

## APPENDIX

**Briefing on Strategies for Open Market Operations**

The purpose of the memo from Mr. Sternlight and myself was to alert the FOMC to the pros and cons of the recent shift in the strategy for implementing open market operations--that is, greater emphasis on reacting to the federal funds rate and less on hitting borrowing objectives. It also was meant to raise the question of whether, under what circumstances, and by how much the Committee would like the Desk to shift back toward the previous strategy.

The extent of the change in strategy shouldn't be exaggerated; the level of federal funds rate relative to expectations always played an important role in conditioning open market operations before October 19, and since then the Manager has continued to take some account of reserve pressures as indicated by the level of borrowing when planning his operations. The market has perceived some shift in emphasis, noting both stronger reactions from the Desk when funds are trading away from an assumed center of gravity and a flexible attitude towards borrowing.

The advantage of paying closer attention to the federal funds rate is that you will be more likely to get the rate you expect; the disadvantage is that this could be the wrong rate, and concerns about market reactions and other factor may make it difficult to adjust the rate sufficiently when appropriate. This is also a problem with borrowing objectives, but the use of this technique did allow some limited scope for the market to ease or tighten on its own--frequently in a stabilizing

direction. This occurred in part because estimates of required reserves tended to lag reality, but mostly because incoming information on the economy, prices, and financial markets led to expectations of a change in system policy. The more the Committee emphasizes a federal funds rate objective, the less opportunity there is for this to occur. As the market comes to recognize the desired federal funds rate, the rate will move to that level and generally stay fairly close to it.

The problem is that this rate may not be consistent with achieving the Committee's goals for activity and inflation. Even if it were the appropriate rate initially, it probably soon would not be, after inevitable shifts in the underlying forces working in the economy. The danger would seem especially great right now in light of an unusual uncertainties concerning the strength of demand domestically, the trade outlook and the dollar. To be sure, discretionary changes in the desired rate, as in borrowing targets, could be made, but there would be a certain amount of inertia to overcome. In these circumstances, if the Committee decides to continue emphasizing the federal funds rate in open market operations, it may need to give special consideration to the conditions under which it would expect that rate to be changed over an intermeeting period.

The likelihood of distortions to reserve management and financial markets through the year end, especially in light of some residual fragility in financial markets, will make it difficult and potentially disruptive to shift back toward a borrowing objective over the next few weeks. But the Committee may want to instruct the Desk to review the situation carefully in the new year, with an eye toward finding opportunities to place more emphasis on reserve objectives and to allow more scope for the funds rate to fluctuate.

Donald L. Kohn

December 15, 1987

### Monetary Aggregates Targeting

Two of the memoranda distributed to the Committee were intended to provide background for a discussion of some of the issues related to the choice of target ranges for the monetary aggregates that will occur in February. In particular, it might be useful at this time to review the place of the aggregates in implementing monetary policy, and whether the Committee wishes to reestablish a range for M1 or another narrow aggregate. With respect to the latter issue, the Committee has told Congress it would re-examine its treatment of M1 before deciding finally on 1988 targets, and some observers elsewhere in this city have been advocating that greater attention be paid to M1-A.

The experience of 1987 might provide a useful reference point for consideration of some of these issues. The marked slowing of money growth this year occurred despite a pickup in nominal income growth, and was accompanied by increases in various velocity measures after several years of declines. Most of the behavior of money and velocity in 1987 can be accounted for by the rise in market interest rates. The process by which this came about involved to a important extent Federal Reserve decisions to firm money market conditions. With deposit offering rates either constrained to zero by law in the case of demand deposits or lagging the rise in market rates in the case of liquid retail deposit categories,

monetary aggregates became less attractive assets to hold. The System validated the weakening in money demand by reducing reserve provision to prevent interest rates from dropping back as demands for required reserves declined. The reduction in demand resulting from the rise in rates is reflected in the higher turnover of money so that income was less affected, at least contemporaneously.

Moreover, the aggregates appear to be very sensitive to changes in rates, as can be seen from the elasticities in Table 1 of the memo distributed with the bluebook. The M1 elasticity over four quarters is about twice as large as was estimated in the late 1970's and early 1980's when this aggregate was given heavy weight in policy; the M2 elasticity also is relatively high over the intermittent term relevant to monetary targets. Given such responsiveness, the models can "explain" 4 of the 5 percentage point deceleration of M2 from 1986 to 1987 and 6 of the 9 percentage point deceleration of M1 with interest rate effects alone.

Of course "explaining" and "assessing the implications of" can be two very different exercises. They are particularly so in the presence of high interest elasticities, which in effect enables movements of the aggregates to depart markedly from movements in nominal income when interest rates move appreciably. In this respect, an interest elastic aggregate is just not a very good policy guide. If for example there were an unexpected strengthening in demands for real output, only a small increase in interest rates might be needed to prevent an accompanying acceleration of the money stock, while a much larger one would be necessary to rein in aggregate demand and check the associated inflationary pressures. Adhering to a money stock target under these circumstances could result in an increase in velocity and considerably faster income growth than had previously been contemplated.

Beyond the problems posed by higher interest elasticities, there is the gap between what we can explain and what has actually occurred. Some of this is just the inevitable noise in any estimated demand relationship. But part of it also results from the continuing process of adaptation of the financial sector to deregulation and innovation. In a deregulated deposit market, the relationship between money and income depends on the behavior of depository institutions in setting rates as well as that of the public in reacting to the menu of rates before it. We have made considerable progress in modeling offering rate behavior over the past few years, but it does represent an additional area of uncertainty.

Variations in the money-income relationship can also occur if the public changes the way it manages its financial balance sheet for reasons other than changes in market or deposit interest rates. Something of this sort may have been at work in 1987, when households apparently decided to finance an unusually high proportion of their spending by slowing down asset accumulation; borrowing by households is estimated actually to have declined from 1986. This pattern of behavior reverses a trend of several years in which both sides of household balance sheets were being built up. The reasons for the reversal this year are just as hazy as those for the build up in previous years, but the changes in incentives under the new tax law may have had some effect.

The various factors tending to interfere with the connection between money and income work to some degree on all the aggregates. In comparisons among the various aggregates, M1 seems clearly to come out as the least reliable indicator or target because of its high interest elasticity. M1-A looks better using the model results, but the models

themselves have not done well explaining M1-A growth in recent years. The pattern of model errors suggests that M1-A is more interest elastic; these models suggest this is consistent with its velocity movements in recent years, and would make any comparisons less favorable. The results of some recent work on M1-A are based on a questionable specification of the relationship of this aggregate to the economy, and in any case do not clearly point to superiority for M1-A. Thus the benefits of adding M1-A to the array of aggregates the Committee targets probably would be marginal.

Taken together the evidence and analysis would seem to point toward the need to continue to interpret movements in the aggregates carefully in light of other information about financial markets and the economy. This of course is what the FOMC has been doing for several years. The question is whether there is now any reason to change. Some of the instability in velocity has been associated with the process of adaptation to deregulation, and surely much of this has been completed as banks settle on pricing strategies and the public finishes its initial adjustment to new instruments. But much of the variations in velocity have been related to the swings in interest rates. These have been associated importantly with the inflation and disinflation process since the late 1970's. Judging by 9-1/4 percent bond yields, this is not yet viewed by the market as completed. Further sizable swings in interest rates cannot be ruled out, especially in view of sensitive inflation expectations and uncertainties facing the global economy.

**Notes for FOMC Meeting**

**December 15, 1987**

**Sam Y. Cross**

The dollar has moved down sharply since your last meeting, falling by more than 5 percent against most major foreign currencies. The decline has occurred in an atmosphere of pervasive pessimism about the currency. Market participants continue to express deep skepticism about the commitment of the U.S. and others to policies needed to promote exchange rate stability. The dollar's decline occurred despite substantial amounts of intervention, and despite actions by the authorities in a number of G-10 countries to reduce global imbalances.

In early November, at the start of the period, the dollar was under heavy downward pressure. Market participants were concerned that Congressional efforts to reduce the U.S. budget deficit appeared to be deadlocked. There were many doubts about the official commitment to exchange rate stability following press reports that the U.S. Administration was more concerned about preventing recession than about stabilizing exchange rates. Meanwhile, remarks from officials abroad made the market feel that the Germans for their part were unwilling to adjust their fiscal and monetary policy to stabilize exchange rates.

In that environment, the Desk intervened from November 5th through the 10th, to purchase more than \$1 billion, about two-thirds of it against marks and one-third against yen,



much of it carried out in cooperation with dollar purchases by other central banks. Although the intervention was heavy, market participants, influenced by the press stories concerning the U.S. view about the dollar, assumed that our intervention was aimed at slowing the dollar's downward movement rather than halting its decline.

Thus, it was not until mid-November that the pressures on the dollar began to subside, when this continued intervention was reinforced by official statements--specifically a statement by President Reagan--that began to make market participants more confident that the United States was not looking for a further decline of the dollar. Also, the drop in the U.S. trade deficit to \$14.1 billion for September, announced about the same time, suggested that progress was being made in reducing global imbalances. Another factor was that U.S. budget negotiations appeared to be making some progress, and indications were appearing that the German authorities were in fact willing to pursue more expansionary measures. Over several weeks, the Bundesbank lowered its rate on repurchase agreements with banks from 3.8 percent to 3.25 percent.

Late in November we had news of coordinated interest rate adjustments in Germany and several other European countries, plus the long awaited agreement on a U.S. fiscal deficit reduction program. But this provided only limited, temporary support for the dollar. Although official commentary welcomed these actions, market participants remained skeptical. They

questioned the magnitude of the policy moves here and abroad as well as the willingness of the U.S. Administration to follow through with other needed changes in an election year when fear of recession was emerging as a dominant concern.

In these circumstances, the dollar resumed its decline immediately after Thanksgiving. The Desk again entered the market for the second period of intervention during the six weeks, purchasing a total of \$272 million between November 27 and December 4, once again in cooperation with other central banks. But it wasn't until the Germans and other Europeans took further interest rate action, cutting discount rates, and the market saw those moves supported by coordinated intervention, that the dollar got a few days respite. Then, on December 10, when the U.S. trade deficit for October was announced at \$17.6 billion, dollar exchange rates moved down another step, falling by more than 1-1/2 to 2 percent against the mark and yen within minutes. Again the Desk and other central banks entered the market, purchasing dollars against both marks and yen. This was the third episode of intervention in the period, and in the three business days since the trade figures were announced, the Desk has bought a total of \$351 million.

