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In Search of the Elusive Credit View: Testing for a Credit Channel in Modern Great Britain

by Katherine A. Samolyk

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Introduction

Modern macroeconomic theory has generally characterized the link between the financial sector and macroeconomic activity as a monetary phenomenon, focusing on the use of money as a medium of exchange. However, positing money as the key financial aggregate abstracts from the credit flows taking place in the broader, sophisticated financial markets of modern developed economies.

In the last decade, there has been an increasing macroeconomic interest in understanding the relationship between the performance of the broader financial sector and aggregate economic activity. The notion that variation in the supply of financial services may help explain real output fluctuations has come to be known as the credit view of the financial transmission mechanism. This view posits that the relationship of these services to economic activity is not completely captured in monetary aggregates. The interest in developing a credit view as opposed to a monetary view is coincident with the dramatic changes taking place in the financial services industry and with the breakdown of the conventional money-income relationships.

A credit view of the link between financial flows and real economic activity is not new, however. It is fundamental in Irving Fisher's (1933) analysis of the Great Depression, in which he explained how the effect of deflation on borrowers' solvency contributed to the severity of the economic contraction. Bernanke (1983) interpreted and tested a credit view of the impact of financial distress in his well-known empirical study of the Great Depression. In discussing the importance of the performance of the financial sector for economic activity, he argues:

> ...economic institutions, rather than being a "veil," can affect costs of transactions and thus market opportunities and allocations. Institutions which evolve and perform well in normal times may become counterproductive during periods when exogenous shocks or policy mistakes drive the economy off course. (p. 257)

Recent literature exploring the microfoundations of credit markets explains how financial markets matter in channeling an economy's flow of funds to current investment opportunities.[1] In this literature, the most common source of demand for financial services arises from informational asymmetries. Investors with financial capital do not have good information about the

■ 1 Examples of current work in this area are summarized in Gertler (1988).

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entrepreneurs with the most profitable investment opportunities. The specific characteristics of financial contracts and financial institutions reflect ways of solving these information problems. Optimal financial contracts and institutions minimize the resource costs associated with producing information for investors and monitoring the activities of entrepreneurs.

Economic activity is dependent on the smooth operation of this financial structure. Changes in the cost of supplying credit-market services can affect investment expenditures and output; thus, financial sector performance can feed back to the real sector and exacerbate output fluctuations.

However, empirical tests of the credit view in the modern U.S. economy have yielded mixed results (King [1985], Bernanke [1986]). Gertler (1988) notes that these results may reflect the identification problems inherent in estimating reduced-form macroeconomic relationships. Alternatively, the mixed results may be because the credit disruption channel, identified by Bernanke, has not been captured in the credit proxies used in this empirical work.

Depression-era studies suggest that when financial institutions are performing well, their operation is inconspicuous. When credit relationships are disrupted, however, economic activity is notably affected. Thus, it is not the flow of good credit, but the disruption of the system due to bad credit that underlies the credit transmission mechanism.

This paper investigates the credit view in the modern British economy. Great Britain represents an interesting alternative to the modern United States as a testing ground for the credit view because of the way it handles bad credit cases—insolvencies by debtors. Its goal in resolving insolvencies is to recover creditors' funds; the mode of resolution is primarily liquidation. In contrast, U.S. laws promote the rehabilitation of insolvent debtors, which encourages reorganization of the insolvent entity and avoids the shutting down of operations. Thus, insolvencies in Great Britain are more likely to disrupt existing credit relationships because the insolvent entities generally liquidate.

Using British insolvency data, this paper presents evidence favoring a "credit disruption" interpretation of the link between financial failure and real economic activity. Borrowers' insolvencies explain a portion of the variation in real output not explained by variations in monetary aggregates or past real output. This suggests that insolvencies associated with liquidation are a channel by which financial market performance can feed back and affect economic activity. Liquidations affect economic activity negatively, as they are costly to resolve and disrupt future credit flows to investment opportunities.

The methodology employed here follows Bernanke's (1983) study of the Great Depression in the United States. The tests find that the volume of insolvencies contributes significantly in explaining output fluctuations in Great Britain between 1964 and 1987. Insolvencies are negatively related to output, controlling for monetary conditions and lagged economic activity.

In section I, this study is related to two empirical studies of the Great Depression in describing the credit view tested here and the methodology used to conduct the investigation. In comparing the modern British economy with those considered in other studies, we are comparing economies that may differ in both political economy and production possibilities. The advantages of using Great Britain as a testing ground for the credit view are discussed in the context of cross-economy comparisons. Section II presents the regression specifications and estimation results, and section III concludes.

I. Identifying a Financial Transmission Mechanism

Previous Studies

The tests for a financial transmission mechanism presented here are most closely related to two previous empirical studies by Bernanke (1983) and Haubrich (1989). These studies test for a credit channel in explaining the severity of the Great Depression in the United States and Canada, respectively. The methodology these authors employ essentially involves including measures of financial-market performance as explanatory factors in a reduced-form monetary model.

In his empirical investigation, Bernanke uses information about the liabilities of failed banks and failed nonbank firms to explain real output in a Barro-type monetary model.[2] Bernanke concludes that the loss of financial services resulting from bank failures made the economic downturn longer and more severe than would be predicted by looking only at the monetary contraction.

