	.209

*All equations are estimated with Cochrane-Orcutt correction for first-order serial correlation. All variables except Chunemp, and "Other" enter in log form. See Appendix 2 for definitions of variables.

†The reported results are the sum of the lagged coefficients.

‡"Other" is a dummy for credit controls in 1980 for consumer durables, a dummy for credit rationing in housing, and the ratio of output price to capital price in the producers' durables equation.

§For consumer durables and housing this is calculated by dividing the short-run interest elasticity by one minus the coefficient on the lagged dependent variable.

the role of the main explanatory variables. Interest rate effects are particularly large in the housing sector, indicating that a 10 percent decrease (increase) in the mortgage rate—e.g., from 10 to 9 percent—would gradually lead to about an 8 percent rise (decline) in expenditures on residential construction. The interest sensitivity of expenditures in the other two sectors is also substantial but well below that for the housing sector. Together, the results for the three sectors imply that a 10 percent decline in the general level of interest rates would augment expenditures in the long run by 3.2 percent, or about $27 billion in 1982 prices, using 1985 as the base.[5]

For all three sectors, the short-run interest rate effects are substantially smaller, but they are also less certain and more difficult to quantify precisely. We have, therefore, made no systematic attempt to explore interest rate effects for the short run or for any period less than the "long run."

The estimates for the more recent sample period, 1975-86, are broadly similar to the full period estimates. In particular, the long-run interest rate effects remain significant in all three sectors. For the first part of the sample period, however, interest rates are statistically significant for the residential construction sector but not for the other two sectors.

A comparison of the subperiod results suggests that the interest sensitivity of expenditures on consumer durables and producers' durable equipment may have risen over time. The estimates for various cut off points in the 1970s confirm this impression. While the estimated effects over the subperiods are somewhat sensitive to moderate changes in the sample size, they do suggest that the interest sensitivity of the two sectors has been greater over the last 10-15 years than in the 1960s.

The housing sector results, by contrast, do not reveal a trend in the interest sensitivity, which has remained strong throughout the period. The subperiod estimates for the housing sector are more sensitive to changes in the sample size than those for the other two sectors: the coefficients of the explanatory variables and their significance vary considerably for small changes in the sample period. This problem may reflect, in part, uneven changes in the importance of various components of capital costs and credit rationing, and their interaction with one another as well as with the activity variables.

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[5] These and other estimates discussed here refer only to the direct effect of interest rates; in fact, however, there are multiplier or feedback effects as demand and income in each sector respond to initial growth in the other sectors.

Formal statistical tests to examine the significance of any shift in interest sensitivity are broadly in line with our impressions based on results for various subperiods (Box 1). They indicate a small but significant upward shift during the 1973-76 period for the consumer durables and the producers' durable equipment sectors but not for the housing sector. Of course, even without a shift in the interest elasticity, the *whole* structure underlying our estimates may have shifted over time. Statistical tests to explore this possibility are inconclusive: they suggest a shift in the housing and consumer durables sectors but not in the producers' durable equipment sector.

The expenditure equations also give some insight into the changing role of credit rationing. We test for two kinds of credit rationing. First, we find that the credit controls imposed by President Carter in 1980 directly reduced spending on consumer durables by about 3 or 4 percent. Second, and more important, as we argued earlier, periods of tight monetary policy were often associated with restrictions in the quantity of credit available to the housing and small business sectors.[6] Our estimates show that credit crunches in the housing sector directly reduce spending by about 5 percent on average for the sample period as a whole. The results from dividing the sample confirm the view that credit rationing plays a smaller role in recent years.

To sum up, there is significant evidence that the interest sensitivity of spending on consumer durables and producers' durable equipment has risen since the mid-1970s. The evidence for the housing sector is ambiguous: it suggests a shift in the overall structure but not in the interest sensitivity of expenditures. The average interest elasticity for the three sectors appears to have risen over time, as the impact of credit rationing has declined. More generally, in all three sectors, the long-run influence of interest rates on private spending developments has been important, at least since the mid-1970s.

Exchange Rate Effects

Estimates of total expenditures for the producers' durable equipment and consumer durables sectors, as noted earlier, do not allow us to examine the substitution between foreign and domestic goods resulting from changes in exchange rates. In this section, we explore this "substitution effect" in two ways: first, we test how exchange rates affect the division of expenditures between imports and domestically produced goods; and second, we estimate the effect of exchange rates on exports. Measures of relative prices and trade-weighted exchange rates were tried as proxies for the exchange rate variable. In our primary estimates, the exchange rate influence appears through relative prices—the ratio of import prices to prices of competing domestic goods and the ratio of export prices to prices of competing foreign goods, all expressed in dollars.

Because of data limitations and our desire to focus on a period with significant exchange rate movements, the estimates in this section cover only the period from around 1970 to the present. We are therefore unable to examine possible shifts in the external sector influence on the economy during the early or mid-1970s.

The equations for domestic demand for home produced goods—constructed by subtracting imports from total domestic expenditures for each sector—are similar to the expenditure equations, with the addition of exchange rate variables. Details of the estimates along with four representative equations are reported in Box 2. The results are broadly consistent with our earlier findings for total expenditures: spending in both sectors is sensitive to economic activity and interest rate variables. In addition, demand in both sectors also appears to be quite sensitive to changes in exchange rates. However, these results are considerably less robust than our estimates of total expenditures. The interest and exchange rate variables are not consistently significant, and in most cases are sensitive to small changes in the sample period. As noted above, the interest and exchange rate effects are difficult to separate empirically presumably because the two variables tend to move together over time. More fundamentally, the relative weakness of these estimates may be due to the difficulties of measuring and identifying domestic demand for home production and its explanatory variables.

Given the mixed results for expenditures on domestic output, it is useful to estimate import demand *directly*, and thereby infer spending on domestically produced goods. In addition, to round out our results, we estimate the exchange rate effect on the demand for exports.

Import and export demand equations for consumer durables and producers' durable equipment were estimated for a number of overlapping sample periods from 1970 to 1986. Details of the equations as well as estimates for two sample periods, 1971-86 and 1975-86, are reported in Box 2. Judged in terms of the standard statistical criteria, these estimates appear to be reliable,

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[6] We limit our empirical tests to the housing sector because it is difficult to separate small business investment from large business investment. This limitation is not likely to have serious consequences for our results for two reasons: (1) the results for housing should be indicative of broader credit rationing effects, and (2) in equations that exclude measures of credit rationing, its effect should be at least partially captured by the interest rate variable.

Box 2: Regression Estimates for the Tradeable Goods Sectors

In this box we present the details of our empirical estimates for the external sector, as well as additional evidence on the robustness of our results. Exchange rate effects are estimated for two sectors—consumer durable goods and producers' durable equipment—using three different dependent variables—domestic goods demand, imports, and exports. To give an idea of how sensitive the results are to changes in sample period, estimates for both the 1971-86 and 1975-86 periods are reported.

The domestic goods demand equations are shown in Table B. The results are somewhat weaker than the expenditure equations, but they provide us some insight into the role of exchange rates. The overall fit is not as good but there is less serial correlation. The interest rate effect remains strong and significant in the consumer durables equation, but becomes smaller and insignificant in the producers' durables equation. Finally, the exchange rate effects are economically large in both equations, but only marginally significant in the consumer durables equation.

These mixed results are probably due to two problems with the data. First, domestic demand is measured with error because the trade and expenditure data classify final demand in different ways. Furthermore, our measure of domestic final products includes an unknown quantity of imported materials and supplies. These measurement errors bias our exchange rate elasticities toward zero. The second problem is that interest and exchange rates are closely related both behaviorally and statistically. This multicolinearity may explain the low t values for some of our interest and exchange rate elasticity estimates.

Table B

Regression Estimates for Demand for Domestic Goods*

	Consumer Durables		Producers' Durable Equipment†	
	1971-86	1975-86	1971-86	1975-86
Constant	−0.58 (1.4)	−0.69 (1.7)	−9.82 (9.8)	−9.76 (3.6)
Income	0.33 (4.5)	0.38 (4.6)	1.68 (15.8)	1.66 (6.6)
Interest	−0.05 (4.3)	−0.06 (3.7)	−0.12 (1.7)	−0.09 (0.9)
Relprice	−0.10 (2.3)	−0.15 (1.7)	−0.46 (5.8)	−0.46 (2.4)
Chunemp	−0.04 (4.5)	−0.04 (3.6)	—	—
Lagged Dependent	0.65 (11.1)	0.61 (9.2)	—	—
Credit	−0.05 (2.5)	−0.06 (3.0)	—	—
Summary Statistics				
$\bar{R}^2$	.976	.957	.969	.942
SEE	.032	.030	.023	.026
Rho	−.428	−.478	.083	.058

*All equations are estimated with Cochrane-Orcutt correction for first-order serial correlation. All variables except Chunemp enter in log form. See Appendix 2 for definitions of variables.

†The reported results are the sum of the lagged coefficients.

By directly estimating import equations we can avoid the problem of measurement error. The import and export equations are of the following form:

$$(1)\ \text{TRADE} = a + b_i\ \text{INCOME} + c_i\ \text{RELPRICE} + d\ \text{OTHER},$$

where all variables except the change in unemployment are in log form and both INCOME and RELPRICE enter as long polynomial lags. TRADE is the constant dollar value of imports and exports for both consumer durable goods and producers' durable equipment. INCOME is a measure of overall economic activity: in the import equations it measures domestic activity, and in the export equations it is a weighted average of foreign income. RELPRICE is a sector-specific measure of the relative price of foreign versus domestic goods. OTHER is the change in unemployment in the consumer durable imports equation and a dock strike dummy in the producers' durables import equation. More precise definitions of the empirical proxies are given in Appendix 2.

Table C reports the estimates for both imports and exports.* The reported coefficients are the sums of the lagged coefficients and should be interpreted as long-run elasticities. All the equations have good overall fit and reasonable autocorrelation estimates. The income and exchange rate elasticities are in line with previous work. Note in particular the high income elasticity for both import equations.

We also tested the robustness of our results to changes in sample period and to different proxies for the exchange rate effect. Varying the sample starting point from 1971 to 1975 and the end point from 1983 to 1986 confirms that the reported elasticities are representative, but it also shows that the parameters are unstable. Using the real exchange rate—the exchange rate adjusted for inflation differentials—yields similar results. As expected, the real exchange rate elasticities are generally lower than the relative price elasticities. The real exchange rate elasticities are also more variable, reflecting the instability of the relationship between real exchange rates and relative prices.

*Consumer durables exports excludes auto exports to Canada. Auto trade with Canada is determined more by trade agreements and marketing considerations than by macrovariables such as income and exchange rates. When we included Canadian autos in our export data, the overall fit deteriorated and the income variable became insignificant.

Box 2: Regression Estimates for the Tradeable Goods Sectors *(continued)*

Table C

Regression Estimates for Imports and Exports*

	Imports				Exports			
	Consumer Durables		Producers' Durable Equipment		Consumer Durables		Producers' Durable Equipment	
	1971-86	1975-86	1971-86	1975-86	1971-86	1975-86	1971-86	1975-86
Constant	−31.66	−27.27	−28.74	−30.18	8.43	−4.68	−1.29	−3.68
	(14.4)	(19.9)	(7.4)	(8.9)	(11.1)	(3.6)	(1.4)	(2.9)
Income	4.64	4.06	4.83	5.03	1.94	1.21	1.85	2.37
	(16.3)	(22.7)	(12.8)	(16.1)	(13.3)	(4.9)	(12.6)	(9.2)
Relprice	−1.55	−1.00	−1.22	−1.27	−1.61	−1.42	−0.94	−1.00
	(8.0)	(4.7)	(4.6)	(5.6)	(17.3)	(13.2)	(7.1)	(6.5)
Other†	−0.07	−0.06	−1.17	−0.70	—	—	—	—
	(4.2)	(2.8)	(5.1)	(0.9)				
Summary Statistics								
$\bar{R}^2$	.894	.971	.930	.987	.871	.898	.813	.702
SEE	.039	.038	.045	.038	.074	.059	.034	.027
Rho	.679	.282	.766	.433	.173	−.074	.699	.750

*All equations are estimated with Cochrane-Orcutt correction for first-order serial correlation. The reported coefficients are the sum of the lagged coefficients. Each variable, except "Other," enters in log form. See Appendix 2 for definition of variables.

†"Other" is the change in unemployment in the consumer durables equation and a dock strike dummy in the producers' durables equation.

although the explanatory power of some variables is moderately sensitive to changes in the sample period.

The relative price variables are highly significant in all import and export equations (Table 2). The price elasticity estimates for imports are roughly similar in the two sectors. They imply that a 10 percent increase in the relative price of imports will gradually reduce imports of consumer and producers' durables by about $22 billion in 1982 prices, using 1985 as the base. On the export side, the price elasticity is considerably larger for consumer durables than for producers' durable equipment, but both estimates are substantial. These results imply that a 10 percent increase in relative export prices will eventually lower the combined exports of the two sectors by about $10 billion in 1982 prices, using the 1985 base level. As with the interest rate effects, the short-run influence of changes in relative prices and exchange rates is much smaller, quite uncertain, and difficult to quantify.