All in all, the Desk has purchased more than \$1.6 billion in its intervention operations since the last FOMC meeting. Of this amount, \$994 million was against marks and \$654 million against yen.

The Treasury and the FOMC have operated in roughly equal overall amounts, but the currency compositions of the two agencies' intervention have been shifted to take account of the currency composition of their balances. Thus, the Federal Reserve sold \$784 million worth of marks and no yen.

Looking ahead, market participants see little to break their pessimism toward the dollar. They doubt that the U.S. will do much to resist further falls in the dollar. They know that the current account deficit to be financed next year will be large. They know that private inflows financed the bulk of our deficits in 1985 and 1986, but fell off sharply this year, and that official authorities have purchased most of the dollars covering our deficit during 1987. Indeed, data we collect on intervention show that official purchases of dollars by the Group of Ten and other European central banks reached more than \$100 billion during the first eleven months of this year. How much official financing will come in the next year and under what terms is not easy to predict, but there are some signs that are not encouraging. There are reports of shifts into non-dollar currencies: notably, Taiwan is frequently reported to be buying marks and yen for reserve diversification. Also, the

has in the past week shifted its market intervention approach, and has resisted upward pressure on by purchasing large amounts of marks (rather than dollars), even at times when the United States and Germany were selling marks to support the dollar. These purchases of marks by were

undertaken despite the strong protests of Stoltonberg, and apparently in contravention of EC agreements. None of this can make anyone feel very comfortable about the financing of the U.S. external deficit next year.

**Notes for FOMC Meeting**

**December 15-16, 1987**

**Peter D. Sternlight**

The stock market plunge of mid-October, and subsequent market unsettlement, continued to cast a shadow over market developments, and execution of domestic open market policy during the recent intermeeting period. To a considerable extent, the turbulence abated, and more normal trading patterns and relationships were restored, but an edge of nervousness remained as participants and analysts sought to assess the damage that might have been done and review the outlook. Regarding specific financial consequences to market makers, some instances have come to light of significant damage but in general one is struck by the absence of crippling losses that "might have been" given the extent of price moves and the gaps in liquid market making. As to the outlook, some of the instant market reassessments that looked toward an immediate increase in the prospects for business recession in coming quarters have been modified to call for some slowing in the economic expansion, but on most evaluations not a recession.

Desk operations treated reserve targets with particular flexibility over the period, drawing substantial guidance from the Committee's desire to see day-to-day funds rates center around the 6-3/4-6-7/8 percent area, as well as from comparisons of reserve path levels and projections. For the first few weeks of the period, the paths used a \$400 million borrowing level, but

lower levels were readily accepted in association with desired money market conditions. No effort was made to push borrowing up to that level as it became clear that doing so would entail appreciably higher funds rates. By early December, the formal path allowance for borrowing was reduced to \$300 million, but actual borrowing ran below that level as well, while funds continued in the desired range. Indeed, in the two full reserve maintenance periods since the last meeting, borrowing averaged just \$223 million, and so far in the current period the average is about \$150 million. Meantime, the funds rate averaged 6.73 and 6.82 percent, respectively, in the first two reserve periods and also around 6.82 thus far in the current period. Today it's around 6-1/4 -- thanks to snowstorms and high float.

Past relationships would have led us to expect borrowing of \$400 million or more in association with recent funds rates. The dearth of borrowing may be due in part to a desire to conserve window use for what could be more stressful times, or possibly more advantageous times, perhaps around year-end. Also with credit risk under such close scrutiny there may be a particular desire to avoid being seen at the window at all. A further factor, perhaps, is the current low level of seasonal borrowing; such borrowing is typically at low ebb until late winter. To some extent, of course, our own mode of operation could be contributing to the low borrowing; since larger banks typically only borrow at the very end of a reserve period, our actions to relieve this need for a bulge at the end of the

reserve period, in order to avoid an upward push on the funds rate, leave borrowing low for the period. The turn of the year, or soon thereafter, could bring a return toward a more normal borrowing-funds rate relationship, but it would be chancy to place great confidence in this prospect. Flexible allowance was also made for swings in excess reserves, which moved in a wide saw-toothed pattern over the period.

Money growth, which showed signs of rapid expansion in the immediate wake of the stock market plunge, turned quite sluggish in November, with no growth at all in M2 and an actual decline in M1. This left October-November growth of M2 appreciably below the Committee's 6-7 percent indicated pace. Growth in M3 tracked the Committee's pace more closely as banks appeared to take more initiative in adding to non-M2 funding sources--possibly in order to avoid costly year-end problems or to build a cushion against the possibility of bank names coming under pressure. Early December data suggest continued softness in at least the narrow money measures.

The Desk met large reserve needs over the period through a combination of outright and temporary provisions. The large needs were essentially the seasonal increases in currency and required reserves, with currency running a little heavier than usual and required reserves growing a bit less than usual as money growth weakened. The System's total outright purchases were a little over \$8 billion, thus using most of the enlarged leeway the Committee provided. Included were market purchases of

\$2.6 billion in bills and \$4.1 billion in coupon issues, along with \$1.4 billion of bills and notes bought directly from foreign accounts. Incidentally, so far in 1987, the System's outright portfolio has increased, net, by about \$21 billion including \$4 billion in bills and \$17 billion in Treasury coupon issues. (Last year's net rise was about \$20 billion, with much more in bills than coupons.) The Desk also made use of repurchase agreements in the latest period, arranging either System or customer transactions on many days, although we managed to stay out altogether after December 4. Moreover, the size of these temporary transactions was typically more modest than in the days just following October 19, though heavier volume was done in the first couple of days of December when the funds rate temporarily flared above 7 percent.

Yields on fixed income securities, after their sharp drop in the wake of the mid-October stock market collapse, worked slightly higher on balance over the intermeeting period-- especially late last week when the market was shocked by a sharply higher October trade deficit and weaker dollar. Early in the intermeeting period, yields declined further, as foreign rate cuts and early assessments of the economic impact of the stock market collapse fanned some hopes of more overt easing steps in monetary policy. As the period advanced, evidence that the economy was even stronger than had been envisioned pre-October 19, and that the stock market plunge may not have entirely derailed the expansion, led to more sober appraisals of



interest rate prospects. The budget deficit reduction exercise, while considered to be better than nothing, was nevertheless considered unimpressive and uncertain in its ultimate impact, so it was more a neutral than a plus factor. Then, late in the period, the huge October trade deficit and the tumbling dollar augmented market concerns about renewed inflation and produced further upward rate pressure. Just in the last couple of days, though, bond prices recovered again, based at least partly on weaker oil prices.

For the period, intermediate and long-term Treasury rates were little changed to up about 15 basis points. The 30-year bond yield is now around 9.20 percent, up from 9-1/8 before the last meeting, and a low point of about 8.80 early in the intermeeting period. Bill rates were volatile over the period, swinging particularly in response to the ebb and flow of quality concerns elsewhere in the market. Net bill rates rose about 1/4 percentage point over the period. In the latest auction, 3 and 6 month issues sold at 6.00 even and 6.45 percent compared with 5.80 and 6.24 percent just before the last meeting. The Treasury has continued to pay down modest amounts of bills in recent weeks, while adding to coupon issues to cover the ongoing deficit.

In other markets, longer corporate and municipal yields rose less than those for Treasury issues. Some shorter private market instruments showed sharper rate increases, however, particularly where maturities bridge the year-end period.

Many market participants have painful memories of rate pressures at year-end last year. The general expectation is that pressures will be considerably less this year, largely because we don't have the tax-related bulges in credit to contend with. There is still some concern, though, and funding for the weekend that begins December 31 is already quoted at elevated rates. There is also concern that some pressures could begin to build even before year-end--as indeed happened last year. That, too, is expected to be less pronounced than last year, although some analysts have already been saying they expect to see slightly higher funds rates in the next couple of weeks even without any change in policy.

As for policy expectations, market participants pretty much see a stand-off between forces that might lead to greater accommodation--chiefly a softening economy in the wake of the stock market plunge--and forces that could work toward firming, particularly the declining dollar and related concerns about inflation.

On a housekeeping note, I'd like to mention some likely primary dealer list changes coming up. We plan shortly to add three firms to the list, one U.S. based, one Japanese and one British. These would be the first additions in a little over a year. We also expect, quite shortly, applications from two major Japanese banks to acquire existing primary dealers. If these go through--which would entail normal bank regulatory approval as well--it would mean there'd be 12 foreign-owned dealers, half of

them Japanese. During the past year, we've been following developments in the Japanese market closely, and believe they have been making significant progress toward opening their financial markets to greater foreign participation, as well as joining others in working toward harmonized bank capital standards. We learned this morning about the naming of additional foreign members to TSE. There is still some distance to go, though. Moreover, the rapid increase in their ranks as primary dealers gives us some pause and we have in mind giving some weight to that geographic concentration factor as we look ahead. Near term, there may also be some deletions from the primary dealer list, at least temporarily, reflecting consolidations and potential sales of operations.

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Leeway recommendation

Mr. Chairman, current reserve projections running through the next intermeeting period suggest that we may need additional leeway again for changes in outright holdings--this time to accommodate large declines in currency and required reserves in late January and early February. I would suggest that the intermeeting leeway which was temporarily raised to \$9 billion in the latest period, remain at that level for the next period as well.

**FOMC Briefing  
Michael J. Prell  
December 16, 1987**

A good number of economic data have been released since we published the Greenbook a week ago. The fact is, though, that those data have done only a little to illuminate the pattern of developments in the current quarter--and even less to clarify the intermediate-run tendencies that monetary policy might have to deal with. None of the statistical information in hand at this juncture gives us much basis for gauging, in particular, the ultimate effects of the stock market decline on aggregate demand.

Under the circumstances, it should not be surprising that the latest Greenbook forecast is little altered from the one we prepared for the Committee's November meeting. Real GNP growth in 1988 was raised by a couple of tenths of a percent--admittedly not a quantitatively significant change, but one that is consistent with our sense that the stock market decline has not had a devastating effect on consumer or business expectations.

At the same time, however, we clipped a couple of tenths off our 1988 projection of wage and price inflation. While we still are projecting a clear acceleration of wages, it looks to us like pay increases are coming in a little lower at this point than we had anticipated, and the prevailing mood of caution and focus on cost-cutting and job security are likely to continue restraining wage gains for a while longer.