Haubrich's (1989) study of the Canadian experience during the Great Depression provides less support for a broad interpretation of

■ 2 This type of model embodies the rational expectations "money view" that only unanticipated changes in the money supply affect output (see Barro [1978]).

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the credit view. He uses changes in the number of bank branches (rather than failed banks' liabilities) to measure contraction of intermediation services in Canada during the 1930s. The results indicate that changes in the scale of banking activity through branching were insignificant in explaining output when controlling for monetary factors and lagged output.

The market structure of the Canadian banking industry, which was highly concentrated with extensive branching, may explain these results. The Canadian banking crisis of the 1930s, unlike that of the United States, was not characterized by extensive bank failures: Credit problems were dealt with by bank reorganization rather than bank liquidation. Thus, Haubrich finds that the reduction in financial services associated with bank-branch consolidation did not significantly affect output.

Both of these studies focus on banks and their role in creating a primary market for certain borrowers during the 1930s. Both studies are consistent with the notion that the credit-market disruptions associated with borrower debt default and liquidation are the channel by which financial-market performance can exert an effect on economic activity.

Why Study the Modern British Economy?

Like the Depression-era studies, tests of the credit view in the modern U.S. economy have emphasized indirect credit flows through bank lending in measuring the performance of the financial sector. King (1985) and Bernanke (1986) use various types of bank loans in vector autoregressions explaining output that yielded inconclusive evidence about the credit view in the modern U.S. economy. The mixed results of these tests suggest that bank loans may be a poor proxy for the credit-disruption channel identified by Bernanke.

The mixed evidence of a "bank lending" financial transmission mechanism is perhaps not surprising given the nature of the modern U.S. financial sector. In the last two decades, financial markets have evolved dramatically. Nonbank institutions have developed to compete with the traditional banking sector in supplying external finance to borrowers. The traditional banking sector now plays a less significant role in channeling funds to primary borrowers than in previous decades. Also, the modern U.S. financial system operates over a large safety net of government policies, which includes a "too-big-to-let-fail" bailout policy toward troubled depository institutions. These factors imply that the modern financial transmission mechanism is different from that of the 1930s.

The British banking industry has long had a relatively concentrated market structure utilizing extensive branching, with the Bank of England acting as lender of last resort and providing oversight for all deposit-taking institutions.[3] Few British banks have failed. In the last two decades, the British financial sector, like its U.S. counterpart, has evolved so that the traditional banking sector now facilitates a smaller share of the flow of funds than in earlier decades (Bank of England [1985]).

While these factors would seem to rule against a test of the credit view in Great Britain, there is an important difference between the United Kingdom and the United States: The two nations differ in how they deal with insolvent borrowers.

In Great Britain, the goal in resolving an insolvency is primarily the recovery of creditors' funds; the mode of resolution is primarily liquidation. Upon the petition of creditors, an insolvent entity is usually placed into receivership and liquidated to meet the creditors' claims. This involves the dissolution of the entity and some degree of default on its liabilities. The United States, on the other hand, has a tolerance for bankruptcy and a tradition of reorganization rather than liquidation.[4] Thus, insolvency in Great Britain has been associated with a greater degree of disruption of existing credit-market relationships—the credit channel emphasized by Bernanke.

This study uses both noncorporate and corporate insolvencies in Great Britain to test whether the ill health of primary borrowers in the financial sector can help explain variations in real output, in addition to monetary conditions. The volume of British insolvencies should negatively affect economic activity, as liquidation is costly both in resolution and in the disruption of credit flows to real investment opportunities.

■ 3 The importance of the central bank's backing is most dramatically demonstrated by the limited nature of banking crises given the government's minimal provision of deposit insurance. Deposit insurance has only recently been promoted by British government policymakers and offers a relatively small degree of coverage. During the Secondary Banking Crisis of the early 1970s, secondary banks, which include other deposit-taking institutions, were bailed out by the Bank of England (see Bank of England [1978]). For a further description of the British banking sector, see Bank of England (1985) and Pozdena and Hotti (1985).

■ 4 See "Bankruptcy Law," *The Economist*, February 24, 1990, pp. 77-78.

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Although this study does not emphasize the indirect credit channel of bank lending, it is consistent with the credit view that the health of financial firms matters to financial-market performance. Even if they do not themselves fail, financial intermediaries are an important conduit of the credit-disruption channel for two reasons. First, bad loans affect the health of bank balance sheets, by reducing their internal capital. This may affect the characteristics of future credit extended and the use of intermediation technology in making new loans. Second, liquidation of insolvencies abrogates existing credit relationships, so that banks must expend resources in seeking out new investment opportunities.

Insolvencies in Great Britain

The measure of credit failures used in this study is the number of insolvency cases in the British economy. The legal definition of insolvency is that a borrower cannot pay its liabilities to its creditors when due; that is, the borrower is in default on the promised flow of debt service. The important feature of insolvencies in Great Britain is that the existing management is replaced and the insolvent entity is liquidated.