The relative price variables take into account not only price changes due to nominal exchange rate changes but also price changes unrelated to exchange rate movements. To estimate the influence of exchange rates on imports and exports, it is necessary to determine the extent to which exchange rate changes affect import and export prices as well as prices of competing domestic and foreign goods.

No significant evidence about exchange rate effects on prices exists at a level comparable to disaggregate categories in this article. Recent studies at a much higher level of aggregation suggest, however, that in the long run exchange rate changes lead to large but usually less than equal percentage changes in import and export prices. Moreover, studies also indicate a considerable influence of exchange rate changes on domestic prices here and abroad. Using certain plausible assumptions based on these studies, Table 2 provides the likely effects of exchange rate changes on imports and exports of the two sectors under consideration. Since the same assumptions are used for both sectors, the estimated exchange rate effects preserve the underlying relative pattern of the price elasticities reported in the table.[7]

The estimated exchange rate effects on imports and exports, though smaller than the relative price effects, are substantial. On the import side, combining the two sectors, a 10 percent decline in the trade-weighted nominal exchange value of the dollar is estimated to reduce the volume of imports by 7-8 percent in the long run. Using the 1985 base level, this implies a reduction of about $13 billion in 1982 prices. On the export side, the long-run exchange rate effect is considerably smaller than for imports but it is statistically and economically significant.

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[7] For a review of the evidence on exchange rate effects on prices, see M. Goldstein and M.S. Khan, "Income and Price Effects in Foreign Trade" in *Handbook of International Economics*, edited by P.B. Kenen and R.W. Jones (Amsterdam: North-Holland, 1983). Incidentally, note that only in the extremely unlikely case where exchange rate changes have equal percentage effects on import prices but no significant effect on export prices and on prices of competing goods would the exchange rate elasticity be the same as the price elasticity. Also note that the sign for the exchange rate effect is positive for imports, the opposite of that for the relative import price effect, since changes in import prices are inversely related to changes in the dollar exchange rate.

Due to considerable uncertainty about exchange rate effects on prices of imports, exports, and domestic goods, these results should be viewed not as precise estimates, but as evidence of strong exchange rate influence on U.S. international trade in consumer and capital goods. Some caution in interpreting exchange rate results is also suggested by the fact that the magnitude of the underlying price elasticities is somewhat sensitive to moderate changes in the sample, although those elasticities remain substantial and important regardless of the estimation period.

Table 2

Long-Run Relative Price and Exchange Rate Effects*

	Imports		Exports	
	Percent	$ 1982 (billions)	Percent	$ 1982 (billions)
Consumer Durable Goods				
Price Effect†	−12.75	$−12.63	−15.15	$−1.83
Exchange Rate Effect‡	+7.64	+7.57	−6.06	−0.73
Producers' Durable Equipment				
Price Effect†	−12.45	−9.49	−9.70	−8.02
Exchange Rate Effect‡	+7.47	+5.69	−3.88	−3.19
Total§				
Price Effect	−12.61	−22.12	−10.40	−9.80
Exchange Rate Effect†	+7.57	+13.26	−4.16	−3.92

*Change in imports or exports in response to a 10 percent change in the relative price variable or in the trade-weighted nominal exchange rate. The real or 1982 dollar figures use the 1985 average for each series as the base. The signs refer to the direction of changes in imports and exports.

†The price elasticities are the average of two estimates reported in Box 2. All estimates are statistically significant at the 99 percent level.

‡For a 10 percent decline in the trade-weighted nominal dollar exchange rate, we assume the following effects on various prices (all expressed in dollars): 7.5 percent for import prices; 4.0 percent for export prices; and 1.5 percent for domestic prices. In addition, prices abroad are assumed to decline by 2.0 percent in foreign currency terms. These assumptions imply that relative import prices will change by 6.0 percent and relative export prices by −4.0 percent. Of course, all signs would be reversed for appreciation of the dollar.

§The elasticity estimates represent the average of the two component elasticities, weighted by their share in 1985 total private expenditures. The dollar figures are the sum of changes for the two components.

Further Analysis and Conclusions

Our empirical work indicates substantial long-run interest rate effects on spending in all three sectors. These effects are particularly large for the housing sector. We also find evidence of strong long-run exchange rate effects on consumer durables and producers' durable equipment.

To get an impression of the quantitative importance of interest and exchange rates, consider the effect of simultaneous changes in the two variables on domestic output. A 10 percent increase in both interest rates and the trade-weighted exchange value of the dollar would eventually lead to nearly a 6 percent drop in the combined output of the three sectors (Table 3). This is equivalent to nearly 1 1/3 percent of GNP and 1 2/3 percent of total private expenditures. As noted elsewhere in this article, this is only the direct effect; the actual long-run GNP outcome would also include multiplier or indirect effects.

Our work also provides some evidence of a rise in the interest sensitivity of spending in the early or mid-1970s.

Table 3

Long-Run Interest and Exchange Rate Effects on Domestic Output*

	Total†		Contribution of‡	
	Percent	$ 1982 (billions)	Interest Rate	Exchange Rate
Consumer Durable Goods	−4.8	−12.4	32.8	67.2 (91.2)
Producers' Durable Equipment	−4.6	−14.4	38.3	61.7 (58.4)
Residential Construction	−8.7	−15.4	100.0	0
Total	−5.6	−42.2	59.3	34.8 (87.1)

*Based on the interest rate elasticities for the sample period 1975-86 in Table 1 and the exchange rate elasticities in Table 2.

†Change in domestic output (i.e., expenditures minus imports plus exports) in response to a simultaneous 10 percent change in interest and exchange rates, using 1985 as the base year. The sign refers to the direction of change in domestic output. Note that the table assumes no net change in inventories over the sample period.

‡Percent of total contribution. The numbers in parentheses refer to the portion of the exchange rate effect due to imports.

The upward shift appears to be significant in the consumer durable and producers' durable equipment sectors. On the exchange rate side, data limitations prevent us from exploring the possibility of a shift in the exchange rate sensitivity. But the relevant price and exchange rate elasticities are likely to have been greater since the mid-1970s than in the earlier period, as suggested by empirical analyses at the aggregate level. Even without any change in the underlying elasticities, the exchange rate effects on domestic economic activity may have risen over time, because of larger exchange rate movements and the increased scale of international financial and non-financial transactions of the U.S. economy.

These findings suggest that monetary policy continues to have powerful long-run effects on the economy. The declining impact of credit rationing seems to have been offset by the increasing sensitivity to interest rates and the greater role of exchange rates. On balance, the long-run link between monetary policy variables and output appears to be stronger today than in the past. But such a conclusion would tend to overreach our results for at least three reasons: first, our empirical analysis does not cover all sectors of the economy; second, our analysis of credit rationing effects, with focus only on the most important of those effects, is not comprehensive and may understate the role of credit rationing in the 1960s and the 1970s; and third, given that the financial and economic environment has continued to undergo significant changes in recent years, uncertainty about our results may be greater than would normally be the case in such estimates.[8]

The strong long-run link between financial variables and economic activity by itself suggests but does not necessarily imply efficacious monetary policy. For policy actions to be effective, the relationship between policy instruments and financial variables must also be reliable and sufficiently predictable. This aspect of the transmission mechanism, as noted in the introduction, is beyond the scope of our investigation. It should be emphasized, however, that policy implications of our findings are best appreciated by keeping in mind that recent changes in the financial system are widely believed to have made the link between policy instruments and financial variables less reliable than before. Many economists have argued, for example, that the increased role of market forces and international financial integration have weakened the ability of monetary policy to exert a significant and predictable influence on interest and exchange rates.

The implications of the results in this study are considerably less favorable for monetary policy over the short- to medium-term. The channels of policy influence are complex and operate with long and variable lags. The increased importance of exchange rates and the external sector has added further complexity and uncertainty to the workings of the policy channels. Our results suggest that the extent and timing of the lagged interest and exchange rate effects are uncertain, making it difficult to assess the short- to medium-term influence of monetary policy on economic activity.

These unfavorable implications aside, our main findings are encouraging for the role of monetary policy. In particular, the breakdown of credit rationing mechanisms seems not to have weakened the long-run monetary policy influence on the economy. To be sure, because of uncertain lags, interest rate effects on economic activity do not appear as quickly as credit rationing effects. Over a longer period, however, the average increase in interest rates needed to restrain demand is unlikely to be higher than in the past.

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Ethan S. Harris

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[8] Standard econometric techniques are not satisfactory for estimating relationships in the face of on-going structural changes or for detecting *uneven* effects of those changes.

Appendix 1: The Theoretical Framework

The analysis in the text is based on the open economy framework developed by Mundell and Fleming. Before presenting the model, however, it is useful to review some of the basic accounting of open economy macro. GNP is equal to expenditure (aggregate spending by domestic residents), minus the portion of expenditure devoted to imports, plus exports (purchases of home goods by foreign residents):

(1) $Y = E - M + X$.

In addition it is useful to consider spending on domestic goods by domestic residents:

(2) $DD = E - M$.

Combining (1) and (2) we see that GNP is the sum of demand for home goods by residents and by foreigners:

(3) $Y = DD + X$.

The Mundell-Fleming model divides the economy into three markets, represented graphically by an IS, LM, and BOP curve.[1] These are shown in the graph below. The IS curve plots points at which the goods market is in equilibrium. In algebraic terms, it sets output equal to the sum of private expenditure, government spending, and net exports:

(4) $y = E(\overset{+}{y},\overset{-}{r},\overset{+}{C}) + G + X(\overset{+}{y^f},\overset{+}{e}) - M(\overset{+}{y},\overset{-}{e})$,

where r is the nominal interest rate, C is a measure of credit availability, G is government spending, y^f is foreign income, and e is the exchange rate (in dollars per unit of foreign currency, so that an increase in the exchange rate means a depreciation of the dollar). The signs of the partial derivatives are shown above each right-hand variable. The IS curve slopes downward because lower interest rates encourage higher spending in the interest sensitive sectors of the goods market and this tends to increase income. The IS curve shifts up and to the right when government spending increases, when the exchange value of the dollar falls, and when credit constraints are relaxed.

The LM curve plots points of equilibrium in the money market:

(5) $M/P = L(\overset{+}{y},\overset{-}{r})$,

where M is the nominal money stock and P is the price level. The LM curve slopes up and to the right: higher income increases money demand and higher interest rates reduce money demand, so income and interest rates must move together to maintain money demand equal to a fixed money supply. Increases in the money stock shift the LM curve down and to the right.

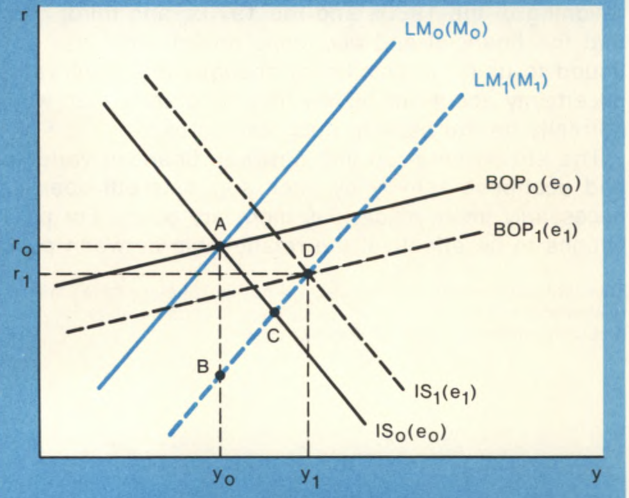
The Balance of Payments curve (BOP) traces points at which there is no net flow of foreign exchange out of the United States. The Mundell-Fleming model assumes perfect capital mobility; here we generalize the framework by assuming that capital is partially mobile between countries. This means that increases in U.S. interest rates will cause some increase in capital flows into the United States. Algebraically,

(6) $0 = K(\overset{+}{r}) + X(\overset{+}{y^f},\overset{+}{e}) - M(\overset{+}{y},\overset{-}{e})$,

where K is net capital inflows. The BOP curve slopes upward because with a given exchange rate higher incomes stimulate imports, worsening the balance of payments, while higher interest rates cause capital inflows, improving our balance of payments. The BOP curve shifts down and to the right if the exchange value of the dollar declines or if foreign incomes rise.

With this model it is simple to show the macroeconomic effects of monetary policy (see graph). An increase in the money supply shifts the LM curve down

Monetary Policy in an Open Economy Under Flexible Exchange Rates



Note: Initial equilibrium is $A(r_0,y_0,e_0)$. The increase in the money supply shifts $LM_0(M_0)$ to $LM_1(M_1)$ causing interest rates to fall towards B. Lower interest rates stimulate spending, pushing income toward C. This causes the exchange rate to increase, shifting $IS_0(e_0)$ to $IS_1(e_1)$ and $BOP_0(e_0)$ to $BOP_1(e_1)$. Final equilibrium is at $D(r_1,y_1,e_1)$.