As you know, the key feature of our forecast is the marked slowing in real GNP growth by early 1988. Basically, our thesis was that the stock market drop would begin soon to leave its mark on consumer spending, and that wary businessmen would move very quickly to trim orders and production so as to avoid any notable buildup of inventories. The available information doesn't provide many hints that this deceleration is yet in train. Indeed, the labor market data through November suggest substantial strength in employment and wage and salary income, and this was the major reason why we raised our projection of fourth-quarter GNP growth from 2-1/4 percent to 3 percent.

As I noted earlier, the incoming data of recent days have not added much to our understanding of how this quarter is developing. Rather, they have created a puzzle. On the one hand, the strong gains estimated for industrial production--0.4 percent in November on top of an upward-revised 0.9 percent in October--reinforce the notion that we had considerable upward thrust coming from a manufacturing sector that is benefiting from improved international price competitiveness and increased business investment.

The other data received since last Wednesday, however, leave us wondering where all that production has been going. The November increase in retail sales was in line with our expectations, but the sizable downward revisions in September and October would force us to write down a considerably deeper fourth-quarter decline in real consumer spending than the 2 percent annual rate shown in the Greenbook.

The merchandise trade data for October were similarly disappointing--especially the surprising decline (on a seasonally adjusted basis) in our nonagricultural exports. Even making due allowance for the tremendous volatility of these numbers, they suggest a moderate downward revision to the gain in real net exports we had forecast for this quarter.

Inventory investment in October, in contrast, evidently was stronger than we had anticipated but the added accumulation doesn't seem to have been great enough to fill the gap between output and spending. Nor does the anecdotal information give one the sense that a very large inventory buildup is in process.

We received one additional current indicator this morning. Housing starts were up somewhat more than we had expected in November, at 1.64 million units versus 1.52 in October. The improvement reflected a bounceback in the multi-family category, which had dropped noticeably in the prior month. The decline in interest rates seems to be providing an offset to the stock market drop in the single-family sector. These stronger starts will, however, do little to raise current quarter construction outlays.

My own guess is that we shall see some better numbers on final spending in the remaining data for the fourth quarter. However, it also appears quite possible that real GNP growth will fall a bit short of our 3 percent Greenbook forecast and that a greater share of the output will end up in inventories. Such a mix-shift would, of course, make more likely the first-quarter output deceleration we have forecasted.

A poll taken by the National Association of Business Economists recently showed 7 percent of respondents saying that the economy already is in recession and another 43 percent saying a recession will occur by the end of 1988. While the recession-now scenario seems unduly pessimistic, any reasonable confidence interval around our forecast certainly would encompass the possibility of a modest downturn in activity. But, as we perceive the outlook, even with an allowance for a significant negative stock market effect, recession does not seem the most likely outcome. We continue to believe that the foreign trade sector will provide substantial support to output and employment growth. U.S. competitiveness has improved, and the stronger G-10 expansion in the third quarter and the easing actions taken by European monetary authorities also are a source of some encouragement. The impetus from trade improvement should, in turn, help to sustain capital spending. I might note that the Commerce Department put out its survey of 1988 plant and equipment spending plans. It shows a 7.3 percent nominal increase over 1987--just a shade above our projection. The survey responses came in between early October and early December, so they probably don't reflect any stock-market influence.

We have continued to build a moderate further decline in U.S. interest rates into our forecast, and this provides additional insurance that the economy will be able to reestablish solid upward momentum in the latter part of 1988, after the wealth effects of the stock market have taken their toll on consumer demand. Should consumers not respond

much to that wealth reduction, however, the outlook for 1988 would, in our view, be considerably more robust--perhaps robust enough to result in a noticeable decline in unemployment and rise in capacity utilization. In such circumstances, a substantial increase in interest rates might well be necessary to temper the rise in aggregate demand and avert a serious deterioration in wage and price trends.

By depicting these two scenarios, I certainly don't want to suggest that a wide range of other possibilities doesn't exist. However, I believe both scenarios are well within the range of plausible outcomes, and they point up what we perceive to be a dilemma for the Committee: namely, given the lags in the effect of policy action, an easing or tightening step might be appropriate now, but it isn't clear which. This, of course, isn't an unprecedented problem, but the present situation--with its unusual overlay of international considerations--seems to involve extraordinary imponderables.



Donald L. Kohn

December 16, 1987

### **Monetary Policy Alternatives**

A major issue for the Committee in considering its short-run alternatives is the interpretation of recent monetary data and its implications for the economy. Monthly data have been distorted by the bulge in demand deposits that followed the stock market crash. The run-off of that bulge was a major influence on November growth, especially for M1. But weakness has persisted into early December. Indeed, information received over the past two days suggests that M1 will decline again in December, and that the pickup in M2 growth will be less than had been projected in the bluebook. Taking account of our new projections for December, and averaging through the ups and downs of recent months, we now project that M1 will increase at around a 1-1/2 percent annual rate over September to December, M2 at around a 3-1/2 percent rate and M3 a little over 5 percent. This would represent a shortfall from expectations at the November meeting, and, especially for M1, a further slowing from the pace previously recorded this year.

Part of the shortfall arises because the staff had built some heightened liquidity demands into its projections last time, and these haven't materialized. In the absence of such demands, fairly slow growth is not entirely unexpected. Interest rates had risen through mid-October, and the same forces that have been restraining monetary expansion through the year undoubtedly have been at work in the fourth quarter. In fact, on a quarterly average basis, growth in the fourth quarter is not far different than would be

predicted by the models, which see earlier increases in interest rates as still damping money growth. And it is close to expectations at the September meeting. The major surprise continues to be in demand deposits, which are projected to be dropping substantially further in December. While demand deposits have been weak at all types of banks, the very largest money center banks have experienced a disproportionate decline this year. The weakness in these deposits tends to feed through into M2, since it probably does not reflect shifts into other M2 components. Unfortunately, I have had no new insights on this subject overnight. Committee members may remember that we were equally puzzled by the strength of demand deposits in 1985 and 1986, and conducted several special rounds of follow-up calls to banks and their corporate customers. The answer we received most consistently referred to interest rate effects, especially on compensating balances. And the concentration at largest banks suggests that this type adjustment of business accounts remains an important channel. A further factor we uncovered in the process of assessing rapid demand deposit growth was the role of mortgage prepayments, which, because of certain regulations in the mortgage market, tend to be lodged in demand accounts for a time. The rise in prepayments as interest rates fell likely boosted demand deposit growth in 1986, and their slackening probably has contributed to weakness this year. For all these rationales, the question remains as to whether the decrease in the demand deposits and shortfall in broader aggregates is signalling a fundamental tightening of liquidity in the economy that will lead to considerable restraint on economic activity.

Collateral evidence in financial markets on the thrust of policy in the most recent period presents a mixed picture, as interest rates rose and

stock prices fell on balance, but the dollar dropped sharply. While the decline in the dollar might be consistent with an expectation of a weakening economy and prospective declines in interest rates, the response of the bond market suggested that the drop in the dollar was seen to arise from other sources, and concerns were more that the lower dollar would be strengthening the economy and prices over time. The yield curve retains a fairly steep upward slope, which generally indicates that the market, at least, expects that the trend in policy is more likely to need to be toward restraint than ease.

The bluebook paths have built into them some pickup in money growth over the next several months. Basically, this strengthening arises from the lagged impact of the decline in interest rates in late October. Under alternative B, which assumes that rates remain about where they are, the pickup is only expected to bring money growth about in line with income, in part because the decline in interest rates after October 19 merely brought them back to their levels of August. Thus, without further rate declines, the impact on money demand also is modest, essentially undoing the effects of previous increases since August.

Whether such an outcome is satisfactory, or how the Committee would like to calibrate the Desk's response to additional information over the intermeeting period, could depend on a weighing of the risks in the outlook. Alternative B may not be sufficient to assure a satisfactory expansion of the economy if the stock price decline does have a substantial impact on demand, as in the staff forecast. As Mike has mentioned, that forecast, and in particular the pickup in activity the second half of the next year, depends in part on an assumed further easing of policy, indexed by lower interest rates and more

rapid money growth than under alternative B--especially if the unchanged conditions of that alternative were maintained well into next year. If the risks were seen on this side, but the Committee did not want to ease until trends were clearer, it could tilt the intermeeting adjustments in the directive in the direction of ease. In this context, a failure of money to pick up substantially could be seen as adding to, or at least signalling, a shortfall in the economy. If this were a concern, the Committee could indicate that in judging the need for intermeeting adjustments the Desk should put a little more emphasis on incoming money data, especially if it continued to come in weaker than expected.

On the other hand, the effects of the recent dollar decline could be seen as shifting the risks more to the inflation side. Especially if the decline in the stock market did not seem to be having very marked effects on domestic demand, slow money growth in this context would be needed to damp domestic demand to reduce pressures on capacity and prices as the impact of the lower-dollar showed through. Under these circumstances, the Committee would not want to lean toward ease, and might need to consider the possibility of tightening should the dollar decline seem to be gathering momentum.

With respect to the directive, the draft in the bluebook moves back toward the standard language in use in recent years, but retains some sense of the need for special flexibility. It is sufficiently general to fit most choices the Committee might make about the strategy for implementation over the coming period, except perhaps for either extreme--that is, a complete and immediate return to borrowing targeting, or a further and more permanent shift to looking exclusively at federal funds rates.

BOARD OF GOVERNORS  
OF THE  
FEDERAL RESERVE SYSTEM

# Office Correspondence

Date October 29, 1987

To Federal Open Market Committee

Subject: Definition of the Borrowing

From Donald L. Kohn

Objective

The attached memorandum responds to questions about the treatment of two types of discount window credit in the implementation of monetary policy under an operating procedure keyed to an objective for discount window borrowing. The first section of the memorandum (beginning on page 2) deals with "special situation" borrowing--borrowing classified as adjustment credit that does not share the usual characteristics of such credit. Generally the Desk treats such borrowing analogously with extended credit by excluding it from borrowing levels sought under its basic borrowing objective. The question was raised as to whether such treatment, perhaps acting through effects of published data on market expectations, might not result in tighter money market conditions than intended. The second section (beginning on p. 8) addresses the issue of whether the inclusion of seasonal credit in the borrowing objective imparts a systematic seasonal pattern to the federal funds rate.

As discussed in the previous memorandum to the FOMC on the federal funds rate and the borrowing objective, the relationship between those two variables is fairly loose. The evidence presented in this memorandum suggests that the current treatment of the two types of credit in question has not contributed to the imprecision of that relationship or to systematic movements in the federal funds rate. Thus, the results do not present a case for altering current procedures.