Bankruptcies include the cases of insolvent persons and partnerships handled under bankruptcy acts. When a noncorporate borrower is insolvent, the bankruptcy of the estate may be acknowledged voluntarily or determined in the courts. A creditor petitions the courts to place a receiving order against a debtor, which places his estate into the receivership of an officer of the court. The court makes a receiving order only when it is satisfied that the debtor has committed an act of bankruptcy. Alternatively, creditors and debtors may resolve a bankruptcy without recourse to the courts.[5]

Cases of insolvent incorporated entities, which are said to go into liquidation, are included in the series called company liquidations; these insolvencies may be settled in or out of court, as well. Compulsory liquidations are settled by court orders upon petition, and voluntary liquidations are resolved without court proceedings. The insolvency series do not include companies that choose to liquidate for reasons other than insolvency.[6]

The insolvency series, compiled by the Department of Trade and Industry, are originally published in British business periodicals. These series capture failures of financial firms as well as those of nonfinancial firms and individuals.[7] Other studies have generally used financial aggregates to measure financial-market performance; however, the number of credit relationships is also important when there are fixed costs to establishing such a relationship. To interpret the link between insolvency and economic activity as a credit channel, it would be best to consider both the number of insolvency cases and the financial flows involved (the liabilities and assets of insolvent entities).

Unfortunately, only data on the numbers of insolvency cases are published quarterly. Data on the assets and liabilities involved in corporate insolvencies are not published. However, statistics on the assets and liabilities involved in bankruptcies settled by receiving orders and deeds of arrangement are available in annual data series.[8] These series indicate that the number of bankruptcy cases is positively correlated with the volume of bankrupts' liabilities and with the severity of the insolvencies.

Figure 1 shows the annual number of bankruptcies and the annual volume of liabilities associated with these cases in constant pounds-sterling. The two series track each other relatively well, although 1978 is an obvious exception: In this year, the average size of liabilities involved in a bankruptcy claim was unusually large.

Figure 2 illustrates the relationship between the annual number of bankruptcy cases and the inverse of the ratio of bankrupts' assets to liabilities. Because a low asset/liability ratio indicates a more severe default, the latter series is positively related to the severity of the insolvency cases. The two series indicate that an increase in the number of bankruptcies is associated with a

■ 5 Bankruptcies liquidated without recourse to the courts are called deeds of arrangement. Deeds of arrangement comprise only about 1 percent of the number of court-settled bankruptcy cases. Both types of case resolution are included in the bankruptcy series used in the subsequent empirical tests.

■ 6 These cases are called members' voluntary liquidations.

■ 7 Bernanke included both failed nonbank liabilities and failed bank liabilities, which reflect the failed contracts with primary borrowers and with bank depositors, respectively. The joint significance of these series could be interpreted as evidence that the production of services associated with each layer of financial contracting is significant.

■ 8 See Central Statistical Office, *Annual Abstract of Statistics*, 1966-1988.

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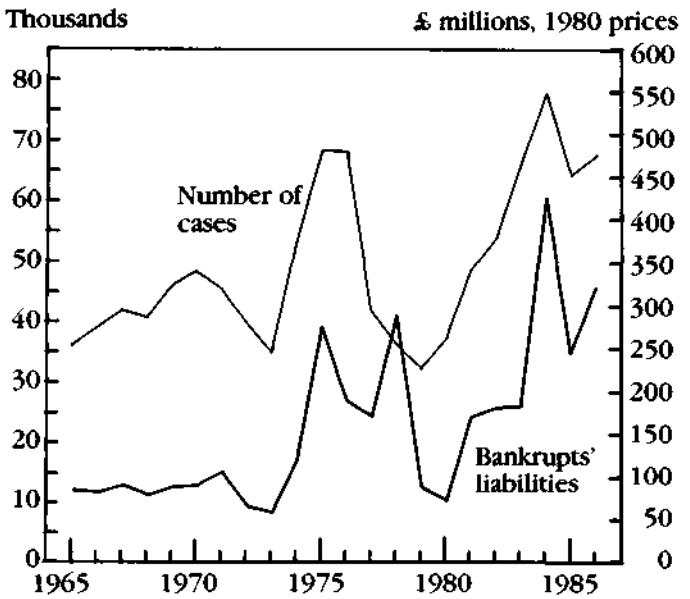
FIGURE 1

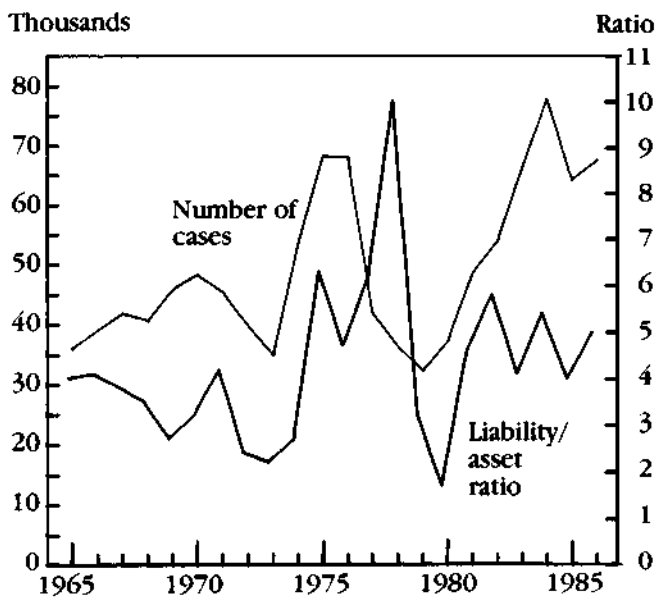
Number of Bankruptcies vs. Bankrupts' Liabilities



SOURCE: Central Statistical Office, *Annual Abstract of Statistics*, various issues.