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[1] Several heroic assumptions are made to keep the exposition simple. For example, we assume static expectations and fixed prices and we do not fully take into account stock and flow distinctions.

Appendix 1: The Theoretical Framework *(continued)*

and to the right. This stimulates expenditure in the interest-sensitive sectors of the economy, causing income to rise. In addition, the increase in the money supply may help relax credit restraints, shifting the IS curve up and to the right. With lower interest rates and higher income, however, there is upward pressure on the exchange rate, causing both the IS curve and the BOP curve to shift to the right. At the final equilibrium, income is higher for several reasons: (1) lower interest rates have encouraged spending in interest-sensitive sectors, (2) the weaker dollar has caused demand to shift away from foreign goods in favor of home goods, and (3) with greater liquidity in the economy there may be less rationing of credit to the housing and small business sectors.

Relaxing some of the strict assumptions of the model complicates the exposition and may alter some of the conclusions. For example, if the domestic price level is allowed to change in response to an increase in the money supply, this will reduce the real money supply, offsetting some of the short-run increase in GNP. Indeed, if the economy is near full employment, prices may rise one-for-one with the money supply, completely offsetting the stimulative effect of the monetary expansion. As a further example, if traders anticipate a loosening of monetary policy the exchange rate may overshoot, initially jumping above its new long-run level. These short-run adjustments can have long-run implications because they have long-lasting effects on the stock of foreign assets.

Using this framework we can also explore the impacts of financial innovation and the increased openness of the economy on policy effectiveness. Financial innovation may have reduced the role of credit rationing in transmitting monetary policy to the economy. This means a smaller sympathetic shift in the IS curve in response to stimulative monetary policy. If spending is also relatively insensitive to interest rates, so that there is a steep IS curve, then monetary policy has lost its effectiveness. On the other hand, our results suggest that financial innovation and other structural changes in the economy have increased the interest sensitivity of aggregate demand, flattening the IS curve and enhancing policy effectiveness.

The opening up of the economy may have increased the power of monetary policy. As we pointed out earlier, under flexible exchange rates the balance of payments curve shifts to the right when monetary policy eases. This shift will be larger if imports and exports are more sensitive to exchange rates. Greater capital mobility may also increase the effect of a change in the money supply by flattening the BOP curve. It is worth reiterating, however, that the increased openness of the U.S. economy has probably increased the unpredictability, as well as the magnitude, of policy effects. That is, although the slopes of the various curves may now be more favorable to policy makers, the curves may also have become more unstable.

Appendix 2: Empirical Proxies

This appendix provides detailed descriptions of the variables used in this study. The explanatory variables can be divided into four general categories: aggregate activity, interest rates, exchange rates and trade prices, and dummy variables. Most of the data comes from either the National Income and Product Accounts (NIPA) or the Federal Reserve Board's MPS model of the United States Economy (MPS).[1]

Dependent variables

With one important exception, the dependent variables are taken directly from the NIPA (Tables 1.2 and 4.4). The exception is exports of consumer durable goods, which includes autos. Because of the special nature of auto trade with Canada, however, we decided to net-out Canadian autos. This, in turn, required constructing quarterly Canadian auto data from annual data for the period before 1977. Most of the other series are available back to the late 1940s, but the disaggregated trade data does not start until 1967.

Activity variables

Each expenditure equation includes measures of general activity that are in some way specific to the individual sectors. The producers' durable equipment expenditure equations capture "accelerator" or activity effects using real gross private domestic business product (NIPA). Both consumer durables and housing include a measure of permanent income: real disposable income, averaged over eight quarters (NIPA). They also include the effect of temporary liquidity constraints on spending, measured by the change in the unemployment rate. (See Bureau of Labor Statistics, *The Employment Situation—Household Survey*, various issues.)

In the tradeable goods equations, somewhat more elaborate income variables are used. The import and domestic goods demand equations use the same activity variables as the expenditure equations, except consumer durable imports uses current real disposable income

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[1] The National Income and Product Accounts are published by the U.S. Department of Commerce in the *Survey of Current Business*; the MPS model is described in an unpublished manuscript, Flint Brayton and Eileen Mauskopf, *The MPS Model of the United States Economy* (February, 1985).

Appendix 2: Empirical Proxies *(continued)*

rather than permanent disposable income. Both export equations use the Federal Reserve Board's weighted average of foreign GNP (MPS).

Interest rates

In theoretical models, interest rate effects often appear through complicated cost-of-capital variables. These variables serve as proxies for the price of a unit of services from a durable good, taking into account physical depreciation, taxes and relative prices, as well as the financial (or interest) cost of investment. For each sector, we experimented with several cost-of-capital variables, but in many cases the best fit resulted from the simplest measure—a nominal interest rate.

The consumer durable goods and producers' durable equipment equations use the six-month commercial paper rate and Moody's AAA corporate bond rate, respectively. The commercial paper rate is a proxy for the short-term borrowing cost of households, and the bond rate captures the long-run financing cost of business investment. Cost-of-capital effects are also captured in the producers' durables equation by including the ratio of the price of output to the price of new capital (FMP). The commercial paper rate is from Board of Governors of the Federal Reserve System, *Federal Reserve Bulletin*; the corporate bond rate is from Moody's Investor Service.

In contrast to these simple measures, the housing equations use a complicated measure which is a weighted average of the cost-of-capital for owner-occupied and rental housing. These cost-of-capital variables take the general form:

$$(1)\ \text{Cost} = (P^h/P) \cdot [d + i \cdot (1\text{-}t) - \dot{P}^h] \cdot \text{TAX},$$

where P^h/P is the price of housing relative to a general consumer price index, d is the rate of physical depreciation, i is the effective interest rate on fixed rate mortgages, $\dot{P}^h$ is distributed lag on past housing inflation, t is the marginal income tax rate, and TAX is an amalgam of other tax effects. This measure is adopted from the MPS model.

Exchange rates and trade prices

Exchange rates affect output primarily by altering the relative price of domestic versus foreign goods. In the regressions reported in the text, these relative price variables are constructed from implicit deflators (NIPA). For the import and domestic goods demand equations,

$$(1)\ \text{Relprice1} = \frac{\text{M/M82}}{\text{(E-M)/(E82-M82)}},$$

where M is imports, E is expenditure, and the suffix "82" designates a constant dollar figure. The relative price variable is similar in the export equation, except that a general price index is used to represent the price of the foreign country's home goods:

$$(2)\ \text{Relprice2} = \frac{(\text{X/X82}) \cdot e}{\text{FCPI}},$$

where X is nominal exports, X82 is real exports, and e and FCPI are the Federal Reserve Board's measure of the effective exchange rate and foreign consumer prices (where each variable is weighted by the volume of multilateral trade for our principal trading partners).

Dummy variables

We used three different dummy variables. In the consumer durables equations, the dummy variable accounts for President Carter's restrictions on credit cards. It has a value of one in the second and third quarters of 1980, and zero otherwise. The housing dummy takes a value of one in periods when deposits declined at savings and loan institutions (MPS). These credit rationing episodes occurred in the following periods: 1966-III to 1966-IV, 1969-III to 1970-III, 1973-IV to 1975-I, 1979-IV to 1980-III, and 1981-I to 1982-II. The third dummy captures the effect of dock strikes on imports (MPS). It takes non-zero values in 1962-65, 1968-69, and 1977-78.

Inflation in the Service Sector

Inflation rates for services have exceeded those for goods in every year since 1949, except during periods of large oil price increases. From 1949 to 1981, the GNP deflator for expenditures on services rose at an average annual rate of 4.8 percent compared with 3.7 percent for goods. Since 1982, the gap between the two indexes has widened to 3.5 percent, with services rising at an average of 5.5 percent and goods at 2.0 percent.

These figures suggest that the recent decline in inflation rates is not necessarily the result of inflation having been "wrung out" of the system by the protracted recession of the 1980s. Instead, the burden of the decline has been borne disproportionately by the manufacturing sector, where the recession, the increase in foreign competition resulting from the dollar's appreciation, and the conditions of oversupply in raw materials markets have been responsible for unprecedented slackness in prices in recent years. In contrast, the recent behavior of service inflation suggests that, absent the unusual circumstances in manufacturing, the economy would again be prone to high inflation rates. Thus, the future course of inflation depends critically on the behavior of inflation in services.

Several explanations have been advanced for high inflation rates in services. One is that service price indexes are constructed in ways that systematically overstate price increases by accounting inadequately for improvements in the quality of the services delivered. Accounting for changes in the quality of services is held to be fraught with practical difficulties. Unlike durable and nondurable goods, little tangible is left to examine for quality changes once a service has been rendered. In general, quality improvements cause increases not only in the costs of products, but also in benefit to consumers. Correctly constructed output and price measures would treat these increased benefits as equivalent to increases in the quantity of the product, not in its price.

A second type of explanation regards the existing data as accurate and seeks to explain them on economic grounds. One such approach notes that, unlike manufacturing, the personal element in the provision of many services limits the scope for improvements in labor productivity. In manufacturing, the faster growth of labor productivity affords more room to grant wage increases without passing them on to prices. In order to maintain its labor force, the service sector must match the wage increases in manufacturing. However, there is no offsetting productivity improvement for services, whose prices must then rise in order to maintain profit margins. Thus, labor productivity growth differentials can cause prices in the two sectors to diverge.[1]

Another approach focuses instead on the fast growth of the nondistributive services sector[2] in recent years.

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[1] See William J. Baumol, "The Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis," *American Economic Review*, 57 (1967), pages 415-426.

[2] This sector is defined here as comprising Finance, Insurance, and Real Estate, and the Services sector proper. In the sequel, it will be referred to as "services" for brevity's sake, unless ambiguity arises.

After remaining roughly constant during the 1950s and 1960s, the share of nondistributive services in real output grew to 35 percent by the 1980s (Table 1). This rapid expansion has maintained upward pressure on both wages and prices in the sector, a situation exacerbated by its disproportionate and increasing reliance on female labor.

These three perspectives on the inflation gap between services and goods have very different implications for future service price inflation. If service price increases are systematically overstated, the problem of service price inflation is more apparent than real, but if inherent productivity growth differences are the cause, it is here to stay. Finally, if service price inflation results from the growth of demand for services, then it may be mitigated if service sector growth slows down in the future.

The purpose of this article is to contribute to a deeper understanding of the inflation differential between services and manufacturing, by examining the success of these explanations in accounting for the post-war data. The analysis shows that there is no proof positive of the mismeasurement view. Nor do the data suggest that the inflation differential is explained exclusively by sectoral differences in productivity growth rates. There is, however, some evidence suggesting that continued growth of the service sector relative to the manufacturing sector, reflected by the tightening of the female labor market relative to the male market, has been behind the high rate of service sector inflation.

Overview of service price inflation

This section describes more fully the course of inflation in different industries in the economy and forms the basis for the choice of industries that are the focus of the rest of the analysis.[3] The broadest grouping of service industries, often called the "service-producing

Table 1

Inflation and Productivity by Industry

		Service-Producing Industries						
					Nondistributive Services			
	Manufacturing	Total	Transportation & Public Util.	Wholesale & Retail	Total	Finance & Insurance	Real Estate	Services
Inflation rates*								
1949-85	3.3	4.3	4.4	3.6	4.9	5.4	4.0	5.4
1949-69	2.1	2.6	2.6	1.9	3.3	4.3	2.1	4.0
1970-81	5.9	6.9	6.9	6.7	7.1	7.4	6.5	7.5
1982-85	1.9	5.4	6.2	3.2	6.4	5.4	6.4	6.8
Productivity growth*								
1949-85	2.7	1.3	2.8	1.3	0.8	0.1	2.1	0.6
1949-69	2.8	2.0	3.2	1.8	1.5	0.2	4.3	1.0
1970-81	2.0	0.4	2.2	0.2	0	0	−0.5	0.2
1982-85	4.7	0.2	1.9	1.4	−0.6	0.1	−1.6	−0.2
Share of output†								
1950-59	27	54	10	18	27	4	9	13
1960-69	26	57	9	18	29	4	11	14
1982-85	25	65	11	19	35	5	13	18
Share of employment†								
1950-59	38	53	10	22	21	4	1	16
1960-69	36	56	8	23	25	5	1	19
1982-85	26	67	7	26	34	6	1	27

*Percent per annum.
†Percent of nonfarm business sector.