This subject has been tentatively scheduled for discussion at the upcoming FOMC meeting, depending on whether there is time available once the Committee has completed its regular business.

# Office Correspondence

Date October 29, 1987

To Mr. Kohn

Subject Treatment of Special Situation and

From David E. Lindsey and Gary Gillum<sup>1</sup>

Seasonal Borrowings in Desk Operations

At a recent Board meeting, questions were raised about the appropriate treatment of special situation borrowing in Desk operations aimed at attaining the FOMC's specified level of adjustment plus seasonal borrowing. Also reemerging was the issue of the appropriate treatment of seasonal borrowing, which had been briefly reviewed in a previous memorandum to the Federal Open Market Committee,<sup>2</sup> discussed by the Committee at its July 7 meeting, and examined in more detail at a Board seminar on July 30. The body of this memorandum addresses the implications for policy implementation of both of these issues. Appendix A presents econometric evidence on the relation of special situation borrowing and the funds rate. Appendix B presents econometric evidence on the relation of seasonal borrowing and the funds rate.

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1. James Glassman and Mary Hoffman assisted in the preparation of this memorandum.

2. David E. Lindsey and James Glassman, "A Review of the Relation of the Funds Rate and Intended Discount Borrowings," Board staff memorandum to Donald Kohn, July 1, 1987, page 7; transmitted to the Federal Open Market Committee with a cover memorandum from Donald L. Kohn, "Attached Study of Borrowing and the Federal Funds Rate," July 1, 1987.

**Special situation borrowing**

Special situation borrowing is discount credit that, while classified officially as adjustment credit, occurs in circumstances that disrupt the normal interaction of bidding for funds in the market and administrative pressures at the discount window. Frequently, such borrowing is by a troubled institution whose normal market access has been cut off, but whose borrowing is classified as adjustment until the protracted nature of the funding problem becomes clearer and the credit is reclassified as extended credit. At other times, random events such as computer breakdowns may give rise to very large short-term funding needs that force a depository institution temporarily to use the discount window in volume to avoid an overdraft. Finally, when borrowings surge on the settlement day just prior to a Thursday holiday, borrowing in the next maintenance period begins at an artificially high level -- unrelated to reserve pressures in the new statement period -- and the Desk often will make an allowance by considering such borrowing to be of a special situation nature.

An extreme example of the first type of special situation borrowing occurred in May and early June of 1984 when Continental Illinois borrowed massive amounts of adjustment credit -- at one point nearly \$5 billion -- before its borrowing was reclassified as extended credit. The computer outage at the Bank of New York on November 21, 1985, which resulted in the bank borrowing nearly \$23

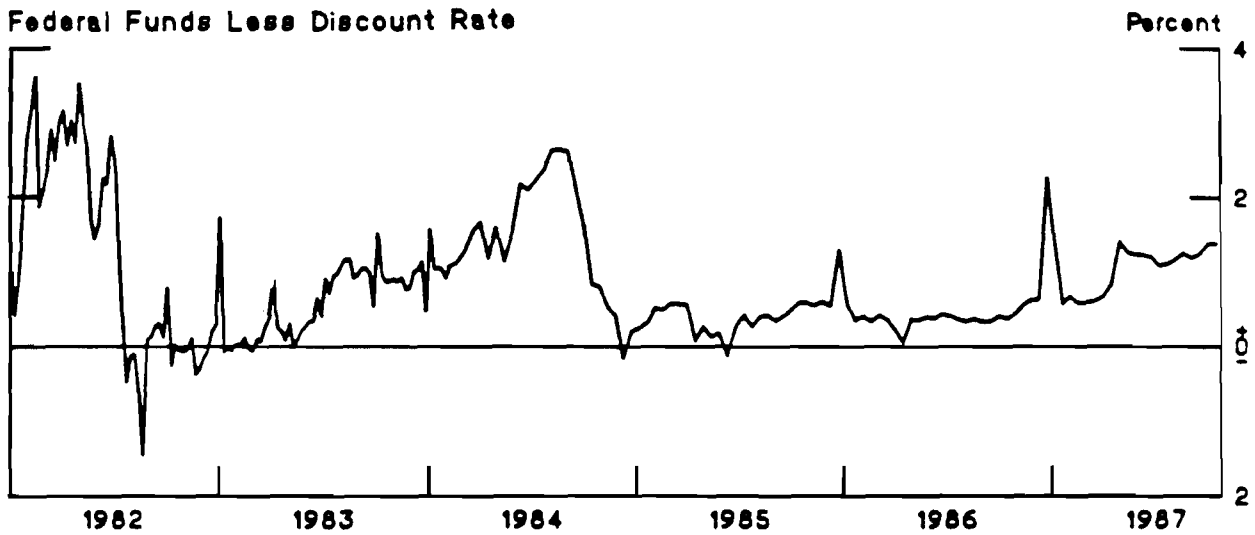
billion in adjustment credit that night, is a notable example of the second type of special situation borrowing. Although the Federal Reserve put considerable pressure on the Bank of New York to resolve its computer problems as soon as feasible, and the bank obtained some funds in the federal funds market, it was impossible for that bank to raise more than a small fraction of needed funds, and adjustment credit was provided to cover the bulk of the associated account deficiency. As a final example, borrowing surged on settlement day prior to the Thanksgiving Day holiday in 1984, giving rise to considerable special situation borrowing in the following maintenance period, as may be seen in chart 1.

Because of the character of the circumstances giving rise to special situation borrowing, the operating presumption has been that such borrowing is akin to extended credit in its impact on funds market conditions. That is, given an offsetting reduction in nonborrowed reserves to maintain a predetermined volume of other adjustment plus seasonal borrowing, special situation borrowing should have little effect on the federal funds rate. Thus, the Desk normally makes either a formal or informal adjustment to treat special situation borrowing along with extended credit as similar to nonborrowed reserves and to exclude it from the measure of adjustment plus seasonal borrowing that the Desk attempts to keep at the FOMC's specified level.



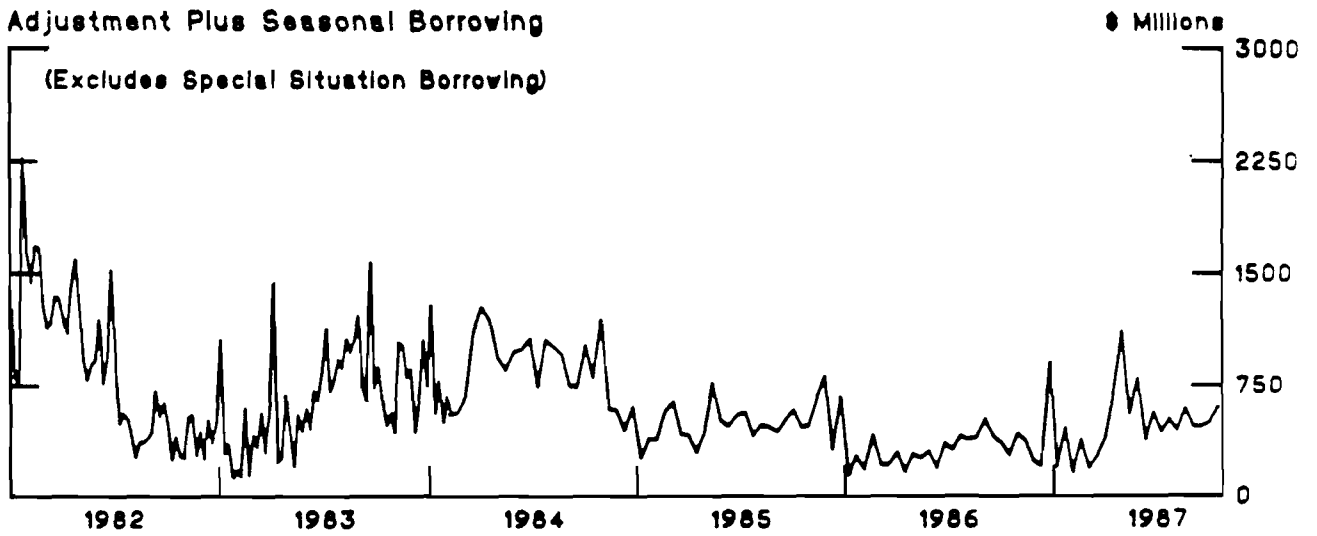
Chart 1

Federal Funds Less Discount Rate

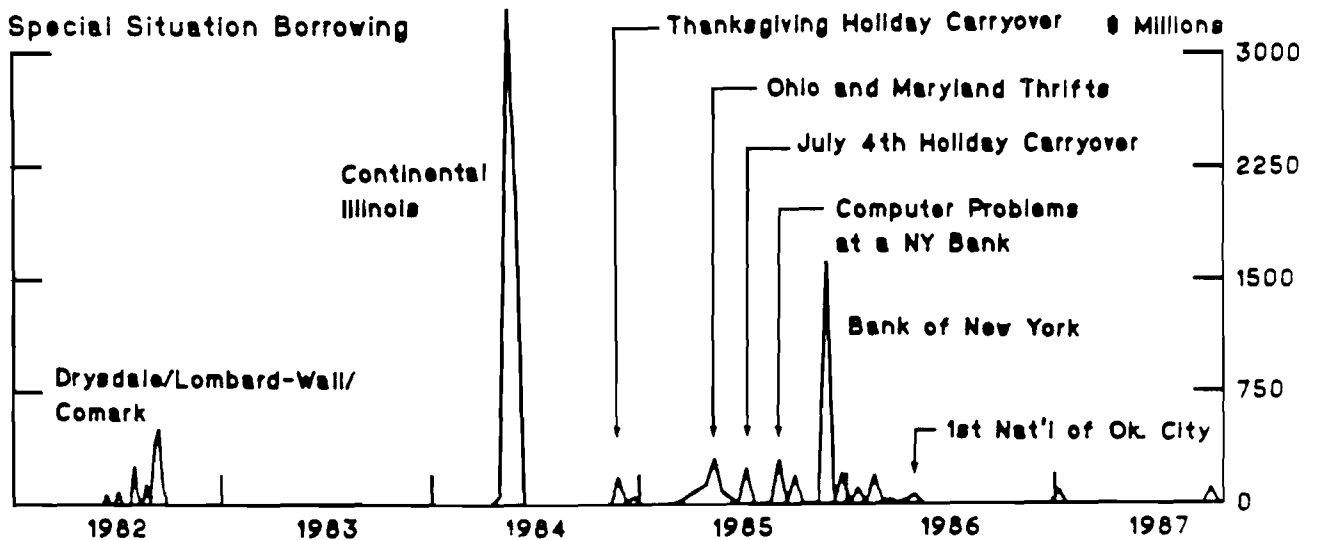


Adjustment Plus Seasonal Borrowing

(Excludes Special Situation Borrowing)



Special Situation Borrowing



NOTE: Maintenance period averages.