FIGURE 2

Number of Bankruptcies vs. Bankrupts' Liability/Asset Ratios



SOURCE: Central Statistical Office, *Annual Abstract of Statistics*, various issues.

higher degree of default on noncorporate borrowers' liabilities. This dimension of financial distress is not captured by looking at the volume of bankrupts' liabilities alone.

II. Empirical Tests of the Credit View

This section presents the empirical tests of the insolvency and liquidation interpretation of the credit view. These tests are most closely related to the empirical studies by Bernanke (1983) and Haubrich (1989).

A basic reduced-form monetary model was estimated, regressing some measure of real gross domestic product (RGDP) on its own lagged values and on lags of the monetary aggregate M1, which serves as the transaction medium. Lagged values of the insolvency series were then added to the basic monetary specification equation to test whether they made a significant contribution in explaining output.[9]

Does Output Cause Insolvency?

Because we are testing whether insolvencies resolved by liquidation can help explain output fluctuations, it is important to establish that insolvencies are not merely a reflection of fluctuations in output or in monetary policy. Both corporate and noncorporate insolvencies are dealt with when the legal criterion of insolvency is met and involve the settlement of the claims in

■ 9 The series for gross domestic product from 1964 to 1983 are from the Organization for Economic Cooperation and Development's (OECD) 1983 *Summary of Monthly Economic Statistics*. The RGDP series from 1984 to 1986 are from various issues of the OECD's *Main Economic Indicators*. The monetary aggregate used here is the Bank of England's definition of M1, which includes currency in circulation plus sight deposits at reporting institutions in the monetary sector. The M1 series was obtained from the Central Statistical Office's (CSO) monthly publication *Financial Statistics*. For a discussion of the M1 series, see Central Statistical Office (1987). The numbers of bankruptcies and corporate liquidations in England and Wales were obtained from the CSO publication *Economic Trends* (1975), for the years 1964 to 1975. The insolvency series for the years 1975 to 1986 were obtained from various issues of the CSO monthly publication *Financial Statistics*. We later discuss and present tests of whether the ex ante choice of legal liability (corporate versus noncorporate) and the ex post choice of legal resolution (in or out of court) significantly differ in their relationship to economic activity.

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TABLE 1

Granger-Causality Tests: Sample Period 1964-1987[a]

	Explanatory Variable F-Statistic that the Four-Quarter Lag Equals Zero[b]				
Dependent Variable:	RGDP	M1	Bankruptcies	Compulsory Liquidations	Voluntary Liquidations
Bankruptcies	0.91	1.39	16.04	0.39	0.75
	(.465)	(.244)	(.000)	(.818)	(.558)
Compulsory Liquidations	1.42	3.46	1.43	3.33	2.05
	(.235)	(.012)	(.232)	(.015)	(.097)
Voluntary Liquidations	4.53	.094	2.12	.254	7.92
	(.003)	(.984)	(.087)	(.906)	(.00003)

a. Specification: constant, time trend, four lags of log-levels.
b. Significance levels of f-test are indicated in parentheses.
SOURCE: Author's calculations.

default.[10] Thus, these settlements are not made based on expected future conditions and do not include liquidations made for other reasons.

Granger-causality tests on the variables included in the regressions indicate that corporate liquidations are bidirectionally related to M1 and RGDP (see table 1). To control for the simultaneous relationships indicated in the Granger-causality tests, all of the regressions include equivalent lags of real output, M1, and the insolvency series. Also, all specifications are estimated with and without contemporaneous values of the explanatory variables.[11] The results are similar, so only those specifications without contemporaneous values of explanatory variables are presented here.

Alternative Reduced-Form Specifications

The test procedure does not attempt to resolve current macroeconomic debates about how money affects real output; nor does it attempt to take a stand on the issue of deterministic versus stochastic trends in macroeconomic variables. Thus, several reduced-form models were estimated using total or unanticipated monetary aggregates, and log-levels or log-differences of macroeconomic time series.[12] For brevity, we discuss the results of two reduced-form models that are comparable to the specifications used by Bernanke and Haubrich; these models explain the detrended level of RGDP with the log-differences and the log-levels of the financial variables, respectively.[13]

Model one follows Bernanke in defining output as RGDP relative to an exponential trend. It explains detrended RGDP with four lagged quarters of detrended RGDP, M1 growth, and the growth rates of bankruptcies and liquidations. Although Bernanke was explaining output relative to trend, he posited the growth rates of both money and debt-default variables as the relevant financial variables. We estimated this model using total money growth and unanticipated money growth, alternatively.

Model two follows Haubrich and estimates a

■ 10 For further information and an analysis of these series, see CSO (1975, 1987), and *British Business* (1980).

■ 11 Bernanke included contemporaneous values of money growth and failed liabilities, assuming they were unrelated to innovations in output.

■ 12 The estimation of the unanticipated nominal series follows Bernanke. He constructed the unanticipated growth rate of M1 as the residuals from a regression of the growth rate of M1 on four lagged growth rates of M1, prices, and output. Haubrich's empirical specifications included lags of the monetary aggregate M1.