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[3] The available measures of service price inflation are distinguished by method of classification (by consumers' expenditure category or by industry of origin) and by breadth of coverage. The data on GNP deflators by industry are discussed here because they are consistent with the wage and productivity data to be used in the subsequent analysis. Other sources of data on service price inflation are the deflators for components of GNP and personal consumption expenditures (PCE), and the consumer price index (CPI). The GNP deflator for services involves purchases by the government, foreigners, and consumers, the third category being the largest. Since GNP accounts register final rather than intermediate transactions, purchases of services by business are excluded.

PCE deflators are calculated by a method that aggregates information on real and current dollar outlays on subcategories of consumption expenditures. The real figures for most of these subcategories are calculated by deflating current dollar expenditures by the CPI for comparable commodities and services. Hence, the underlying price information in the PCE is largely the same as that in the CPI. The two indexes exhibit very similar movements at a disaggregated level and only differ in the aggregate as a result of different weighting schemes. The disaggregated PCE data may also be roughly compared with the industry data for categories of expenditures that bear similar titles. The two sets of inflation rates tell roughly the same story.

sector," comprises transportation and public utilities, wholesale and retail trade, finance, insurance and real estate (FIRE), and the catch-all group "services." Inflation performance is not uniform across service-producing industries (Table 1). The behavior of prices in wholesale and retail trade differs moderately from that in manufacturing, and transportation and public utilities prices started to increase rapidly only in response to energy price shocks. It is the "nondistributive" services—FIRE and the narrow service industries—that have been the source of persistently high inflation rates, exceeding those in manufacturing by 1.6 percentage points per year since 1949, and 4.5 percentage points from 1982 to 1985.[4]

The table shows several other features of nondistributive services that set them apart from the rest of the economy. First, the growth of labor productivity in this group of industries has been considerably lower in each period than in manufacturing. As noted above, this may be a consequence of the inherently limited scope for labor-saving improvements in service activities. Alternatively, it may reflect inaccurate measurement, causing inflation figures to be biased upward and growth of output (and hence, output per worker) to be biased downward. Second, the share of these industries in total output has grown from 29 to 35 percent since the 1960s, after remaining relatively stable for two decades. Manufacturing and distributive services show essentially no change. Third, employment in nondistributive services accounted for 21 percent of nonfarm business workers in the 1950s, rising to 34 percent by the 1980s; the share of manufacturing employment declined from 38 percent to 26 percent over the same period. The faster rate of growth in services' employment share than its output share is a reflection of the disparate rates of labor productivity growth in the two sectors.

Two industries, business services and medical care, have grown in size relative to the rest of the nondistributive services sector, while personal and domestic services have shrunk, the latter quite dramatically (Table 2). However, while nondistributive services comprises a diverse group of activities, inflation in services is not restricted to a few specific areas (such as health care); it is a feature of practically all such services. Hence, a first analysis of service price inflation should focus on features common to all service activities. Two such approaches are examined below.

Mismeasurement of service price inflation

One explanation for high service price inflation is that it is systematically overstated because published data fail to take into account improvements in the quality of the services delivered. To see what is at issue here, consider the concrete case of a durable good such as a refrigerator. As frost-free refrigerators come to dominate the market, the price of the average refrigerator

Table 2

Output and Employment Shares and Inflation in Nondistributive Services Industries

	Rate of Inflation*				Share of Output†		Share of Employment†	
	1949-85	1949-69	1970-81	1982-85	1949-69	1982-85	1949-69	1982-85
Finance & insurance	5.4	4.3	7.4	5.4	15	14	21	20
Real estate	4.0	2.1	6.5	6.4	37	37	5	5
Hotels & lodging	5.6	3.3	8.3	9.7	3	2	5	5
Personal services	4.9	3.3	7.4	5.4	9	6	13	8
Business services	5.6	4.9	6.3	7.6	10	16	11	21
Entertainment	4.9	3.8	5.9	4.8	3	2	5	4
Medical care	5.4	3.9	7.5	6.7	11	16	15	25
Legal services	7.3	5.0	9.4	12.9	4	3	2	3
Education	6.3	6.3	6.4	6.2	2	2	6	6
Domestic services	5.0	3.7	8.4	1.6	4	1	17	3

*Percent per annum.
†Percent of nondistributive service sector.

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[4] The wage, price, output, and employment series in this article are taken from annual data by industry in the National Income and Product Accounts. At the time of writing, data for 1986 were not available. Comparable data for 1986, taken from the National Income and Product Accounts and Bureau of Labor Statistics sources suggest that the trends described here have moderated only slightly, if at all.

rises because the frost-free variety costs more. Price indexes that merely record the price of the average refrigerator will thus register increases, and all other things being equal, refrigerators will exhibit more inflation than commodities that have not undergone quality improvements. Correct measures of prices and output (that are comparable with earlier figures) should, however, reflect the fact that the average refrigerator constitutes "more" refrigerator than it did before the introduction of frost-free technology. Hence, quality improvements should be represented as increases in output and may not necessarily cause increases in the prices of the (quality-adjusted) goods. The argument asserts further that the problems of capturing quality improvements are greater in the case of services than in the case of goods. The quality of many services, for example legal counsel, can only be observed at the time the service is rendered, whereas for goods something tangible remains to be examined after purchase.

These problems will cause measures of the growth in labor productivity (output per worker) to be biased downward, because not enough of the increase in expenditures is attributed to growth in real output. Other aspects of the methods of measurement of industry prices and output can cause output and labor productivity measures to be understated and inflation estimates to be biased upward. In some industries, no direct measurements of prices are available, and real output has to be extrapolated from some measure of inputs to the production process, often an indicator of employment. Setting the growth of real output equal to the growth of employment obviously allows for no growth in labor productivity. In summary, the problems posed by quality changes and the intangible nature of service output make it difficult to divide successive observations on expenditures into information on prices and quantities that are comparable over time.

In the absence of direct information on quality and productivity changes with which the measured price and output data can be compared, it is difficult to come to any definite conclusions about the extent of the quality bias in services. However, several indirect and circumstantial pieces of evidence seem to suggest that measurement biases may not be the major cause of the inflation differential between services and goods.

The CPI takes systematic account of quality changes only in the case of automobiles, where the effects of annual model changes are analyzed using cost data supplied by manufacturers. For other goods and services, information on quality changes enters the measurement of prices in an *ad hoc* manner: if a field representative (the person who samples prices in stores, hospitals, and so on) believes a quality change has occurred, he or she notifies a "quality specialist" at the Bureau of Labor Statistics, who determines whether an adjustment needs to be made. Changes in the specifications of appliances are as likely to be picked up by this method as improvements in medical diagnostic procedures through the use of more sophisticated equipment. Similarly, changes in the longevity of durable goods are as likely to be missed as changes in the degree to which providers of services "cut corners."[5] While there are changes in service quality that are not taken into account by the CPI, it is not clear that changes in the quality of goods are captured substantially better.[6]

The significance of quality measurement problems is also called into doubt by consideration of specific components of the CPI. For categories such as medical care and entertainment, indexes are calculated for both the relevant services (visits to doctors' offices and entrance to sporting events) and the corresponding goods (drugs and sporting goods). If, for example, there is fast growth of demand for medical care, we would expect the prices of both the goods and services related to medical care to rise quickly. In contrast, if the difficulties of capturing service quality changes were the main cause of higher price inflation in services than in goods, we would expect to see the goods in these categories experience low inflation rates relative to the corresponding services. The gap between inflation rates for goods and services in these expenditure categories is, with few exceptions, substantially less than the gap between overall goods and services inflation rates (Table 3). With the same exceptions, the detailed goods inflation rates are typically no less than the corresponding overall goods inflation rates. Thus, these data suggest that whatever causes the prices of medical care, personal care, entertainment, education, and housekeeping services to rise rapidly also infects the prices of the corresponding commodities. For example, the data are consistent with growing demand for these categories of expenditure. It is not what would be expected were the differential treatment of quality improvements in goods and services responsible for the observed high service inflation rates. Only for home maintenance after 1982 and apparel is the discrepancy between the commodities and services indexes similar to that between overall goods and services inflation. This divergence of prices could be explained by

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[5] In "Determining the Effects of Quality Changes on the CPI," (*Monthly Labor Review*, May 1971), Jack Triplett surveyed a number of studies of quality bias in medical care prices and found no conclusive evidence of an upward bias in this component of the CPI. He also suggested that it was not possible to rule out a deterioration of quality in services, in which case the price indexes would be biased downward.

[6] The author would like to thank (without implication) Patrick Jackman for useful discussions on which this argument is based.

Table 3

Average Annual Inflation Rates of Related Goods and Services in the CPI

Category	1977-86 Goods	1977-86 Services	1977-81 Goods	1977-81 Services	1982-86 Goods	1982-86 Services
Home maintenance	4.9	7.3	8.0	10.0	1.8	4.6
Housekeeping	5.9	5.9	8.4	8.4	3.5	3.4
Apparel	3.7	7.8	4.8	10.3	2.1	5.2
Medical care	8.1	9.1	8.2	10.1	8.0	8.1
Personal care	6.2	6.2	7.5	7.8	4.9	4.5
Entertainment	5.2	6.1	7.0	6.4	3.4	5.8
Education	9.1	9.6	8.4	9.0	9.8	10.1
Goods in CPI*	5.2		7.1		3.2	
Services in CPI†	7.0		8.5		6.0	

*Excludes food, energy, and used cars.
†Excludes energy.

increasing competition from imports, especially during the period of the dollar's appreciation.

An alternative perspective on the accuracy of service price inflation rates is provided by examining in detail the construction of price series for different industries. Ideally, inflation in the value added price deflator for an industry is the difference between the rates of growth of current dollar value added (receipts net of materials purchases) and real value added. In practice, the method used to arrive at price indexes varies from industry to industry, depending on the availability and reliability of data. For some industries, data on purchases of intermediate goods are not available, and real value added is approximated by "extrapolation" of an index of some measure of real activity, such as real personal consumption expenditures or employment. This has the effect of measuring the real value of total rather than net output.[7] (Inflation is then the difference in the rates of growth of the current dollar and real output measures). In other cases, a deflator is calculated directly by combining personal consumption deflators and detailed earnings data for products and industries contained in the particular industry aggregate.[8]

Evidently, some of these methods of measurement ignore productivity improvements to a greater or lesser degree. If real output is measured by employment, then productivity growth is, by definition, zero. Similarly, if prices are measured by earnings, then to the extent that earnings rise because of productivity increases, real output growth will be understated and inflation overstated. In contrast, extrapolation of real output from measures such as the number of admissions to sporting events permits productivity growth to be nonzero and does not necessarily attribute productivity improvements to inflation. Thus, the extent to which productivity growth is missed and incorporated in inflation should be related to the methods used to measure prices and output, if incorrect accounting for productivity growth is a serious problem.

Grouping industries according to the way their prices are measured should show whether the industries in any particular group experience inflation rates that differ significantly from those in other groups. For example, if measurement of output by employment biases estimates of inflation upward relative to other methods of measurement, we would expect higher average inflation in this measurement group. To assess the long-term importance of measurement problems, we calculated the average inflation rates for the industries in each measurement group for each decade. The ordering of measurement groups by inflation rates changes in each decade (Table 4). In particular, industries using an employment indicator to measure output (group E) show no tendency toward systematically higher average inflation rates than other groups.

Differences in measurement methods thus do not appear to explain the differences in inflation among service industries. Of course, the finding that measurement methods do not explain the variations in inflation

[7] For some industries, notably banking and credit agencies, and holding and other investment companies, no direct measure of current dollar output is available since many services are performed without explicit charges. The practice employed is to *impute* a value for these services. In the case of banking, this imputation is based on the excess of interest income over interest disbursed. For a full discussion, see John A. Gorman, "Alternative Measures of the Real Output of Commercial Banks," in *Production and Productivity in the Service Industries*, ed. Victor Fuchs (New York: National Bureau of Economic Research, 1969).

[8] For example the deflator for amusement and recreation services is derived by combining price data on admissions to various sporting and artistic events. Details of the construction of these indexes are to be found in Martin L. Marimont, "Measuring Output for Industries Providing Services: OBE Concepts and Methods," in Fuchs, *op. cit.*

rates *among* service industries does not allow us to conclude that they do not contribute to the gap *between* goods inflation and the inflation of the service sector as a whole. It may be that some feature of service sector real output growth is missed systematically by all measurement methods, and wrongly attributed to price inflation. This type of mismeasurement would not be detected as the particular consequence of one measurement method as opposed to another. Nevertheless, if the measurement method used for an industry were responsible for the level of its inflation rate, then variations in measurement methods should be related to variations in inflation rates among service industries.

This section has examined the extent to which high rates of service sector inflation can be explained by failure to take account of quality and productivity improvements. We have not turned up *positive* evidence of mismeasurement. This result does not allow us to conclude that data on the service sector is accurate, for which a case-by-case analysis of measurement procedures would be required. However, it does suggest that it may be more fruitful to attempt to explain the manufacturing/services inflation differential on economic grounds.