The issue raised at the recent Board meeting involved the potential in this approach for market participants to misperceive the FOMC's intentions. Market participants monitor published values of adjustment and seasonal borrowing for indications of the FOMC's current specification of intended pressure on reserve positions. However, special situation borrowing is not identified as a separate component of adjustment credit in the published statistics. Thus, market participants could incorrectly interpret a figure for adjustment credit that is enlarged by special situation borrowing as a sign of Federal Reserve tightening of reserve provision when no such policy move is intended. The resulting altered expectations of the Federal Reserve's policy stance could place temporary upward pressure on the federal funds rate independent of actual reserve provision.

The alternative approach would be to forego the adjustment for special situation borrowing and for the Desk to try to keep all adjustment plus seasonal borrowing, including special situation borrowing, at the FOMC's specified level. However, if the analysis behind the current treatment of special situation borrowing is correct, this alternative approach would result in an undesired easing of funds market conditions when such borrowing occurred. Including special situation borrowing in a targeted amount of adjustment plus seasonal borrowing would imply a dollar-for-dollar decline in the rest of adjustment plus seasonal borrowing as

special situation borrowing occurred. Lessened pressure on reserve positions as the rest of borrowing fell would tend to induce a decline in the spread of the funds rate over the discount rate that would be at variance with the expected funds rate outcome given the FOMC's intended policy stance.

In fact, the occurrence of special situation borrowing does not appear to have systematic effects on the federal funds rate. Chart 1 plots the funds rate-discount rate spread in the top panel, adjustment plus seasonal borrowing excluding all special situation borrowing in the middle panel, and special situation borrowing in the lower panel. The maintenance-period data span the years from early 1982 to date. Although a loose association between the spread and adjustment plus seasonal borrowing excluding special situation borrowing is apparent to the naked eye, no clear distortion of the relationship resulting from the occurrence of special situation borrowing, apart perhaps from the aftermath of the Continental Illinois episode, is evident.

Econometric evidence reinforces this judgment. It strongly suggests that, since early 1982, special situation borrowing apart from the fallout of the Continental Illinois episode in the summer 1984 has had no significant impact on the funds market once account is taken of the effect of the rest of adjustment plus seasonal borrowing. (See Appendix A.) The Continental Illinois episode, moreover, appeared not to reflect a direct impact of Continental's borrowing on

the funds rate, but rather an indirect effect on the willingness of other banks to tap the discount window. With Continental's funding difficulties shaking public confidence in the banking system generally, large institutions in particular became more reluctant to use the window out of a desire to avoid rumors about their own financial condition.

This evidence thus suggests that special situation borrowing in itself has not systematically added to funds market pressure through any mechanism. The Desk's procedure has been to offset the reserve injections from special situation borrowing by reductions of nonborrowed reserves. If such borrowing had put independent upward pressure on the funds rate, either through market misperceptions of FOMC intentions or through the market pressures usually associated with adjustment borrowing, the econometric evidence (in Appendix A) would be expected to reveal a positive association between the funds rate and such borrowing. But it does not. Thus, the treatment of special situation borrowing in the Desk's implementation of the FOMC's monetary policy in general does not seem to have given rise to funds market distortions.

The lack of a systematic effect on the funds rate through a market misperception channel seems to have reflected market participants' knowledge of the way the Desk treats such borrowing and their reasonably accurate estimates of its approximate size when it appears in published reserve statistics. Their estimates have been

derived in part from the breakdown of Wednesday borrowing data by Federal Reserve district that appears on the weekly Federal Reserve condition statement published on Thursday for the week ending the previous day. This information, combined with market intelligence about funding difficulties of particular institutions, at the very least alerts market participants that adjustment plus seasonal borrowing may be unusually high, but may even enable them to identify the approximate magnitude of the special situation component of published adjustment borrowing. As an important supplemental source of information, the press officer at the Federal Reserve Bank of New York normally indicates to reporters at the Thursday afternoon press conference when the amount of borrowing has been appreciably distorted by a special situation. In addition to reporting this information, the press may well attempt to develop the story further through their own independent inquiries. The market also has made inferences about FOMC intentions from the behavior of the funds rate itself.

In the recent instance, when average adjustment borrowing for the week ending September 30 was distorted by about \$150 million of special situation borrowing associated with wire problems in the New York district, market participants had a good handle on the size of the impact on adjustment borrowing. More special situation borrowing, arising from further wire problems and the California earth-

quake, early in the following week helped to bloat the two-week average effect on adjustment plus seasonal borrowing to around \$100 million, which the Desk treated as akin to non-borrowed reserves. Even so, the market apparently correctly inferred from the actual borrowing of \$725 million and emerging conditions in the funds market that the borrowing assumption used by the Desk in constructing reserve paths was in the area of \$600 million.

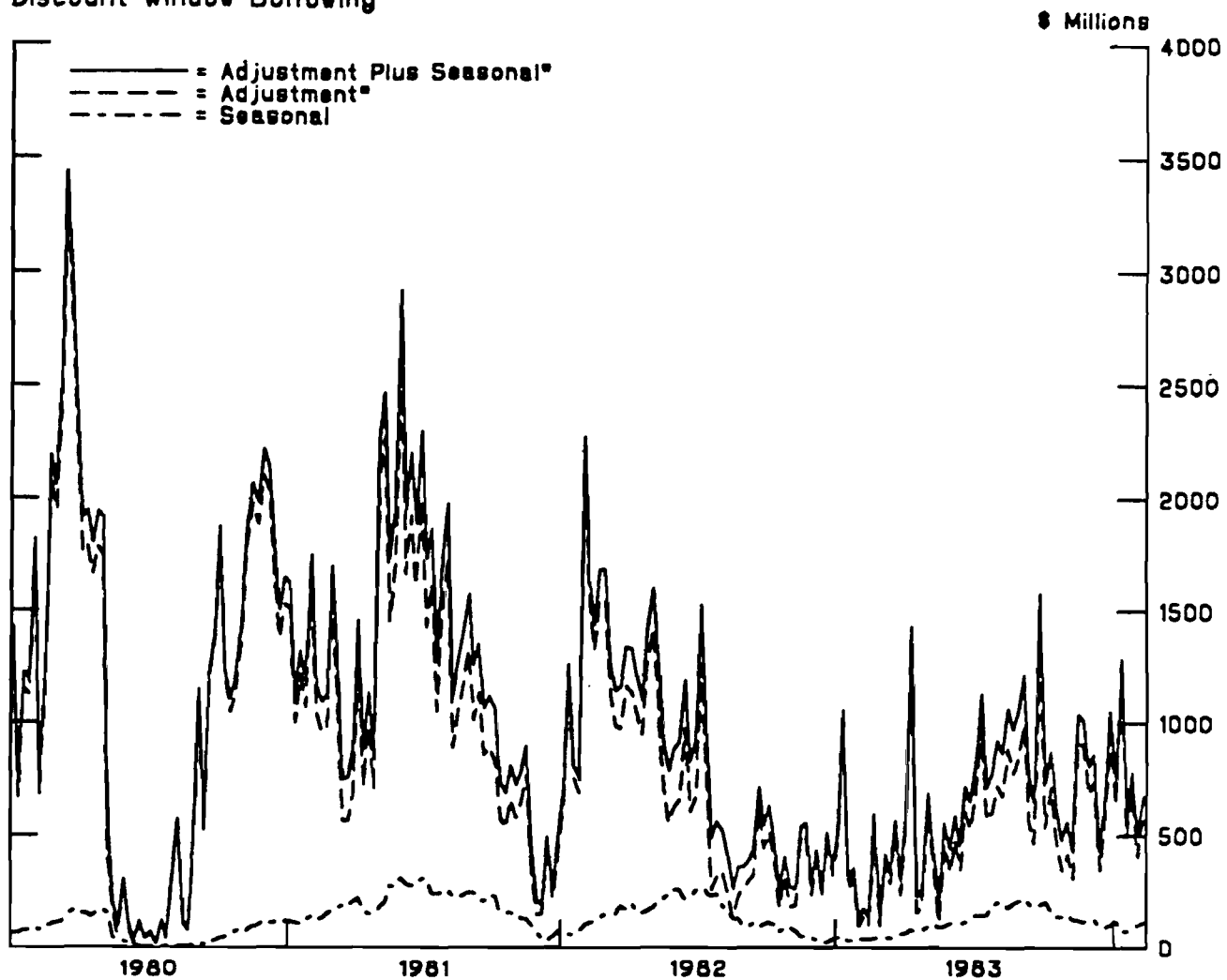
### **Seasonal borrowing**

Seasonal borrowing has displayed a significant seasonal pattern in the 1980s. The top panels of charts 2 and 3 show seasonal borrowing as the irregular broken line for the subperiods of lagged and contemporaneous reserve accounting, respectively. (Adjustment borrowing is the dashed line, while adjustment plus seasonal borrowing is the solid line.) With seasonal borrowing related primarily to the financing needs of small agricultural banks, such borrowing reaches a harvest-season peak during in the third quarter, and a trough early in the first quarter.