■ 13 The third model estimated used the total growth rate of RGDP as the measure of real output. This model included four lagged quarters of the growth rates of RGDP, M1, and the insolvency series in the various specifications estimated. For brevity, these estimation results are not presented here.

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reduced-form model in log-level form. This model attempts to explain RGDP relative to exponential trend with four lagged quarters of detrended RGDP, and the log-levels of M1, bankruptcies, and corporate liquidations.[14]

Estimation Results for Model One

The estimation results for model one using total M1 growth found that both money and insolvencies explained output, controlling for the effect of lagged output. These results are presented in table 2.[15]

The basic monetary model estimated was

$$(1.1)\quad DGDP = \sum_{i=1}^{4} \beta_1(i)DGDP(-i) + \sum_{i=1}^{4} \delta_1(i)DM1(-i) + \epsilon,$$

where $DGDP(-i)$ and $DM1(-i)$ are the ith-lagged values of the exponentially detrended log of RGDP and the growth rate of M1, respectively.

The results for the basic monetary model are presented in column one of table 2. Lagged output explains most of the current behavior of output relative to trend, but M1 growth is significant as well, although the sum of the lag coefficients is both small in magnitude and negative.

Disaggregating Insolvencies by Legal Liability

In specification 2 for model one, the growth rates of bankruptcies and of total liquidations were included as measures of the financial distress of noncorporate and corporate borrowers, respectively:

$$(1.2)\quad DGDP = \sum_{i=1}^{4} \beta_1(i)DGDP(-i) + \sum_{i=1}^{4} \delta_1(i)DM1(-i) + \sum_{i=1}^{4} \pi_1(i)DBankrupt(-i) + \sum_{i=1}^{4} \tau_1(i)DLiquid(-i) + \epsilon.$$

Column 2 of table 2 indicates that the sum of the lag-coefficients is negative and significantly different from zero for both types of insolvencies; these results represent evidence in favor of the credit-disruption interpretation of the credit channel, although the relative magnitude of the insolvency effect is small.

Disaggregating total insolvencies as noncorporate and corporate distinguishes between insolvent borrowers by their ex ante choice of legal liability. Noncorporate insolvencies, categorized as bankrupt individuals and partnerships, represent a class of borrowers Bernanke identifies as those being most likely to rely on indirect credit markets for external finance. There are larger information costs associated with extending credit to small, risky borrowers relative to the size of the loans.

The null hypothesis that the effects of bankruptcies and liquidations are equal could not be rejected in model one. While we do not have statistical evidence that bankruptcies and liquidations have different effects on output, there should be some differences.

Bankruptcies would be expected to be more costly per British pound-sterling of the claims involved because 1) most of the noncorporate bankruptcies are settled in court and 2) upon abrogation of credit relationships, it is more costly to establish new credit relationships with this class of borrowers. However, noncorporate bankruptcies involve a smaller volume of liabilities per claim. While they may have a higher "bang per buck" in terms of the per-pound-sterling default costs, these costs are obscured when measuring credit disruption with the number of insolvency cases. Thus, one reason the effects by type of borrower are not significantly different may be that the smaller size of noncorporate borrowers' claims offsets the higher relative costs of their bankruptcies in terms of

■ **14** The regressions were estimated using the statistical package Regression Analysis and Time Series (RATS) and using the RATS procedure called ROBUSTERRORS to correct for autocorrelation evident in regressions estimated using ordinary least squares (OLS).

■ **15** The estimation results for model one using unanticipated money contrasted strikingly with those of Bernanke's Depression-era study. The lagged growth rates of unanticipated money were not significant in explaining real output. The growth rates of lagged insolvencies had the posited negative relationship to current output, but it was smaller in absolute magnitude and statistically less significant than in the total money model. Insolvencies were marginally significant in several regressions that used shorter lags of the insolvency variables. For brevity, these results are not presented. For an analysis of the debate about the alternative monetary models, see Mishkin (1982).

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TABLE 2

Model One Regression Results:
Sample Period 1965-1987
Dependent Variable: Detrended RGDP