Economic explanations of sectoral inflation rates

In this section we investigate the economic determinants of the manufacturing/services inflation differential.[9] We find support for the view that the differential stems from the higher growth rate of demand for services than for manufactured goods. An alternative view, stressing sectoral differences in productivity growth, is somewhat at odds with the evidence. These conclusions are based both on an informal examination of relevant data and on the estimation of a three-equation econometric model explaining the manufacturing/services inflation differential, manufacturing wage inflation, and service wage inflation.

After experimenting with a variety of forms of the inflation differential equation, we conclude that unit labor cost changes are important determinants, that there is no clear indication of effects from aggregate demand variables, and that variables capturing changes in international competitiveness do not register a large effect. Thus, wage movements are central to the behavior of the price inflation differential.

It is possible to distinguish the "productivity growth differential" and "services demand growth" views of the inflation process mentioned earlier by the behavior they prescribe for sectoral wage inflation. Only if wages are tightly linked, because workers can find jobs with equal ease in the two sectors, will productivity growth differentials be the principal cause of the inflation differential. Otherwise, wages can be set to match productivity changes in each industry without fear of losing workers to another sector. This behavior leaves unit labor costs

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[9] The definition of services used in this section of the paper is nondistributive services *excluding* real estate. Real estate is excluded because the output figure is chiefly an imputation for the services provided by owner-occupied housing. However, no imputation is made for the corresponding labor of homeowners.

Footnote 9 continued
The employment figures for real estate in Table 2 only include real estate agents and janitorial staff. Thus, "output per head" has an interpretation for this industry very different from its meaning in other industries, and the industry is thus omitted to preserve the homogeneity of the data.

Table 4

Average Inflation Rates of Nondistributive Service Industries*
Grouped According to the Method of Measurement of Prices

Group	A	B	C†	D†	E†
Measurement Method:	Prices Based On Earnings Index	Prices Taken Directly from CPI or Personal Consumption Deflators	Total Real Output Extrapolated	Net Real Output Extrapolated	Employment Extrapolated
1950s	4.5	2.9	2.5	3.3	5.6
1960s	4.2	2.4	3.6	2.9	3.5
1970s	5.8	6.2	7.9	9.3	6.9
1980s‡	9.6	7.6	9.8	−0.6	7.8

*Industry inflation rates are weighted by the industry's share of group nominal output.
†Under these methods, an index of real output is first calculated. The industry inflation rate is then the difference between the rates of growth of industry gross product originating (in current dollars) and of the real output measure.
‡1980-85.

Note: Group A: Motion pictures, Medical services, Educational services, Nonprofit membership organizations, Miscellaneous professional services, and Private households; Group B: Banking, Credit agencies, holding, and other investment companies, Real estate, Personal services, Automobile repair and services, and garages, Amusement and recreation services, except motion pictures, and Legal services; Group C: Hotels and other lodging places; Group D: Insurance carriers; Group E: Insurance agents, brokers, and service, Security and commodity brokers, Miscellaneous business services, and Miscellaneous repair services.

unchanged and hence puts no upward pressure on the prices in one industry as opposed to another. Alternatively, differences in sectoral wage behavior can show that the inflation differential is driven by the faster growth of demand for services if the two sectors draw on different labor force groups (services being predominantly female and manufacturing disproportionately male), and if wage inflation is systematically related to the tightness of these labor markets.

To capture these effects, we ran modified Phillips-curve wage equations for each sector. These included the wage growth of the other sector among the explanatory variables, as well as the male and female unemployment rates. We found that there is little interdependence between the wages in the two sectors, contradicting the productivity differential view. However, the female unemployment rate turns out to be an important determinant of service wage inflation, while the male unemployment rate is not. This result conforms with the demand-induced view of the inflation differential.

We now proceed to discuss the findings in detail, starting with the inflation differential equation. Output and employment in the service sector are less volatile and cyclically sensitive than they are in manufacturing. Similarly, the service sector is typically more sheltered from foreign competition and developments in foreign economies than the manufacturing sector. The extent to which these differences are reflected in the price behavior of the two industries is an empirical matter. Manufacturing prices should be more sensitive to movements in the costs of materials, particularly oil. In contrast, service sector prices should be more responsive to changes in labor costs, as these are a higher proportion of total costs in services than in manufacturing.

The estimated inflation differential equation suggests that relative price inflation is most strongly related to changes in energy prices and unit labor costs (Box 1). Energy prices exerted a highly significant effect, raising manufacturing inflation relative to services inflation when they rose.[10] By far the bulk of relative price movements is explained by changes in unit labor costs.[11] After these variables are taken into account, there is little left that can be explained statistically by indicators of international competitiveness, such as the exchange rate or the relative prices of imports and exports, or by indicators of the stage of the business cycle, such as real GNP or the prime age male unemployment rate. This does

Box 1. Inflation Differential Equations

Our econometric analysis of the manufacturing/services inflation differential attempted to relate it to determinants of the individual sectoral inflation rates of which it is composed. Two representative equations are shown below. They demonstrate the relative lack of importance of aggregate demand factors (the prime age male unemployment rate) and prices of competing foreign goods (the exchange rate) in explaining the differential. The conclusions are not sensitive to the particular specification of the variables employed. For example, the percentage changes in the real exchange rate (exchange rate times the ratio of foreign to domestic producer price indexes), the price of nonpetroleum imports, and the price of nonpetroleum imports relative to manufacturing prices all yielded small and insignificant coefficients when they were entered in place of the growth in the exchange rate. The level and rate of growth of real GNP, and rates of change of the prime age male and female unemployment rates also had negligible effects. The regressions were run on annual data for the period 1954-85.

$$P_m\text{-}P_s =$$

$$\underset{(.95)}{.85} + \underset{(.25)}{.02e} - \underset{(-.72)}{.13upm_{-1}} + \underset{(5.5)}{.13pe_{-1}} + \underset{(4.1)}{.44ulc_m} - \underset{(-5.2)}{.83ulc_s}$$

$$\bar{R}^2 = 0.7 \qquad S.E. = 1.2 \qquad DW = 2.23$$

$$P_m\text{-}P_s = \underset{(0.7)}{.46} + \underset{(5.5)}{.13pe_{-1}} + \underset{(5.8)}{.50ulc_m} - \underset{-(5.9)}{.88ulc_s},$$

$$\bar{R}^2 = 0.7 \qquad S.E. = 1.2 \qquad DW = 2.18$$

(t-statistics are in parentheses beneath the coefficients)

where
p = inflation rate of sectoral price deflator,
upm = prime age male unemployment rate,
pe = rate of change of producer price index for energy, and
ulc = rate of growth of unit labor costs.

The subscript m refers to the manufacturing sector, while s denotes nondistributive services. The subscript -1 indicates that the variable in question is lagged one year.

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[10] The large effect of energy prices on inflation remains even when the manufacturing sector is redefined to exclude petroleum production.

[11] If prices are marked up on costs, we would expect the coefficients of unit labor costs to be similar to labor's share in total revenue, which is approximately 60 percent in manufacturing and 75 percent in services.

not mean that these factors are ultimately irrelevant. For instance, unit labor costs in manufacturing fell relative to those in services in the 1980s, and this is held to be due, at least in part, to the influence of import competition on wage concessions. In summary, our analysis of the inflation differential equation suggests that to explain the excess of service price inflation over manufacturing price inflation we should look to the determinants of unit labor costs in each industry. This approach is also supported by the statistical results presented in Box 1. These results suggest that if no changes occur in the economic determinants of the differential, the differential will be negligible.

The change in unit labor costs is the difference between wage inflation and productivity growth. As mentioned above, we are interested in establishing whether the cause of the inflation differential is the different rates of productivity growth between the two sectors, or whether it is the different rates of growth of consumer demand. These two causes have different implications for the functioning of the labor market, and ultimately for the behavior of wages in the two sectors.

The productivity-differential explanation requires that labor is mobile between sectors, in which case wages of comparably skilled workers in both sectors will move in the same way. If not, then workers would tend to move away from the sector paying the lower wages, which would then have to bid up wages to stem the attrition in its labor force. The theory assumes that improvements in productivity accrue to workers in the form of increased wages. By definition, wages can rise as fast as productivity without causing unit labor costs to rise. Consider what would occur in a typical year, when productivity rose faster in manufacturing than in services. Initially, manufacturing wages rise to the extent of the manufacturing productivity increase. In order not to lose its labor force, services must keep wages increasing at the same rate as manufacturing wages. But this means that unit labor costs will rise faster in services than in manufacturing because the service wage increase (which is dictated by manufacturing productivity growth) is not fully offset by service productivity growth. As both sectors adjust prices to maintain their profit margins, prices will tend to rise faster in services, a situation that is exacerbated by the greater share of labor in service sector costs and by the need of the service sector to expand its labor force to meet increasing demand.

Alternatively, consider what will occur if labor is immobile between the two sectors. Higher productivity growth in manufacturing than in services now exerts no upward pressure on service sector wages, since workers are unable to move to manufacturing jobs. Thus, there is no "push" on service sector wages, and hence on prices, that has its source in the superior productivity performance of the manufacturing sector. However, if demand for services is growing sufficiently fast, service wages will tend to rise to attract more labor. The faster services demand grows, relative to the pool of available labor, the faster the industry will have to raise wages. Of course, the fact that productivity growth is low in services will mean that service *prices* will rise more quickly than they would have were productivity better. But slow productivity growth in services is not a necessary ingredient of high wage inflation according to this view, whereas it is central when labor is mobile between the two sectors. When labor does not move freely between manufacturing and services, the "pull" of excess demand for service sector labor is the driving force.[12]

The basic facts of low service sector productivity growth with high inflation, and high manufacturing productivity growth with relatively low inflation, are in broad conformity with the mobile labor view. A deeper analysis, however, supports the view that inflation has resulted from increased demand for services in the face of immobility of labor from manufacturing to services. There is indeed a large difference in the demographic composition of the manufacturing and nondistributive services labor forces (Table 5). Three-fifths of workers in nondistributive services are female, whereas women make up only one-third of the manufacturing labor force. The proportion of women in nondistributive services was only 50 percent in the 1950s. To achieve such growth, nondistributive services have accounted for 45 percent of new female jobs created since 1963, although the sector represented only 38 percent of female employment in recent years, and about 35 percent in 1963. During this period, the female participation rate has risen by about one-third. Meanwhile, wages have risen faster in nondistributive services than in manufacturing, especially in recent years. While the female labor force has grown rapidly, the upward pressure on wages suggests that nondistributive services demand has grown faster.

Further data suggest that the service industries whose employment is growing fast will not be able to alleviate the upward pressure on wages by attempting to attract male workers in large numbers. The traditional employers of the prime age male labor force—manufacturing industries—continue to pay substantially higher wages than service industries, although the gap is narrowing. The average hourly wage in manufacturing was $9.03 over the period 1982-86; in services, it was 16 percent lower, at $7.58. While some workers

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[12] It should be noted that both of these scenarios describe a two-sector economy. Since our empirical analysis does not deal with all the sectors in the economy, this theoretical discusssion should be regarded as only a suggestive guide to the interpretation of the empirical results.

Table 5

Labor Market Statistics by Sector

Sector	Growth in Wages and Salaries per Full-Time Equivalent Employee				Female Share of Industry Employment*†	Industry Share of Total Employment*†	Industry Share of Total Female Employment*†	Share of Increase in Total Female Employment since 1963
	1949-85	1949-69	1970-81	1982-85				
Manufacturing	5.8	4.7	7.8	5.6	34	20	15	8
Distributive services	5.1	4.2	7.2	3.8	42	29	27	28
Nondistributive services	6.0	4.9	7.8	6.4	60	28	38	45

*Average over 1983-85

†Nonfarm economy.

displaced from declining manufacturing industries have moved to jobs in the service sector, the loss of pay and status involved tends to make this transition a slow one.[13] Making service jobs more acceptable in the near future to this group of workers could presumably be accomplished only by increasing wages rapidly. Thus, it is plausible that the pressure on wages in the service sector is aggravated by the "immobility" of workers in other sectors paying higher wages. In the long run, this immobility may lessen, as service wages continue to rise relative to manufacturing wages.

Other labor market statistics, consistent with this view of continued strength in the female labor market, suggest an explanation of the recent divergence of price and wage inflation rates in manufacturing and services. The unemployment rate for females aged 20 and above averaged 6.7 percent from 1982 to 1985, while for prime age males, it averaged 6.8 percent. These figures reverse the pattern of the preceding two decades when the male rate was always below the female rate by an average of 1.2 percentage points. While the pressures on the female labor market, originating largely in the nondistributive services sector, have continued unabated into the 1980s, those on the male labor market have declined substantially. The result has been that service sector wages and prices have grown faster than manufacturing wages in the 1980s.