Seasonal borrowing also seems responsive to the spread of the funds rate over the discount rate, shown in the lower panel. For example, the negative spread in 1980 brought seasonal borrowing down to minimal levels, even in the third quarter of that year, while the relatively sizable spreads in 1981 and 1984 induced relatively large amounts of seasonal borrowing. The evident interest responsiveness of

Chart 2

Discount Window Borrowing



Spread of Federal Funds Rate Over Discount Rate

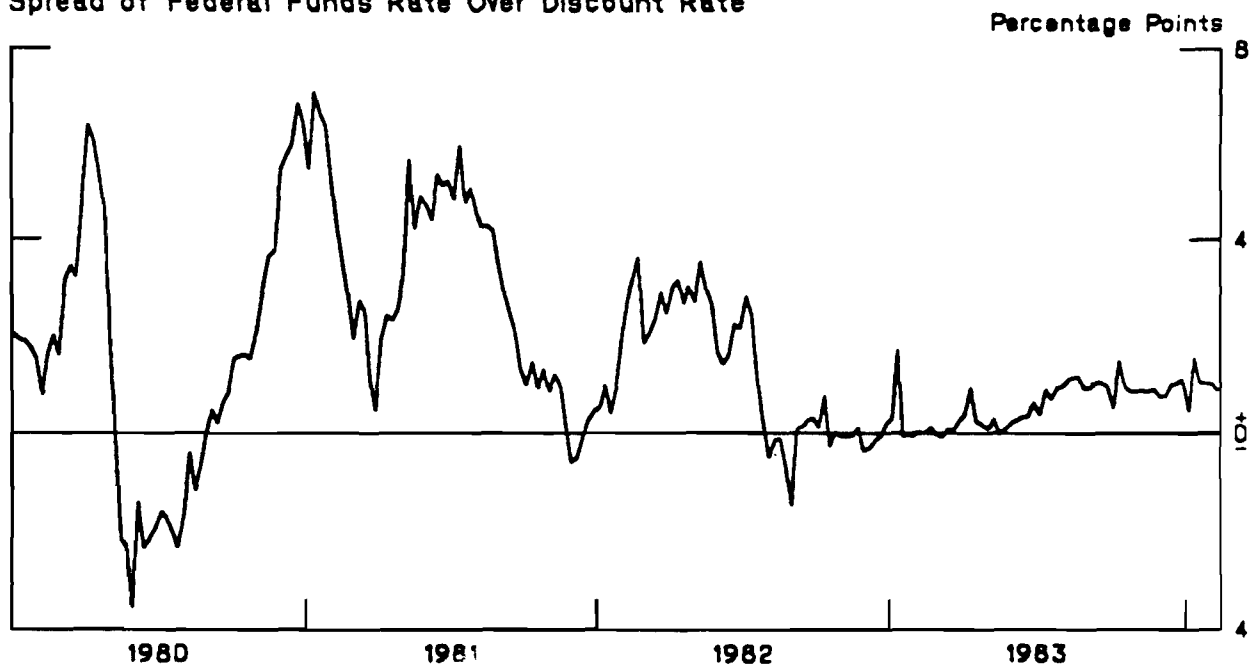
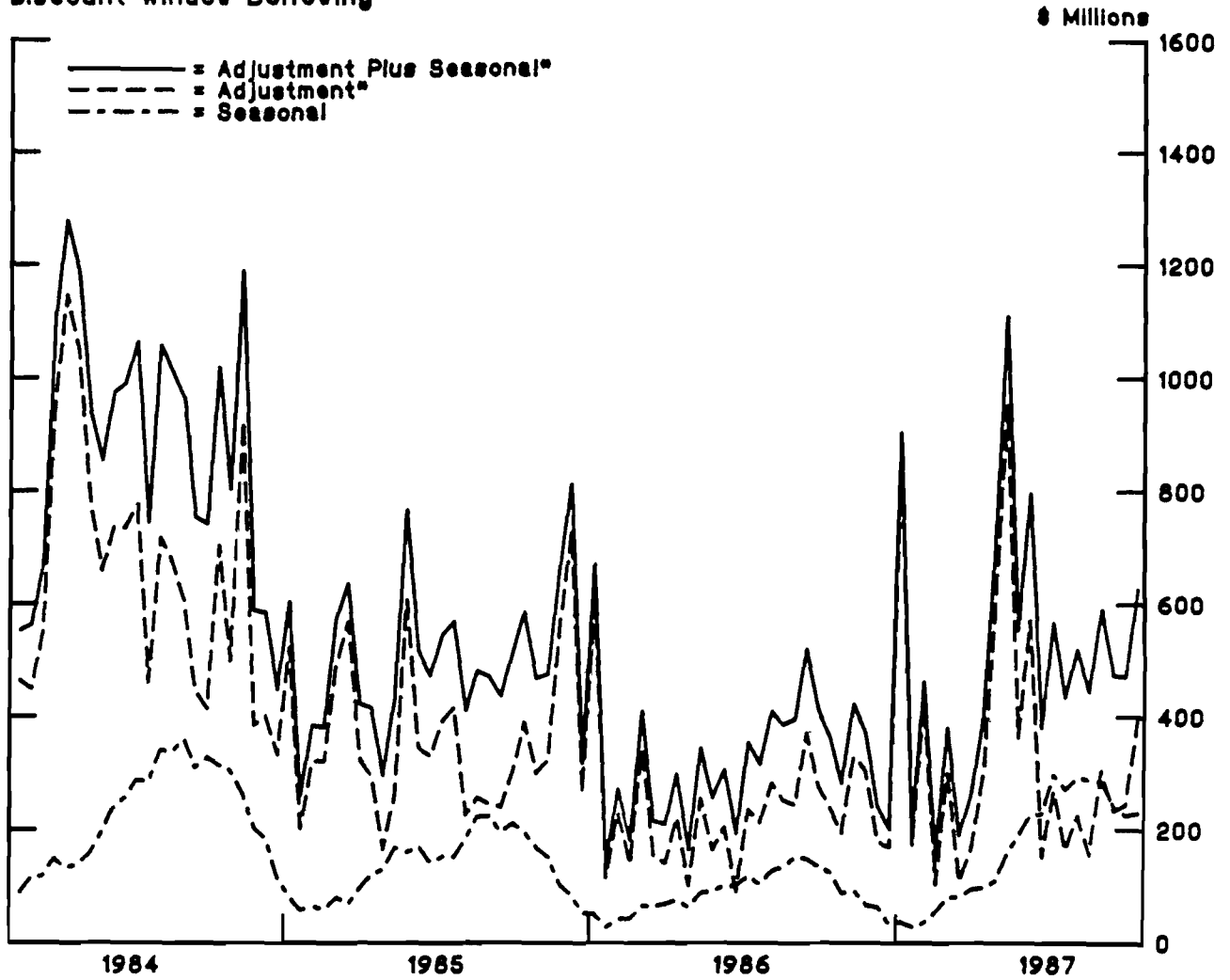
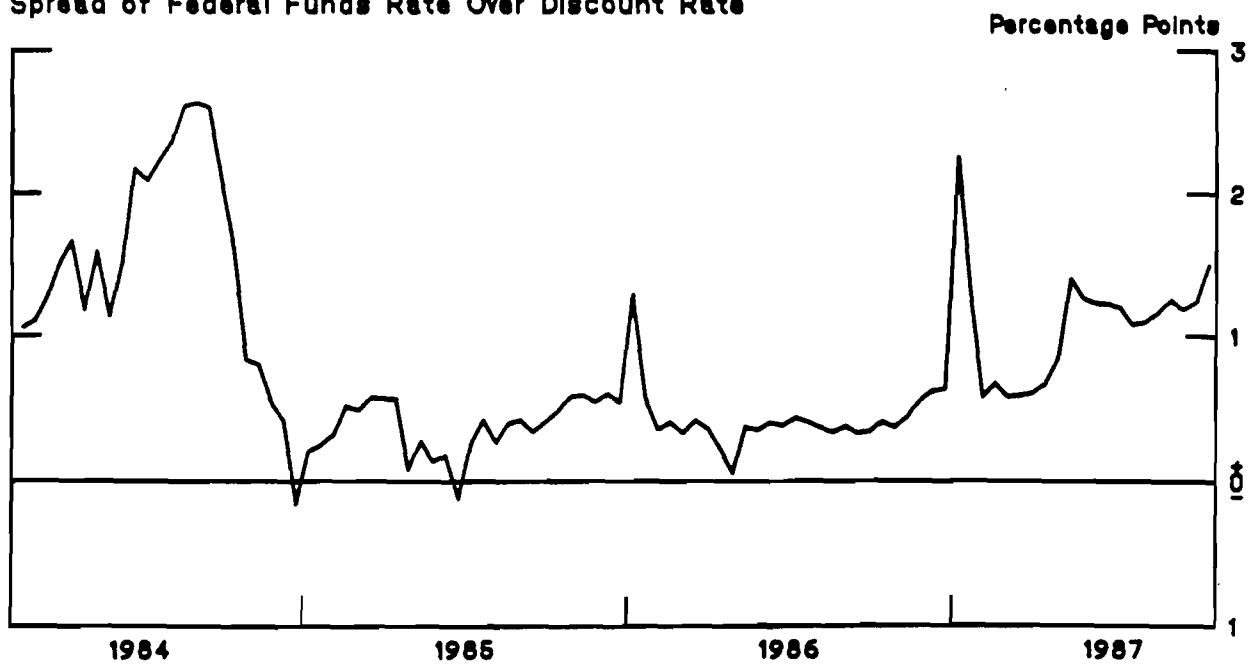


Chart 3

Discount Window Borrowing



Spread of Federal Funds Rate Over Discount Rate



\* Excludes special situation borrowing.



seasonal borrowing is clearly less pronounced than for adjustment borrowing.

Primarily in recognition of the interest sensitivity of seasonal borrowing, the FOMC has included such credit in the borrowing measure used to index its intentions for pressure on reserve positions. This treatment, though, has produced a long-standing debate about whether or not the seasonality in seasonal borrowing could tend to induce an inverse seasonal pattern in the federal funds rate. For example, as seasonal borrowing rises for a given spread going into the third quarter of the year, adjustment credit will have to decline for the Desk to maintain the sum of the two at an intended level. Given the discount rate, the funds rate in principle would tend to fall each summer to bring about the needed decline in adjustment borrowings.

One alternative procedure would be to exclude seasonal borrowing from the targeted measure, and for the FOMC to specify its intentions in terms of adjustment borrowing alone. This approach would be designed to eliminate the potential for induced seasonality in the federal funds rate. Even if seasonal borrowing is responsive to the spread, the lack of seasonality in the adjustment borrowing relation to the spread would then preclude seasonality in the funds rate. And if the relationship between adjustment borrowing and the spread is at least as predictable as that for adjustment plus seasonal borrowing, the funds rate would

then be at least as predictable given the FOMC's intentions as under the current procedure.

Another alternative procedure would be for the Desk to alter its target for adjustment plus seasonal borrowing over the course of the year to account for the estimated seasonal movements in seasonal borrowing. That is, the borrowing target would be raised in the third quarter above its basic level as seasonal borrowing rose and would be reduced in the winter below its basic level as seasonal borrowing fell.