		Specification					
		1.1		1.2		1.3	
Sum of Squared Residuals		.023		.018		.017	
Adjusted R-Squared		.998		.999		.999	
Durbin-Watson Statistic		2.04		2.04		2.05	
Variable (Lag):							
Real GDP	(1)	1.01[a]	(8.98)[a]	.95	(8.44)[a]	.953	(8.28)[a]
	(2)	.094	(.59)	.049	(.32)	.032	(.20)
	(3)	.031	(.19)	-.135	(-.82)	-.153	(-.98)
	(4)	-.144	(-1.27)	.125	(1.09)	.154	(1.32)
	Coefficient Sum:	.99[a]		.99[a]		.99[a]	
M1 Growth Rate	(1)	-.138	(-1.85)[b]	-.207	(-3.0)[a]	-.212	(-3.15)[a]
	(2)	-.062	(-.82)	-.087	(-.98)	-.082	(-.94)
	(3)	-.029	(-.374)	-.004	(-.05)	-.006	(-.08)
	(4)	-.033	(-.43)	-.123	(-1.63)	-.136	(-1.79)[c]
	Coefficient Sum:	-.263[a]		-.420[a]		-.437[a]	
Bankruptcies	(1)			-.046	(-1.97)[b]	-.047	(-1.99)[b]
	(2)			.017	(.79)	.012	(.92)
	(3)			-.016	(-.82)	-.016	(-.77)
	(4)			-.048	(-2.6)[a]	-.048	(-2.68)[a]
	Coefficient Sum:			-.094[a]		-.092[a]	
Corporate Liquidations	(1)			-.040	(-2.15)[b]		
	(2)			-.044	(-3.08)[a]		
	(3)			-.011	(-.81)		
	(4)			.013	(.82)		
	Coefficient Sum:			-.081[a]			
Compulsory Liquidations	(1)					-.009	(-.71)
	(2)					-.006	(-.42)
	(3)					.006	(.45)
	(4)					.007	(.56)
	Coefficient Sum:					-.001	
Voluntary Liquidations	(1)					-.030	(-1.60)
	(2)					-.035	(-2.34)[b]
	(3)					-.017	(-1.28)
	(4)					.005	(.40)
	Coefficient Sum:					-.077	
F-Test: All Insolvency Lags = 0				(a)		(a)	

a. Significant at the 1 percent level.
b. Significant at the 5 percent level.
c. Significant at the 10 percent level.
NOTE: T-statistics are indicated in parentheses.
SOURCE: Author's calculations.

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explicit costs and future leveraged expenditures.[16]

A consideration that would compromise this interpretation of relative insolvency costs is that the ex ante choice of noncorporate legal liability may reflect smaller potential default losses. Thus, tests using a richer data series on insolvent borrowers by type of legal liability are necessary to verify further the relationship between insolvents' legal liability and credit disruption.

Disaggregating Liquidations by Type of Case Resolution

In a third specification for model one, corporate liquidations were disaggregated by whether they were settled out of court (voluntary liquidations) or in court (compulsory liquidations) in the reduced-form specification for output. Column 3 in table 2 shows that the lag-coefficient sums are comparable to regression 1.2 and that the insolvency variables remain jointly significant.

The disaggregation of corporate liquidations represents a test of the hypothesis that the feedback from insolvencies to output will differ by the way in which insolvencies are resolved.[17] The decision of how to settle a default depends on such factors as the size of the claim and the ex post degree of default by corporate borrowers and thus may reflect differences in the costs of the insolvencies related to their mode of resolution.

The resolution of insolvencies is affected by (and thus may be an indicator of) lenders' perceptions of the degree of default, given an informational asymmetry between borrower and lender. Voluntary liquidations may therefore signal a default with less net return to the claimants and could indicate a more serious degree of default. Because a corporate borrower has limited liability, if lenders expect to get no return from litigation, the lower cost of an out-of-court settlement may be in their interest. Compulsory liquidations would, therefore, reflect the more marginal cases of insolvency. A creditor is more likely to litigate his liability if he believes that the actual degree of default is less than the debtor asserts (given the lender's monitoring costs). This interpretation suggests that voluntary liquidations may have a larger default-cost impact on output than do compulsory liquidations.

Some factors mitigate this interpretation of these series, however. In-court resolutions are more costly than out-of-court resolutions, all else being equal. In addition, compulsory liquidations would have a greater effect on output if larger claims are more likely to be litigated; this effect would be related to the volume of liabilities involved. The litigation of large cases could be explained by the fixed costs of court resolution. Also, given an informational asymmetry (between creditors and debtors), random litigation may be in the lenders' interest as a response to adverse selection.[18] This would increase the incidence of compulsory liquidation as an indicator of potential default losses as related to the size of the claim. These factors obscure how the effects of the disaggregated series should differ quantitatively.

A test of the hypothesis that the quantitative effects of the disaggregated liquidation series are equal was not rejected. This result is consistent with the resolution of insolvencies as being an indicator of both the creditors' perceptions of the degree of default as well as the size of the claims (hence the potential gains from litigation). The insignificance of the choice of case resolution for output may indicate that voluntary liquidations signal more serious defaults, while compulsory liquidations are larger and more costly to settle.

Estimation Results for Model Two

The estimation specification for model two used the log-levels (rather than the growth rates) of M1 and of insolvencies as explanatory variables. These regression results are presented in table 3. The basic monetary specification estimated for model two was

$$(2.1)\quad DGDP = \sum_{i=1}^{4} \beta_2(i)DGDP(-i) + \sum_{i=1}^{4} \delta_2(i)M1(-i) + \epsilon,$$

■ 16 Alternatively, the total resource costs associated with an insolvency should be negatively related to output (as in Bernanke's study). In this sense, larger corporate liquidations are more costly, which is consistent with these empirical results.

■ 17 Bernanke emphasized that small borrowers (but not large borrowers) were credit-constrained.

■ 18 Random monitoring has been considered by Diamond (1984) and Moore (1987) as a means of evoking truthful reporting and minimizing the resource costs of informational asymmetries.