To weigh the merits of the two views, it is useful to employ a more formal approach that involves statistical estimation of the determinants of wage inflation in the two industries (Box 2). The estimates for each industry attempt to account for aggregate demand pressure, captured by the prime age male unemployment rate, and for inflationary expectations. Unlike typical aggregate wage equations, they include the wage growth of the other industry, the female unemployment rate, and sectoral productivity growth terms to capture sector-specific effects. The other industry's wage growth captures the extent of the transmission of labor market pressures between sectors. If labor is mobile between manufacturing and services, we would expect long-run wage movements to be similar in the two sectors; that is, we would expect wage movements in one industry to match closely wage changes of the other. By the same reasoning, the smaller the influence of wage growth in the other industry, the less important are spillovers of wage pressure from one sector in determining wage movements in the other.

In contrast, the female unemployment rate is included to capture the notion that labor is immobile between sectors. This theory suggests that pressures on service sector wages emanate from scarcity of the labor employed by the sector, which is predominantly female. If it is valid, we would expect the female unemployment rate to be the principal labor market variable in the services wage equation and to be relatively unimportant in the manufacturing equation.

The results show that manufacturing wage inflation is not directly influenced by service wage growth and is most strongly correlated with movements in the CPI. It also responds to the prime age male unemployment rate, albeit insignificantly,[14] and is insensitive to the female unemployment rate.

Service wage growth displays a weak response to manufacturing wage changes: only 29 percent of these changes are passed through into service sector wage inflation. In a perfectly mobile labor market, much more should be passed through in the long run. Service wages differ most dramatically from manufacturing in their response to unemployment. While manufacturing

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[13] See Kenneth B. Noble, "Millions Who Lose Plant Jobs Pay in Shift to Services," *New York Times*, February 7, 1986, page 1.

[14] Michael Bruno and Jeffrey Sachs find a similar result for the United States and cite several other studies that are in agreement with theirs. See *The Economics of Worldwide Stagflation* (Cambridge, 1985), Chapters 9 and 10.

Box 2. Wage Inflation Equations

We estimate wage equations that are amended versions of augmented Phillips curves for the two sectors. The equation for the service sector is

$$w_s = a_o + a_1 w_m + a_2 w_{m_{-1}} + a_3 \pi_s + a_4 \pi_{s_{-1}} + a_5 upm + a_6 uf + a_7 pc_{-1} + \text{error},$$

where w_s and w_m are the annual growth of wages and salaries per employee in services and manufacturing respectively, π_s is annual labor productivity growth, upm and uf are the prime age male and female unemployment rate, and pc_{-1} is the lagged value of the rate of growth of the consumer price index, included as a measure of inflationary expectations. The equation for manufacturing wage growth is the same, except that service wage growth replaces w_m and $w_{m_{-1}}$ on the right hand side, and manufacturing productivity growth replaces π_s and $\pi_{s_{-1}}$:*

$$w_m = b_o + b_1 w_s + b_2 w_{s_{-1}} + b_3 \pi_m + b_4 \pi_{m_{-1}} + b_5 upm + b_6 uf + b_7 pc_{-1} + \text{error}.$$

The econometric estimation of the sectoral wage equations pays particular attention to the problems of "simultaneity" that are present in the two equations. The service wage equation says that a one percent increase in manufacturing wage growth causes service wage growth to increase immediately by a_1 percent, while the manufacturing wage equation implies that a one percent increase in service wage growth leads to a contemporaneous increase in manufacturing wage growth of b_o percent. Using regression techniques, we can only estimate the *correlation* between manufacturing wage growth and service wage growth. This means that if we run the manufacturing wage regressions, for example, we do not know whether the estimated coefficient of service wage growth reflects the value of b_o, a_o, or some combination of both (w_m and w_s can be positively correlated, but because w_m affects w_s, and not vice versa). It is possible, however, to test for the presence of simultaneous relationships by examining the correlations of w_m with variables that we believe affect w_s without affecting w_m.† Such tests reveal that any correlation between contemporaneous manufacturing and service wage growth is not the result of the direct effect of services wage growth on manufacturing wage growth. The lagged value of service wage growth is also insignificant in the manufacturing equation. The equations used annual data from 1954 to 1985. The final versions of the equations estimated are:

$$w_s = \underset{4.2}{6.2} + \underset{(1.5)}{.22w_m} + \underset{(0.6)}{.07w_{m_{-1}}} + \underset{(1.8)}{.34\pi_s} - \underset{(-1.2)}{.23\pi_{s_{-1}}}$$

$$+ \underset{(0.6)}{.15upm} - \underset{(-2.3)}{.87uf} + \underset{(3.8)}{.61pc_{-1}}$$

$$\bar{R}^2 = 0.83 \quad SE = 0.84 \quad DW = 1.71$$

$$w_m = \underset{(2.9)}{.46} + \underset{(0.9)}{.07\pi_m} + \underset{(0.1)}{.01\pi_{m_{-1}}} - \underset{(-1.5)}{.51upm}$$

$$+ \underset{(.01)}{.01uf} + \underset{(5.7)}{.74pc_{-1}}$$

$$\bar{R}^2 = .73 \quad SE = 1.158 \quad DW = 1.73.$$

Several tests of the significance of the effect of manufacturing wages on service wages were carried out. If $a_o + a_1 = 1$, then increases in manufacturing wages are passed through fully to the service sector, indicating substantial interdependence of the two sectors. The t-statistic for this hypothesis is 3.68, whereas the .005 significance level is 2.8. Thus, the hypothesis is soundly rejected. The coefficients a_o and a_1 are, in fact, insignificantly different from zero. The hypothesis that they are both zero yields an F-statistic of 1.36, whereas the 5 percent significance level is 3.4. Thus, the predictions of the mobile labor model are not supported by the data. In contrast, the female unemployment rate has significant negative coefficients in the services equation, but is practically irrelevant for the determination of manufacturing wages. The importance of the effects of the prime age male unemployment rate is the reverse. These results suggest that conditions peculiar to the female labor market may be important in the determination of service sector wage growth, and hence inflation.

*Further lags of each right hand side variable were not significant in either equation.

†The testing procedure used is described in detail in the working paper, of which this article is a summary, available on request from the author.

wage growth is somewhat moderated by increases in the prime age male unemployment rate, and not at all by the female unemployment rate, service wage inflation responds in a roughly opposite manner. Decreases in female unemployment have a substantial inflationary effect on service sector wages, while changes in male unemployment have neither a large nor significant impact. These results suggest that there has been substantial immobility between the services and manufacturing sectors. Service sector wages respond to movements in the female unemployment rate, since women constitute a major source of workers for this sector.

Thus the influence of one sector's wage growth on the other is at best weak. This result, in turn, suggests that productivity growth differences between manufacturing and services do not explain the difference between their inflation rates. In contrast, the analysis produces some evidence that the two labor markets are separated: each sector's wage inflation is most responsive to the unemployment rate of the demographic group that constitutes the bulk of its labor force.

Given that the data support the view that labor does not move freely between the two sectors, what is to be inferred about the source of the higher inflation rates in services? A story consistent with the evidence is that service price inflation has been driven by growing demand for services relative to manufacturing. This, in turn, has caused an increase in the demand for labor in services, which has drawn disproportionately on the female labor force. The effects of the growth in demand have been to tighten the female labor market relative to the male labor market, resulting in greater upward pressure on wages and prices in services than in manufacturing.

Conclusion

This article has considered several explanations for the high rate of price inflation in service industries relative to manufacturing. In spite of the difficulties of capturing quality changes in services, no positive evidence was turned up to substantiate the view that the inflation differential stems from data collection or measurement problems. While a more complete analysis is required before this view can be dismissed, it seemed promising to attempt to explain the data on economic grounds.

The principal source of wage and price differentials between services and manufacturing seems to be the growth of demand for services against a background of low labor mobility between manufacturing and services. The implications of this model appeared to be more in line with the behavior of wages than an alternative model that traced the inflation differential to underlying differences in productivity growth between the two sectors.[15]

The aggregate historical record is consistent with the view that growth in demand for services has outstripped growth in the available labor supply, causing wages to rise rapidly and putting upward pressure on prices. Recent developments do not suggest any significant change in this trend. For example, average earnings in finance, insurance, and service industries have grown at about 4 percent per annum since 1984, while price increases have slowed by about one-half of a percentage point, but remain above 4 percent. During the same period, annual employment growth has consistently exceeded 5 percent. Thus, demand pressures on nondistributive services do not appear to be easing.

Peter Rappoport

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[15] Of course, a more detailed study focusing on individual industries and on their wage and price inflation rather than on the aggregate differential might suggest a more significant role for the behavior of labor productivity.

International "Middle-Market" Borrowing

Two of the most important developments in the international capital markets since 1980 have been the onset of the less developed country (LDC) debt problem and the surge in international securities issuance. Both of these suggest a diminished role for commercial bank lending. The debt problem has reduced the perceived creditworthiness of LDCs, making loans to some of these countries unattractive at any interest rate. On the other hand, the growing credit needs of industrialized countries have principally been met not by banks but by the international securities markets, to which the most creditworthy borrowers have consistently had good access.

This article assesses supply and demand shifts in lending to a third group of countries, the medium-risk borrowers, for whom the impacts of the debt problem and securities market growth are less clear. These borrowers constitute a "middle market" for international lending.

Our analysis suggests that the international middle market passed through two distinct stages in recent years. First, after the debt problem arose in late 1982, banks reduced the supply of loans to the middle market. Hence the quantity of bank credit fell and spreads increased. While the least risky middle-market borrowers used fixed- and floating-rate bond issues to replace syndicated credits, this did not fully offset declining bank lending to the middle market as a whole.

By 1984, improved opportunities for all middle-market borrowers to raise funds in the securities markets reduced their need for bank loans, with an accompanying fall in spreads. The increase in the supply of funds through bond issuance came primarily from nonbank investors and was not unique to the middle market; medium-risk borrowers benefitted from the same forces that allowed top-tier borrowers to make rapid increases in bond market borrowing. Even if we assume that all floating-rate notes issued by middle-market borrowers were purchased by banks, the total demand for bank funding of middle-market countries fell after 1983. This occurred despite an increase in overall (bank and nonbank) financing of middle-market countries.

The following section defines the international middle market and examines the composition of borrowing by industrialized countries, middle-market countries, and LDCs. We then evaluate changes in middle-market loan and floating-rate note terms, as well as the issuance of fixed-rate bonds. The loan and bond data, considered together, lead to conclusions about supply and demand shifts in the middle market.

Changing patterns of international borrowing

International borrowers can be divided into three groups according to country of residence: industrialized nations, middle-market countries, and non-middle-market LDCs. The middle market consists of countries that have had less access to international securities markets than industrial country borrowers, but offer substantially less credit risk than the poorer LDCs or those countries that have rescheduled debt.[1]

To make these distinctions operational, we begin by applying a common definition of the top tier of international borrowers and then rely on country risk ratings to distinguish between middle-market and LDC borrowers. Of course, some degree of arbitrariness cannot be avoided. Specifically, the industrial country borrowers in the top tier are the G-10 members, including Switzerland. Their long histories of participation in the international credit markets, high per capita incomes, extensive financial resources, and well-developed framework for cooperation in economic matters suggest a low degree of country risk. The middle market includes those countries not in the top tier that meet two principal criteria: a) no reschedulings of debt payments in the decade before 1983, and b) 1983 *Institutional Investor* country risk ratings at least as high as any country that rescheduled or postponed payments.[2] The year 1983 serves as a reference point because we want to see how medium-risk borrowers fared after the debt problem arose. Those countries that rescheduled or postponed payments in 1982 and early 1983 were no longer medium-risk borrowers. Also, the analysis of market lending terms to follow does not apply to involuntary loans made under rescheduling agreements.

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[1] A pure country risk criterion is not the only possible way to distinguish borrower groups. A more extensive credit risk measure would also be plausible. In that case, medium-risk firms in the most creditworthy countries could also be viewed as part of the middle market. However, the available data do not readily distinguish between corporate and noncorporate borrowers, so that standard would be difficult to apply empirically.

Using this definition, the middle market consists of 24 countries: Algeria, Australia, Austria, the Bahamas, Bahrain, Colombia, Denmark, Finland, Greece, Hong Kong, Indonesia, Ireland, Kuwait, Malaysia, Norway, Portugal, Saudi Arabia, Singapore, South Africa, South Korea, Spain, Taiwan, Thailand, and the United Arab Emirates. Some of these nations have had difficulty meeting debt payments since 1983, demonstrating that there are real risks in lending to the middle market.