Charts 2 and 3, however, do not suggest a tendency for the funds rate spread to vary inversely with the level of seasonal borrowing, by falling in the third quarter and rising in the winter.<sup>3</sup> Nor do charts 2 and 3 suggest that this lack of pattern in the funds rate reflects an offsetting seasonal pattern in the sum of actual adjustment plus seasonal borrowing -- for example, a systematic rise in the third quarter and fall in the winter.

Econometric methods confirm the absence of a statistically significant seasonal pattern in the relation of adjustment plus seasonal borrowing to the spread despite a significant seasonal pattern in the relation of seasonal borrowing alone to the spread under the two-week maintenance period regime in place since early 1984. (See Appendix B.)

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3. A year-end spike in the funds rate has emerged in the last two years, but it appears to have been related to special year-end pressures, such as heavy financial transactions volume and larger-than-expected demands for excess reserves, rather than to low seasonal borrowing.

One possible explanation is that market expectations of Federal Reserve intentions and arbitrage by larger banks across maintenance periods prevent potential seasonality in the relation of the spread to the sum of adjustment plus seasonal borrowing from showing through in the funds rate-discount rate spread. Another possibility is simply that the seasonal movements in seasonal borrowing, which are relatively small in magnitude despite their statistical significance, are swamped by random noise in the relation of total borrowing to the spread and thus difficult to detect with statistical methods.

Additional statistical evidence (also reported in Appendix B) indicates that if the Desk had simply been targeting the level of adjustment credit since early 1984, no significant change in the predictability of the funds rate would have resulted. Nor would the funds rate have been more or less predictable if the Desk had formally adjusted the operating target for adjustment plus seasonal borrowing to account for the estimated seasonal movement in the seasonal borrowing relation over the same period, according to another test.

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4. Another possible explanation -- that the seasonal pattern in seasonal borrowing tends to be offset by opposite movements in adjustment borrowing, as institutions substitute one form of discount credit for the other -- is rejected by the lack of statistically significant seasonality in the relation of adjustment borrowing to the spread.

## Appendix A

### Econometric Estimates of the Impact of Special Situation Borrowing on the Funds Rate

The econometric evidence reported in table A1 bears on the responsiveness of the spread of the federal funds rate over the discount rate to special situation borrowing given the remaining amount of adjustment plus seasonal borrowing. Column 1 simply updates through the October 7 maintenance period an equation relating the spread as the dependent variable to adjustment plus seasonal borrowing, excluding special situation borrowing, a constant term, and two dummy variables representing shifts in the constant term for the Continental Illinois episode of the summer of 1984 and for the period since 1986. An equation of this form was reported and discussed at length in an earlier memorandum to the FOMC.<sup>1</sup> Column 2 then adds to this equation three variables representing special situation borrowing by Continental Illinois, the Bank of New York, and all other institutions, respectively.

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1. See Lindsey and Glassman, *op. cit.* In this appendix, though, the equations are estimated with ordinary least squares rather than the two-stage least squares procedure with instrumental variables reported in the earlier memorandum. This change is designed to isolate better the interaction in the current maintenance period of different borrowing variables in affecting the funds rate spread over the discount rate. The results for special situation borrowing were little different when two-stage least squares were employed, while the other regression coefficients were more in accord with a priori expectations.

Table A1

Estimates of Borrowing Functions<sup>1</sup>  
 (The Spread of the Funds Rate over the Discount Rate is the Dependent Variable)  
 (Percentage points; early 1982 to present)

	(1) Without Special Situation Borrowing	(2) With Current Special Situation Borrowing	(3) With Current and Lagged Special Situation Borrowing
1. Constant	.40 (2.1)	.41 (2.1)	.42 (2.0)
<u>Adjustment plus seasonal borrowing<sup>2</sup></u>			
2a. Excluding special situations	.06 (6.7)	.06 (6.6)	.06 (6.5)
Special situation borrowing			
2b. Continental Bank		-.02 (-1.7)	-.02 (-1.6)
2c. Lagged one period			.01 (.1)
2d. Bank of New York		-.01 (-.5)	-.01 (-.6)
2e. Lagged one period			.01 (-.3)
2f. Other special situations		-.01 (-.2)	.00 (-.1)
2g. Lagged one period			.01 (.3)
<u>Dummy variables representing shifts</u>			
3. Summer 1984	.38 (1.3)	.37 (1.3)	.45 (1.5)
4. 1986 to present	.28 (1.0)	.29 (1.0)	.22 (.6)
<u>Summary regression statistics</u>			
5. R <sup>2</sup> (adjusted)	.81	.81	.81
6. Standard error of estimate	.38	.38	.39

1. Uses an ordinary least squares procedure. Fit over maintenance periods between January 6, 1982 and October 7, 1987. T-values appear in parentheses.

2. Coefficients represent the rise in the funds rate in percentage points associated with a rise in borrowing of \$100 million.

None of the three variables is statistically significant, judging by the t values in parentheses. The fit of the equation also is not altered, as may be seen by comparing the standard error of estimate (line 6) and the adjusted  $R^2$  (line 5) in columns 1 and 2. The variable measuring special situation borrowing by all institutions other than Continental and Bank of New York has no systematic effect on the funds rate. Of course, Continental's funding crisis had in indirect effect on the borrowing function by altering the attitudes of other banks toward use of the window, as represented by the dummy variable for the summer of 1984.<sup>2</sup> But once account is taken of the impact on the readiness of other banks to rely on discount window credit in the summer of 1984 through the first dummy variable shown, no additional effect of Continental's special situation borrowing per se is indicated. The results in column 2 suggest that the occurrence of special situation borrowing has not perceptibly affected the funds rate in the same maintenance period when the Desk has operated in a manner that treats special situation borrowing as akin to extended credit by including it with nonborrowed reserves.

Given that data for adjustment borrowing including special situation borrowing in the second week of a two-week

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2. This impact shows up as statistically significant using two-stage least squares, even when Continental's and other special situation borrowing is included. The indirect effects of Continental's funding problems surfaced in the reserve maintenance period following the reclassification of its borrowings as extended credit.

maintenance period are published on the first day on the next maintenance period, column 3 adds special situation borrowing lagged by one maintenance period to the regression. Any effect on market perceptions of FOMC intentions arising from publication might at times occur in the next maintenance period and the lagged variable would pick up this delayed effect if it is present in the data. Once again, however, these added variables are not statistically significant and the goodness of the equation's fit is little changed by their inclusion. A systematic tightening impact on the funds rate of special situation borrowing via market misperceptions in either the current or next maintenance period does not appear to be confirmed by the data.

## Appendix B

### Econometric Estimates of the Impact of Seasonality in Seasonal Borrowing on the Funds Rate

The results of estimating alternative borrowing functions using two-week maintenance period data since early February 1984 are presented in table B1 for seasonal borrowing (column 1), adjustment borrowing (column 2) and their sum (column 3). The borrowing measures are the dependent variables, with independent variables represented by a constant, the spread of the funds rate over the discount rate, and two dummy variables for shifts in the constant term for the Continental Illinois episode in the summer of 1984 and for 1986 to date.<sup>1</sup> Results without seasonal dummy variables appear in lines 1-6, while results with seasonal dummy variables are given in lines 7-14.

For seasonal borrowing, the addition of seasonal dummies improves the fit of the equation significantly, with the standard error falling from around \$70 million (line 6) without accounting for seasonality to around \$45 million (line 12) with explicit account taken of seasonal effects. Many of the estimated additive seasonal factors in seasonal borrowing for individual maintenance periods are significantly different from zero, as indicated by the asterisks. The largest negative seasonal influence is in the

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1. This specification is discussed in Lindsey and Glassman, *op. cit.*



Table B1  
 Estimates of Borrowings Functions With and Without Seasonal Variables<sup>1</sup>  
 (Borrowing Measures are the Dependent Variables)  
 (Millions of dollars; early 1984 to present)

	(1) Seasonal Borrowing	(2) Adjustment Borrowing	(3) Adjustment + Seasonal Borrowing
<u>Without Seasonal Variables</u>			
1. Constant	76 (4.4)	290 (7.5)	366 (9.4)
2. Funds rate less discount rate	120 (5.8)	290 (6.3)	410 (8.7)
<u>Dummy variables representing shifts</u>			
3. Summer 1984	-45 (-1.0)	-369 (-3.7)	-414 (-4.1)
4. 1986 to present	-39 (-2.5)	-221 (-6.4)	-260 (-7.4)
<u>Summary regression statistics</u>			
5. R <sup>2</sup> (adjusted)	.31	.53	.64
6. Standard error of estimate	72	161	163
<u>With Seasonal Variables</u>			
7. Constant	107 (10.6)	277 (7.4)	384 (10.5)
8. Funds rate less discount rate	80 (6.8)	292 (6.7)	373 (8.7)
<u>Dummy variables representing shifts</u>			
9. Summer 1984	-47 ( 1.7)	-297 (-2.9)	-344 (-3.4)
10. 1986 to present	-41 (-4.3)	-207 (-5.9)	-248 (-7.3)
<u>Summary regression statistics</u>			
11. R <sup>2</sup> (adjusted)	.76	.54	.67
12. Standard error of estimate	43	158	154
<u>13. Bi-weekly seasonal variables</u>			
1	-123*	165	42
2	-99*	-185*	-283*
3	-66*	65	-1
4	-77*	-112	-189*
5	-51*	39	-12
6	-60*	-38	-98
7	-44*	2	-43
8	-42*	87	45
9	-19	143	125
10	-15	124	109
11	15	64	79
12	31	47	79
13	35	-40	-5
14	60*	27	87
15	45*	-89	-44
16	80*	-36	44
17	81*	-94	-13
18	87*	-93	-6
19	60*	-103	-43
20	69*	-88	-20
21	50*	-34	16
22	46	-52	-5
23	27	139	167
24	-11	46	35
25	-27	67	40
26	-53*	-52	-105
14. <u>Joint test of seasonality</u>	Significant at 1% level	Not Significant	Not Significant

\*--Significantly different from zero at the 5 percent level.

1. Uses instrumental variables in a two-stage least squares procedure. Fitted over maintenance periods between February 15, 1984 and October 7, 1987. T-values are in parentheses.

first maintenance period of the year, averaging \$123 million. Though the shortfall diminishes, lower-than-average seasonal borrowing continues to be statistically significant through the eighth maintenance period. The buildup in seasonal impacts is evident through the summer, with a peak seasonal boost to seasonal borrowing estimated at \$87 million in the 18th maintenance period of the year. Taken together, the seasonal dummy variables are highly statistically significant, as indicated in line 14.