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where $DGDP(-i)$ and $M1(-i)$ are the ith-lagged values of the exponentially detrended RGDP and the log of M1, respectively. The results for the basic monetary model in column one of table 3 indicate that, again, lagged output significantly explains most of the current behavior of output relative to trend. In this regression, the coefficient sum is now positive, but small.[19]

Disaggregating Insolvencies by Choice of Legal Liability

In specification 2 for model two, the log-levels of bankruptcies and of total liquidations were included as measures of the financial distress of noncorporate and corporate borrowers, respectively:

$$(2.2)\quad DGDP = \sum_{i=1}^{4}\beta_2(i)DGDP(-i) + \sum_{i=1}^{4}\delta_2(i)M1(-i) + \sum_{i=1}^{4}\pi_2(i)Bankrupt(-i) + \sum_{i=1}^{4}\tau_2(i)Liquid(-i) + \epsilon.$$

The first hypothesis tested is that the log-levels of bankruptcies and of corporate liquidations are significantly different from zero. The second column in table 3 indicates that the sum of the lag-coefficients is negative and significantly different from zero for bankruptcies, although smaller in both magnitude and significance than in model one. A hypothesis test equating the quantitative effects of bankruptcies and liquidations could not be rejected. Thus, as in model one, the effects of the of ex ante choice of legal liability by insolvent borrowers (noncorporate or corporate) did not significantly differ using these series.

Disaggregating Liquidations by Type of Case Resolution

In the third specification for model two, corporate liquidations are disaggregated by whether they were settled out of court (voluntary liquidations) or in court (compulsory liquidations) in the reduced-form specification for output. Column 3 in table 3 shows that although the lag-coefficient sums are comparable to regression 2.2, the significance of the financial variables was reduced. As in model one, the hypothesis test that the quantitative effects of the disaggregated liquidation series are equal was not rejected.

III. Conclusion

This paper presents a set of experiments that tests a particular interpretation of the credit view linking financial-market performance to economic activity. British insolvencies, which involve liquidation, are used in tests of a credit-disruption channel from the financial sector to real output.

The proposition that the past insolvencies of corporate and noncorporate borrowers help explain current output was tested, controlling for the past behavior of real output and monetary conditions. The numbers of past insolvencies had a negative and statistically significant effect on output.

Interpreting the insolvency series as capturing the disruption of credit relationships indicates that nonmonetary financial channels to real output should be considered; credit failures as proxied by insolvencies exert their own effects on future economic activity. This evidence is consistent with the cost-of-credit channel emphasized in Bernanke's analysis of the Great Depression. Insolvencies affect output negatively by consuming resources in their resolution and by reducing the volume of internal capital available as a basis for future leveraged expenditures.

These results suggest that one explanation for lack of conclusive evidence about the financial transmission mechanism in the postwar United States may be related to our tradition of dealing with bankruptcy through reorganization rather than liquidation.

It is interesting to note that Great Britain passed an Insolvency Act in 1986. This reform allows British firms to petition the courts to put them into "administration," whereby the firm continues to operate under the management of a court-appointed administrator while the insolvency is resolved. With this legislation, the British legal system is moving away from the tradition of liquidation toward an alternative of reorganization—a system more in the tradition of the United States.

Does the evidence that liquidations adversely affect output imply that liquidations should be avoided at all costs? No; insolvency policies must

19 These results are similar to those for the log-level regressions in Haubrich (1989).

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TABLE 3

Model Two Regression Results:
Sample Period 1965-1987
Dependent Variable: Detrended RGDP

		Specification					
		2.1		2.2		2.3	
Sum of Squared Residuals		.020		.014		.013	
Adjusted R-Squared		.998		.999		.999	
Durbin-Watson Statistic		1.96		2.06		2.15	
Variable (Lag):							
Real GDP	(1)	.838	(7.17)[a]	.616	(7.08)[a]	.621	(7.30)[a]
	(2)	.106	(.78)	.065	(.52)	.036	(.25)
	(3)	.092	(.62)	.023	(.18)	.032	(.27)
	(4)	.015	(2.12)[a]	.232	(2.21)[a]	.25	(2.44)[a]
	Coefficient Sum:	1.05[a]		.94[a]		.94[a]	
Log M1	(1)	-.255	(-1.73)[b]	-.204	(-1.58)	-.188	(-1.42)
	(2)	.008	(.03)	.032	(.13)	.044	(.18)
	(3)	.378	(1.28)	.266	(.96)	.288	(1.00)
	(4)	-.100	(-.62)	-.142	(.97)	-.184	(-1.19)
	Coefficient Sum:	.031[a]		-.048[a]		-.040[b]	
Bankruptcies	(1)			-.039	(-2.03)[c]	-.038	(-1.97)[c]
	(2)			.038	(1.53)	.044	(1.76)[b]
	(3)			-.017	(-.67)	-.020	(-.76)
	(4)			-.010	(-.55)	-.006	(-.36)
	Coefficient Sum:			-.027[b]		-.020	
Corporate Liquidations	(1)			-.008	(-.52)		
	(2)			-.013	(-.79)		
	(3)			.019	(1.55)		
	(4)			.024	(1.67)[a]		
	Coefficient Sum:			.022[c]			
Compulsory Liquidations	(1)					.004	(.41)
	(2)					-.013	(-1.12)
	(3)					.006	(.47)
	(4)					-.001	(-.10)
	Coefficient Sum:					-.004	
Voluntary Liquidations	(1)					-.016	(-.89)
	(2)					-.005	(-.38)
	(3)					.014	(1.36)
	(4)					.026	(2.22)[c]
	Coefficient Sum:					.019[b]	
F-Test: All Insolvency Coefficients = 0				(a)		(a)	

a. Significant at the 1 percent level.
b. Significant at the 10 percent level.
c. Significant at the 5 percent level.
NOTE: T-statistics are indicated in parentheses.
SOURCE: Author's calculations.