We can use OECD data on the composition of new international financing arranged by country borrowers to examine the funding behavior of the three groups of countries. New financing can take the form of bonds, loans, or other facilities (including note issuance, bankers' acceptance, and standby loan facilities).[3]

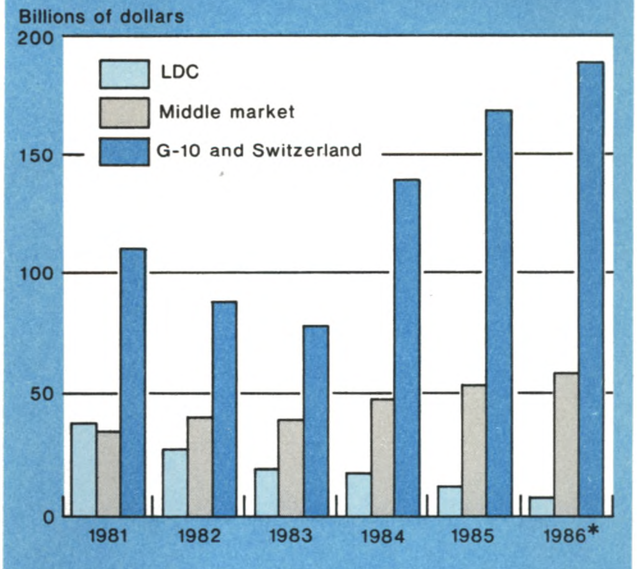
Consider first the LDC segment of the international capital market. These borrowers account for a small and declining share of new financing, especially after 1982 (Chart 1). The post-1982 figures also overstate the level of voluntary new financing arranged by non-OPEC LDCs because the figures include new funds supplied under debt rescheduling agreements. Bank loans have dominated new financing for these borrowers (Chart 2).

In contrast to LDCs, middle-market borrowers have gained progressively better access to the international securities markets. New funding arranged by middle-market countries has grown substantially over the 1981-86 period. This growth is attributable mainly to bond issuance and, to a lesser extent, the arrangement of other facilities. In fact, middle-market borrowers relied on bonds for 52 percent of new funds in the first half of 1986, compared with only 19 percent in 1981 (Chart 3). New bank lending to the middle market has declined both absolutely and relative to other types of credit.

The top tier of borrowers—the G-10 countries and Switzerland—accounts for the bulk of new financing

Chart 1

New International Financing Arranged



*First and second quarter 1986 data at an annual rate.

Source: OECD Financial Statistics Monthly.

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[2] The *Institutional Investor* index is a rough ordering of the likelihood that a sovereign borrower will default on a loan. The index ranges from zero to 100 with higher values implying a lower probability of default. The values are published in March and September; September 1983 ratings were used to define the middle market. Although we should not make too much of the precise numerical ratings, the index is based on a survey of international loan officers and reflects their perceptions of relative creditworthiness.

One further criterion is used to ensure that middle-market members are important borrowers: liabilities to U.S. banks must exceed $1 billion in 1983. Liabilities to U.S. banks are used because the Country Exposure Lending Survey (CELS), in which these data are reported, is in some respects superior to alternative debt measures. Unlike other international lending data, the CELS reports claims adjusted for lending to foreign branches of the borrowing country's banks and third-party guarantees, and is therefore a more accurate measure of debt.

[3] The figures reported in the OECD's *Financial Statistics Monthly* represent new financing arranged in the international markets. Arranged credits need not be drawn down. For example, only about 20 percent of the funds arranged under note issuance facilities (NIFs), included in "Other Facilities," have actually been used by borrowers. NIFs are medium-term facilities through which a borrower issues short-term notes; a group of banks agrees to buy any unsold notes at a prearranged spread over a reference interest rate.

Footnote 3 continued

Also, only publicly announced medium- and long-term loans are included here. Short-term trade credits and loans arranged privately are omitted. Hence the OECD figures differ from those derived from bank balance sheets, such as the Bank for International Settlements loan data.

arranged since 1981, particularly in the 1984-86 period. These low-risk borrowers have consistently relied more on bonds than on loans for new funds (Chart 4). Other facilities are also important funding sources for the top tier of borrowers, although these have generally not been drawn down.

Changes in syndicated loan terms and market conditions

Is the decline in bank lending to the middle market due to a shift in loan market supply or demand? To answer this question, we examine the interest rates charged on middle-market loans. These rates consist of a reference rate, usually the London Interbank Offer Rate (LIBOR), plus a spread representing a risk premium.

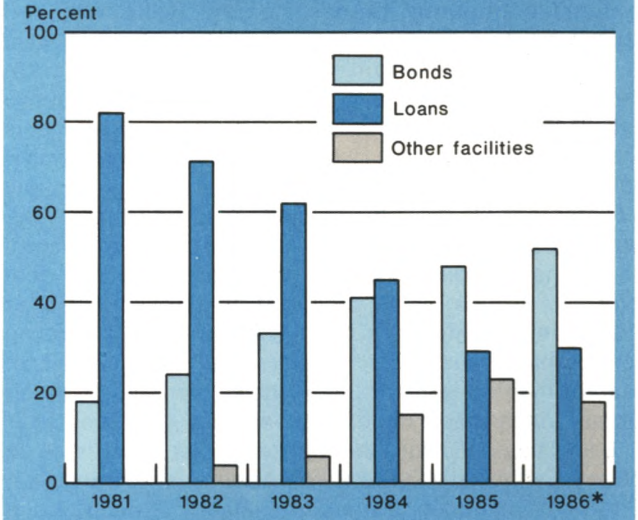
To evaluate spreads, we used a sample of 305 LIBOR-based loans made from 1981-I to 1986-II. To limit credit risk variations within middle-market countries, we considered only loans to governments, government agencies, or (borrower) government-guaranteed loans. We used semiannual averages because of the limited number of observations in some quarters.

Changes in loan spreads over time appear to define three periods (Table 1). Spreads declined from the beginning of 1981 until the end of 1982. Following the emergence of the debt problem, spreads increased,

Chart 3

Financing Shares: Middle Market

Proportion in each category



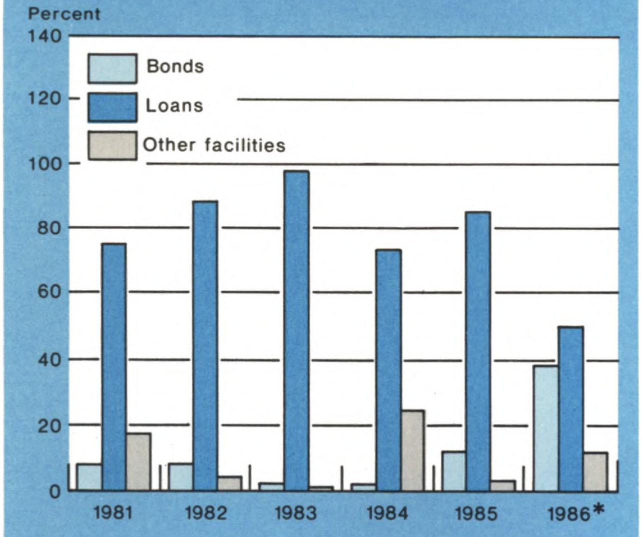
*1986 data through June.

Source: OECD Financial Statistics Monthly.

Chart 2

Financing Shares: Non-Middle-Market LDCs

Proportion in each category



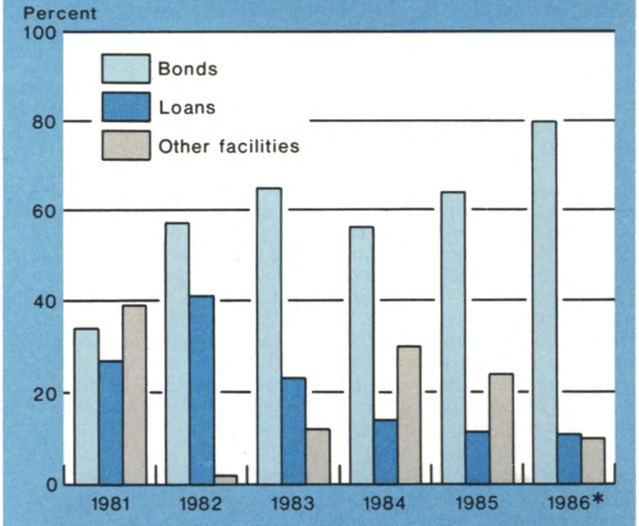
*1986 data through June.

Source: OECD Financial Statistics Monthly

Chart 4

Financing Shares: G-10 and Switzerland

Proportion in each category



*1986 data through June.

Source: OECD Financial Statistics Monthly.

peaking in the second half of 1983. From 1984 until 1986, spreads once again fell.

The changes in spreads are good measures of changes in returns since they have not been offset by variations in other terms and conditions on loans or in the degree of risk. To show this, we analyze two sets of factors. The first is the non-spread loan terms—maturity and grace period.[4] The second includes two determinants of returns that are not explicitly part of the loan contract—the general level of interest rates and the degree of country risk.

Of the two non-spread loan terms, maturity variations tend to confirm the impression of tighter loan terms in 1983, while grace period variations show no real trend. In general, borrowers seek longer grace periods and maturities while lenders have opposite preferences. Hence, extending the grace period or the maturity implies easier credit.[5] Maturities became somewhat shorter in 1983, with little change afterwards (Table 1). On the other hand, grace periods moved erratically. Thus among the contractual terms, the spreads summarize most of the information about changes in market tightness.

Table 1

Middle-Market Syndicated Loan Terms

Weighted Average Semiannual Data*

Quarters	Spread	Maturity	Grace Period	LIBOR (six-month)	Country Risk Index
1981					
I-II	54bp	8.5 years	3.8 years	16.7%	63.4
III-IV	50	8.9	3.1	14.9	64.0
1982					
I-II	50	8.8	4.1	15.1	65.5
III-IV	42	8.7	3.7	11.8	62.2
1983					
I-II	60	7.9	3.6	9.6	58.8
III-IV	67	7.4	4.1	10.3	58.2
1984					
I-II	62	7.0	3.7	11.0	60.3
III-IV	61	7.8	4.0	11.7	54.3
1985					
I-II	54	8.0	4.8	9.1	55.4
III-IV	46	7.3	2.3	8.2	54.9
1986					
I-II	45	7.5	3.8	7.4	53.7

*All averages are weighted by the dollar value of each loan. Since the value of LIBOR reported here is the weighted average of the level prevailing at the loan's signing date, it may differ from LIBOR averages reported in subsequent tables in this article. There are 89 observations for 1981, 74 for 1982, 52 for 1983, 42 for 1984, 36 for 1985, and 13 for 1986(I-II). Fee income is excluded because of missing observations.

Sources: Euromoney *Capital Markets Guide*; *Institutional Investor*.

Among the determinants of loan profitability other than the explicit loan terms, an interest-rate increase reduces the return on a loan with a given spread. The explanation is that if the lender's cost of funds moves closely with the reference rate used in the syndicated loan, the present value of payments associated with the spread declines as interest rates rise. Thus if rates rise, spreads must rise to offer the same expected loan return.[6] An increase in country risk also requires that lenders be compensated by higher spreads to maintain the same expected return.

From the end of the period in which the debt problem emerged (1981-82) until the end of the first post-debt problem phase (1983), average LIBOR fell by about 150 basis points while the average country risk rating declined by four points. The drop in LIBOR implies greater loan returns, reinforcing the conclusion that terms became tighter in this period. Even though the decline in the country risk index suggests that higher spreads may have been appropriate, a fall of four points in the risk index is not substantial and cannot explain the 25-basis-point rise in spreads between the end of 1982 and the end of 1983; countries four points apart in the index have similar country risk and would not normally pay spreads 25 basis points apart.

In the following period (1984-86), LIBOR fell sharply while the risk index continued to drop. The deterioration of the country risk index tends to confirm the impression given by loan spreads of easier credit terms. But in this case, the drop in LIBOR suggests the possibility that loan returns increased despite falling spreads.

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[4] During the grace period, the borrower pays only interest on the loan without making amortization payments. Though management, participation, and agency fees also contribute to the profits of major syndicate members, these profits are small compared to the spread component of returns. We have only limited information about fees.

[5] Theory alone cannot tell us whether longer grace periods and maturities are consistent with higher or lower expected returns. If there is no possibility of default, extending the grace period or the maturity increases the rate of return on a syndicated loan. A longer grace period implies that interest is paid on the full principal of the loan for a longer period. A longer maturity extends the period over which interest payments (including the spread) are made. However, if there is a possibility of default, the expected return on a loan may decline when either the grace period or the maturity is lengthened. The cumulative probability of default rises over time, so the lender may prefer rapid amortization.

Ultimately, liquidity and general interest-rate risk may be more important than credit risk; for example, the yield curve for default risk-free Treasury bonds usually slopes upwards, providing a premium for longer term investments.

[6] This is difficult to show for a syndicated loan but can be illustrated by a $1 perpetual bond that pays a spread s over LIBOR. If banks discount future payments at LIBOR and have flat interest rate expectations, then the present value of the bond is $(\text{LIBOR}+s)/\text{LIBOR}$. To keep this value constant as LIBOR rises, the spread must increase at a rate of s/LIBOR. In general, we observe that the various types of interest rate spreads increase as interest rates rise.