By contrast, though not surprisingly, seasonal effects are not significant in the estimated relation of adjustment borrowing to the spread (column 2). The standard errors (comparing lines 6 and 12) and the adjusted  $R^2$ s (lines 5 and 11) improve by only small amounts with the addition of seasonal dummies.

The central issue of seasonality in the relation of adjustment plus seasonal borrowing to the spread is addressed in the third column. Apart from factors for two maintenance periods, the individual seasonal effects are not statistically significant, and jointly (row 14) they are not at all significant. The standard error of estimate is lowered and the adjusted  $R^2$  raised only by relatively small amounts when seasonal dummy variables are added to the estimated equation. These results suggest the absence of a stable seasonal pattern in the relation of adjustment plus seasonal borrowing to the spread. In addition, without

accounting for seasonality, the standard errors of estimate in lines 6 for adjustment plus seasonal borrowing together (column 3) is about the same size as for adjustment borrowing alone (column 2), while the adjusted  $R^2$  (line 5) is improved by including seasonal with adjustment borrowing. These results suggest there is little to gain in terms of the predictability of the borrowing relationship from attempting to account for seasonality, whether adjustment borrowing is taken by itself or considered together with seasonal borrowing.

Supplemental evidence for this conclusion is provided in table B2. The first column simply repeats the third column of the previous table, in which seasonal factors for the adjustment plus seasonal borrowing function are estimated freely by the regression. Column 2 takes the seasonal factors estimated for seasonal borrowing alone in column 1 of table B1 and forces them into the equation for adjustment plus seasonal borrowing. The fit deteriorates despite the fact that, unlike the first column, 26 degrees of freedom are no longer being used up in estimation of seasonal influences in the regression. In effect, this column shows that seasonally adjusting the sum of adjustment and seasonal borrowing with seasonal factors derived from the seasonal borrowing function alone results in a slight degradation in quality of fit compared with using the regression equation in column 1 with freely estimated (but

Table B2

Adjustment Plus Seasonal Borrowing Functions with Alternative Seasonal Variables<sup>1</sup>  
 (Adjustment Plus Seasonal Borrowing is the Dependent Variable)  
 (Millions of dollars; early 1984 to present)

	(1)	(2)
	Seasonal variables estimated in the:	
	Adj. + seas. borrowing function	Seasonal borrowing <sub>2</sub> function
Constant	384 (10.5)	397 (10.5)
Funds rate less discount rate	373 (8.7)	370 (8.1)
<u>Dummy variables representing shifts</u>		
Summer 1984	-344 (-3.4)	-415 (-4.2)
1986 to present	-248 (-7.3)	-262 (-7.7)
<u>Summary regression statistics</u>		
R <sup>2</sup>	.77	.67
R <sup>2</sup> (adjusted)	.67	.66
Standard error of estimate	154	158
<u>Bi-weekly seasonal variables</u>		
1	42	-123
2	-283*	-99
3	-1	-66
4	-189*	-77
5	-12	-51
6	-98	-60
7	-43	-44
8	45	-42
9	125	-19
10	109	-15
11	79	15
12	79	31
13	-5	35
14	87	60
15	-44	45
16	44	80
17	-13	81
18	-6	87
19	-43	60
20	-20	69
21	16	50
22	-5	46
23	167	27
24	35	-11
25	40	-27
26	-105	-53

\*--Significantly different from zero at the 5 percent level.

1. Uses instrumental variables in a two-stage least squares procedure. Fitted over maintenance periods between February 15, 1984 and October 7, 1987. T-values are in parentheses.
2. The seasonal dummy variables were estimated in the seasonal borrowing equation of column 1 of table B1 and forced into the adjustment plus seasonal borrowing equation shown here.

jointly insignificant) seasonal factors. Moreover, comparing the results in column 2 of table B2 with the upper panel of column 3 in table B1, in which seasonality in adjustment plus seasonal borrowing is not accounted for, suggests that only a negligible improvement in goodness of fit emerges from attempting to take seasonality into account in this way.

Table B3 presents results of regression equations with the spread of the funds rate over the discount rate as the dependent variable. In the top panel, the spread is related without regard to seasonal influences either to adjustment borrowing alone or to adjustment and seasonal borrowing together.<sup>2</sup> This test is designed to contrast the predictability of the funds rate under current procedures (column 2) with that under a procedure expressing the FOMC's intended borrowing level in terms of adjustment borrowing by itself (column 1). The results in the top panel in fact indicate a slightly, though not significantly, closer relationship between the spread and adjustment plus seasonal borrowing together than for adjustment borrowing alone, judging by summary statistics for goodness of fit in lines 5 and 6.

These similar results in the top panel are not surprising given the lack of seasonality in the relation of the

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2. To isolate effects on the funds rate of alternative ways of accounting for current seasonality in borrowing quantities, ordinary least squares rather than two-stage least squares are employed in this table.

Table B3  
 Estimates of Borrowings Functions With and Without Seasonal Variables<sup>1</sup>  
 (The Spread of the Funds Rate Over the Discount Rate is the Dependent Variable)  
 (Percentage points; early 1984 to present)

	Adjustment borrowing (1)	Adjustment plus seasonal borrowing (2)	
<u>Without Seasonal Variables</u>			
1. Constant	-.02 (-.2)	-.25 (-2.4)	
2a. Adjustment borrowing <sup>2</sup>	.14 (7.9)		
2b. Adjustment plus seasonal borrowing <sup>2</sup>		.14 (9.4)	
<u>Dummy variables representing shifts</u>			
3. Summer 1984	1.54 (11.2)	1.31 (9.9)	
4. 1986 to present	.36 (4.4)	.41 (5.3)	
<u>Summary regression statistics</u>			
5. R <sup>2</sup> (adjusted)	.70	.75	
6. Standard error of estimate	.35	.32	
	(1a) Seasonal dummies	(2a) Seasonal dummies	(2b) Seasonally adjusted
<u>With Seasonal Variables</u>			
7. Constant	-.08 (-.7)	-.36 (-2.9)	-.27 (-2.6)
8a. Adjustment borrowing <sup>2</sup>	.15 (6.9)		
8b. Adjustment plus seasonal borrowing <sup>2</sup>		.16 (8.7)	.14 (9.8)
<u>Dummy variables representing shifts</u>			
9. Summer 1984	1.44 (8.4)	1.27 (8.1)	1.40 (11.0)
10. 1986 to present	.36 (4.0)	.43 (5.1)	.42 (5.5)
<u>Summary regression statistics</u>			
11. R <sup>2</sup> (adjusted)	.66	.73	.76
12. Standard error of estimate	.38	.34	.32
13. <u>Bi-weekly seasonal variables</u>			
1	.06	.16	
2	.30	.47*	
3	-.25	-.11	
4	.17	.30	
5	-.08	.00	
6	.08	.17	
7	.05	.10	
8	-.07	-.03	
9	-.29	-.25	
10	-.06	-.08	
11	-.07	-.11	
12	.02	-.06	
13	-.05	-.07	
14	-.11	-.19	
15	.09	.04	
16	.00	-.11	
17	.15	.02	
18	.17	.03	
19	.16	.07	
20	.08	-.01	
21	.23	.11	
22	.05	-.02	
23	-.24	-.28	
24	-.13	-.10	
25	-.16	-.11	
26	-.09	.04	
14. <u>Joint test of seasonality</u>	Not significant	Not significant	

Footnotes on next page.

\*--Significantly different from zero at the 5 percent level.

1. Uses an ordinary least squares procedure. Fitted over maintenance periods between February 15, 1984 and October 7, 1987. T-values are in parentheses.
2. Coefficients represent the rise in the funds rate in percentage points associated with a rise in borrowing of \$100 million.
3. Adjustment plus seasonal borrowings were seasonally adjusted by subtracting from this sum the seasonal dummy variables estimated for seasonal borrowing alone that are reported in column 1 of table B1.

spread to either adjustment or adjustment plus seasonal borrowing, as indicated in columns 1a and 2a in the lower panel. In these columns, seasonal influences on the inverted borrowing functions are represented directly as dummy variables. They are designed to pick up any seasonal movements in the spread that arose from the actual outcomes generated as the Desk sought to attain the FOMC's intention for adjustment plus seasonal borrowing without considering seasonality.

The regression results shown in column 2a indicate that a statistically significant seasonal influence on the spread given adjustment plus seasonal borrowing is apparent in only one maintenance period during the year, while the joint test for seasonality rejects the presence of seasonal influences on the spread over the year as a whole. Reflecting the lack of significant seasonality, the inclusion of seasonal dummies has an adverse effect on the goodness of fit, with the standard error of the estimate and the adjusted  $R^2$  (rows 11 and 12) being worse than those reported in the top panel for column 2 (rows 5 and 6). For column 1a, no significant seasonality in the relation of the spread to adjustment borrowing alone is indicated for the maintenance periods either individually or jointly.

The lower-panel results in column 2b are designed to test whether adjustments to the FOMC's basic intention for borrowing to take account of estimated seasonal influences



would produce a more predictable funds rate than current procedures as represented by column 2 in the top panel. Column 2b in the lower panel represents an alternative method for taking seasonality into account in the inverted function for adjustment plus seasonal borrowing. This column seasonally adjusts the sum of adjustment and seasonal borrowing by subtracting from this sum the seasonal factors estimated for seasonal borrowing alone that are shown in column 1 of table B1.<sup>3</sup> These results are intended to represent the predictability of the funds rate if the intended borrowing target were adjusted period-to-period for the estimated influence of seasonality in seasonal borrowings.<sup>4</sup>

This alternative approach of adjusting borrowings for estimated seasonal influences does little to improve the predictability of the funds rate spread shown in column 2 in the top panel, which ignores seasonality. Neither the standard error of estimate nor the adjusted  $R^2$  is much affected by adjusting the sum of adjustment plus seasonal borrowings for estimated seasonal influences. Overall, then, these

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3. This regression procedure is analogous to that employed in column 2 of table B2 in the sense that the seasonal dummies in that regression were forced to take on the values of seasonal dummies estimated in the seasonal borrowing equation.

4. It might be noted that using seasonal factors estimated over the entire period of fit for seasonal borrowing provides more information in the exercise than in fact would have been available to the Desk in operations going through this period, and hence biases the results in favor of this alternative procedure.

B-7

regressions show little evidence of seasonal influences on the spread given the level of adjustment plus seasonal borrowing.