We can show that the decline in LIBOR was not sufficient to offset the fall in spreads by calculating the change in spreads that would be required to offer the same contractual return in the first half of 1986 as in late 1983. This contractual return is the percentage by which the present value of loan payments exceeds the amount loaned.[7] Using the average values of the grace period and maturity over the late 1983 to early 1986 period, and noting that LIBOR fell from 10.3 percent to 7.4 percent, we can calculate that the average spread would have to fall by about 5 basis points to offer the same contractual return. Hence despite the decline in LIBOR in the second period after the debt problem emerged, the 22-basis-point fall in spreads cannot be explained by declining interest rates. Credit terms did indeed ease after 1983.[8]

Table 2

Nonbank and Bank-Supplied Middle-Market Funds

Billions of Dollars*

	(1) Fixed-rate Bonds	(2) Loans	(3) Floating-rate Notes	(2+3) Total Bank Funding
1981	4.5	27.9	1.6	29.5
1982	7.1	28.5	2.7	31.2
1983	8.5	24.3	4.4	28.7
1984	11.3	21.1	7.8	28.9
1985	16.3	15.3	9.5	24.8
1986†	24.6	17.5	5.3	22.7

*Assumes all floating-rate notes are purchased by commercial banks and fixed-rate bonds are purchased by other investors. The proportion of fixed-rate Eurobond issues in the Securities Data Corporation international bond data base is applied to the OECD total of international bond market issues. Although traditional foreign bond market issues prior to 1984 are excluded from the Securities Data Corporation base, very few foreign issues for middle-market borrowers have been FRNs.

†Year through June at an annual rate.

Sources: OECD *Financial Statistics Monthly*; Securities Data Corporation.

The easing of lending terms after 1983 has allowed many middle-market borrowers to refinance loans at lower spreads. For example, the Danish Export Finance Corporation renegotiated a $200 million loan in October 1984 at a spread of 37.5 basis points over LIBOR for eight years. The initial loan, made in July 1983, carried a spread of 50 basis points for three years, rising to 62.5 basis points for the next four years. Ireland renegotiated a $120 million loan in December 1985 at a spread of 25 basis points for 10 years. The spreads on the original loan, completed in January 1984, were 37.5 and 50 basis points for the first three and next seven years respectively.

Middle-market floating-rate note issuance

The decline in bank lending to the middle market coincided with an increase in floating-rate note (FRN) issuance by middle-market borrowers.[9] Since FRNs are known to appeal mainly to bank investors, the question arises whether middle-market borrowers merely shifted from one form of bank funding to another. This, however, was not the case.

An FRN is a medium-term security (typically five to ten years) that pays a coupon which is tied to a base interest rate. For example, the note might offer a coupon equal to LIBOR plus a spread of 25 basis points. An FRN, therefore, resembles a syndicated loan with a grace period equal to maturity, but is more liquid, provided the borrower remains creditworthy.

A borrower that issues an FRN is probably still relying on bank funding while an issuer of a fixed-rate note is not; banks hold roughly 75 percent of the total volume of FRNs issued and may prefer FRN investments to loans because of their greater liquidity.[10] Banks are far less likely to invest in fixed-rate issues because the coupons on fixed-rate bonds do not rise and fall with bank funding costs; i.e., fixed-rate bonds present greater interest rate risk to banks than FRNs.

Middle-market borrowers have, for the most part, issued fixed-rate bonds (Table 2). Even if we assume that all FRN investors are commercial banks, while all fixed-rate bond investors are not, then total bank-supplied funds to middle-market borrowers have declined more or less steadily since 1982. This is certainly true relative to total middle-market borrowing, and with the

[7] In calculating the contractual return, we assume that there is no possibility of default. The greater the probability of default, the less sensitive the expected return to interest rate variations. This follows because as the probability of default rises, the likelihood of receiving payments in the more distant future declines. It is these more distant payments that are most affected by a change in the rate of discount. Therefore if default is possible, an even smaller fall in spreads is needed to offset the drop in LIBOR.

[8] This view is supported by the financial press; see for example, "Back to the Borrowers' Market," *Euromoney*, May 1984.

[9] Note issuance facilities are not considered in this section. As described earlier, these facilities have been substantially less important as a source of new funds for middle-market borrowers than the bond market.

[10] See G. Ugeux, *Floating Rate Notes* (London: Euromoney Publications, 1985), page 59. Although banks do hold fixed-rate securities, they generally hold very low risk bonds like U.S. Treasuries or tax exempt issues.

exception of a slight 1984 increase in bank funding, it is true in absolute terms as well. While a shift from bank lending to FRN issuance apparently began in 1983, the volume of FRN issuance did not fully offset the decline in loans.

To determine whether FRN investors, like bank lenders to the middle-market, received less compensation for given country risk levels after 1983, we assembled a sample of 89 FRN issues by middle-market sovereign borrowers. Using average annual figures calculated from this sample, we can assess changes in FRN spreads over the 1981-86 period (Table 3).

It is apparent that the spreads on FRNs are much lower than on syndicated loans. These lower FRN spreads are at least partially offset by the greater liquidity of the notes. Like syndicated loans, FRN spreads declined sharply after 1983.

As in the case of syndicated loans, we must consider FRN maturities, the level of LIBOR, and country risk to be certain that changing spreads are indicative of changes in market tightness. Looking first at maturities, it is clear that maturities lengthened after 1983 (Table 3). This may be somewhat misleading because many of the FRNs are subject to call or put options that change their effective maturities. In any case, the maturity figures do not suggest a tightening of terms.

To measure the effect of declining interest rates, we can again calculate the change in spreads that would maintain a constant contractual return, given the drop in LIBOR. Since weighted average LIBOR fell from 10.3 percent in 1983 to 7.8 percent in 1986, and the average maturity over the post-1983 period was 16.5 years, an 8-basis-point drop in spreads would offer the same contractual return as in 1983.[11] Hence the 13-basis-point decline can only be partially explained by falling interest rates.

Table 3

Middle-Market Floating-Rate Note Terms

Weighted Average Annual Data*

	Spread	Maturity	LIBOR (six-month)	Country Risk Index
1981	17bp	7.2 years	17.0%	72.9
1982	22	8.9	13.3	69.4
1983	23	9.5	10.3	65.1
1984	14	16.6	11.2	65.8
1985	11	17.2	9.0	62.0
1986†	12	13.4	7.8	68.0

*All averages are weighted by the dollar value of each issue. There are 8 observations for 1981, 14 for 1982, 15 for 1983, 19 for 1984, 24 for 1985, and 6 for 1986. No effort is made here to evaluate the effect of call and put options on spreads. A careful analysis of these would require the use of options pricing theory.

†Year through June.

Sources: Securities Data Corporation; *Institutional Investor*.

The average risk rating of FRN issuers has consistently been better than the corresponding loan market figure; less risky borrowers have better note market access. But as middle-market borrowers that traditionally relied on syndicated loans for funds have instead issued FRNs, the average country risk rating of these FRN issuers has generally deteriorated.[12] Thus in the FRN market as well as in the syndicated loan market, the risk-compensated returns to middle-market funding seem to have fallen.

Middle-market fixed-rate bond issuance

The declining quantity of bank-supplied funds to the middle market and the falling spreads on loans and FRNs imply a contracting middle-market demand for bank financing after 1983. At the same time, rising issuance of fixed-rate bonds by these borrowers suggests an increase in either the supply of or demand for nonbank funds.

While we do not have enough data on fixed-rate yields to distinguish supply from demand shifts,[13] indirect evidence suggests that the growth of fixed-rate middle-market borrowing parallels the experience of the top tier of country borrowers. For example, the increase in fixed-rate issuance by both middle-market and G-10 borrowers primarily occurred in the Eurobond market, rather than in traditional foreign bond markets (Table 4). Also, the middle-market members with country risk ratings most like those of G-10 borrowers have benefitted most from the expansion of Eurobond market issues. The average country risk rating of middle-market fixed-rate issuers has been better than the the index levels for middle-market FRN issuers and borrowers in the syndicated loan market.

Improved access to the fixed-rate bond markets was not a matter of medium-risk issuers entering the market for the first time. Instead, countries that already had access to the market were able to issue bonds in much greater volume. This group includes the more highly rated European middle-market countries, Australia, and some East Asian borrowers such as South Korea and Malaysia. Even prior to 1984, these and other middle-market members were able to tap the foreign bond markets, particularly in Tokyo.[14]

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[11] The fall in the average spread needed to maintain a constant contractual return is greater in the FRN case than the syndicated loan case. Because FRNs are generally amortized only at maturity, the present value of an FRN is more sensitive to interest rate variations than a syndicated loan. That is, the "duration" of an FRN exceeds that of a syndicated loan with an equal maturity.

[12] The increase in the risk index in the first half of 1986 is based on only six observations. The financial press clearly believes that risk-compensated FRN spreads have declined over time. For example, see "Risk Without Reward," Standard & Poor's International *Credit Week*, December 1985; "The Deteriorating Risk-Reward Ratio," *International Financing Review*, July 26, 1986.

[13] A sample restricted to fixed-rate bonds, without special features such as call or put options, issued by government or government-guaranteed borrowers contains few observations prior to 1983.

Since the growth of middle-market fixed-rate bond issuance in the Eurobond market coincides with the growth of fixed-rate issuance by top-tier borrowers, and because the least risky middle-market members were the most active issuers, we conclude that the same basic factors account for the expansion of both middle-market and G-10 fixed-rate borrowing. A full discussion of these factors is too broad a topic for this article, but several important developments can be cited: the growth of the current account surplus in Japan, coupled with the preference of Japanese investors for securities over nonmarketable assets, the general decline in long-term real interest rates after 1982, financial market innovations, particularly swaps, and the increased competition among financial institutions to provide credit enhancements for securities issues.

Table 4

G-10 and Middle-Market Fixed-Rate Bond Issuance

Billions of Dollars*

	G-10 and Switzerland		Middle Market		
	Total Fixed-rate Issuance	Of which: Eurobonds	Total Fixed-rate Issuance	Of which: Eurobonds	Average Risk Rating
1981	31.0	20.0	4.5	1.6	83.1
1982	46.2	33.4	7.1	3.2	80.8
1983	43.6	28.9	8.5	4.1	75.5
1984	58.5	44.1	11.3	7.1	77.0
1985	82.1	66.2	16.3	12.1	77.1
1986†	139.2	119.1	24.6	18.0	78.4

*Assumes all traditional foreign bond market issues are fixed-rate. Eurobond fixed-rate issues are estimated by applying the proportion of fixed-rate Eurobond issues in the Securities Data Corporation international bond data base to OECD international bond issuance totals. The OECD figures are more comprehensive prior to 1985 but do not provide a breakdown of fixed- vs. floating-rate issues. A sample based on the 1985-86 Securities Data figures supports the assumption that nearly all middle-market traditional foreign bond market issues were fixed-rate.

†Year through June at an annual rate.

Sources: Securities Data Corporation, OECD *Financial Statistics Monthly*; *Institutional Investor*.

All of these imply that at a given cost, middle-market borrowers enjoy an increase in the supply of fixed-rate funds. The surge in Japanese investment represents a clear increase in supply, particularly since East Asian middle-market borrowers had found favor with Japanese investors before 1984. The general decline in real interest rates from historically high levels made fixed-rate borrowing more attractive compared to the floating-rate alternative, benefitting all fixed-rate borrowers. Financial market innovations, such as swaps, have complex effects on international borrowing, but to the extent that they improve the efficiency of securities markets, these innovations tend to reduce borrowing costs. These innovations took hold first in the unregulated Eurobond market where fixed-rate issuance grew most rapidly. Competition among suppliers of credit enhancements can provide new participants access to the bond markets.

Conclusion

The data on the quantity of new middle-market financing and spreads suggest that two distinct phases followed the emergence of the LDC debt problem. The first post-debt problem phase extended from early 1983, after the debt problem arose, until roughly the end of 1983. This period was characterized by a declining supply of new bank funds (loans and FRNs) to middle-market borrowers.

A plausible explanation for the declining supply of bank funding to the middle-market is that the LDC debt problem widely tainted international lending. Even though middle-market countries did not reschedule debt payments by 1983, the debt problem made rescheduling by sovereign borrowers appear more likely.

The second post-debt problem phase began in 1984 and continued through the first half of 1986, the latest period for which we have comprehensive data. The level of new bank funds continued to decline, but spreads declined as well. Hence this period is characterized by a fall in the demand for bank funds.

The second post-debt problem period coincides with the worldwide boom in securities issuance. Middle-market borrowers benefitted from the declining cost of issuing fixed-rate bonds, reducing their reliance on bank-supplied funds. Since the most creditworthy members of the middle market have gained the most rapid access to nonbank financing, the average riskiness of borrowers that still rely on bank funding has increased.

Jeremy Gluck

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[14] See OECD *Financial Market Trends*, October 1984, pages 70-72.

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Library of Congress Catalog Card Number: 77-646559

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