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balance the costs of liquidation with its benefits. One result in the literature about the microfoundations of financial markets is that liquidation, as a contingency, is a characteristic of financial contracts that allows resources to be allocated efficiently. Although a system that settles insolvencies by liquidation may be disruptive, it preserves the incentives for creditors to monitor the performance of borrowers and thus preserves the incentives for borrowers to perform well. And although liquidation involves the death of the borrowing entity, it is part of the contingent contract that creditors are promised for accepting the default risk of their claims. Liquidation of insolvent entities is beneficial to an economy when the alternative is an inefficient use of resources.

A corollary to the allocative role of liquidations is that an economy's legal policies toward insolvency affect the efficiency of liquidations. Townsend (1979) shows how the debt contract that minimizes the resource costs of resolution stipulates that, in the event of a bad investment outcome, creditors can realize the maximum from the actual project's return. Thus, efficient liquidation policies must preserve the integrity of the seniority of claims and must protect creditors from the possibly adverse actions of current managers, whether the insolvency is resolved by reorganization or liquidation. They also must provide an efficient mechanism for deciding how the insolvency should be resolved. For example, it may be optimal to allow creditors to decide whether liquidation would be more efficient than rehabilitation.

This study raises the question of how facets of legal organization may be related to insolvency as a financial transmission mechanism. Although further tests disaggregating British insolvencies by legal liability and legal resolution yield negligible information about the debt-default channels, they provide a focal point for future empirical research on how financial structure is related to economic activity.

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Seasonal Borrowing and Open Market Operations

by E.J. Stevens

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Introduction

A small depository institution with a history of a pronounced seasonal increase in loans relative to deposits may borrow a substantial portion of its projected excess from a Federal Reserve Bank at the basic discount rate. In the aggregate, this seasonal borrowing program provides only a scant source of funds to the financial system, within a framework that is essentially the same as when the program was introduced in 1973.

Substantial growth of peak seasonal borrowing in recent years, after a decade or more of significant changes in financial market structure, suggests the timeliness of reviewing the rationale for the seasonal borrowing program. Furthermore, review seems doubly important because variations in seasonal borrowing have been complicating monetary policy implementation.[1]

The purpose of this paper is threefold. The first objective is to provide a brief description of the program and its role in funding banks and the banking system. The second is to investigate the original rationale for the seasonal borrowing program and to determine how changes in financial market structure during the intervening years may have affected that rationale. The third objective is to explore the connection between the seasonal borrowing program and monetary policy implementation. To date, any potential conflict with monetary policy has been avoided by flexible policy implementation and technical changes in the borrowed reserve index of reserve restraint used to guide open market operations. These responses do complicate policy implementation, but flexibility also eliminates what has become a dubious advantage of the borrowed reserve procedure when seasonal borrowing is the dominant component of the index of reserve restraint.

I. The Seasonal Borrowing Program

The seasonal borrowing program was introduced in 1973, an outgrowth of a Federal Reserve Task Force recommendation contained in "Reappraisal of the Federal Reserve Discount Mechanism," a three-volume System report published in 1971.

■ 1 See Record of Policy Actions of the Federal Open Market Committee for meetings indicated in table 2.

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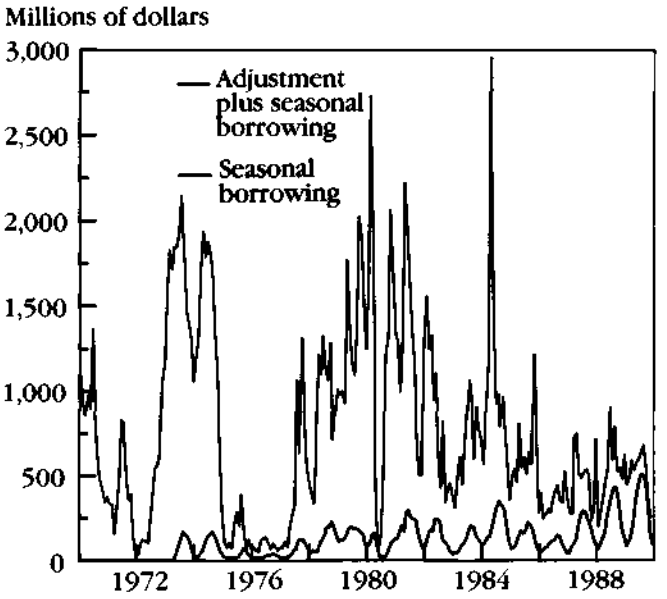
FIGURE 1

Seasonal Borrowing, 1970–89 (Monthly)



SOURCE: Board of Governors of the Federal Reserve System.

The stated purpose of the new program was to assist "...those [member] banks that enjoy only limited or indirect access to national money markets and which have definable and relatively substantial seasonal pressures."[2] The program is one of three ongoing direct lending facilities maintained by the Federal Reserve Banks, the other two being programs for adjustment and extended credit.

Adjustment credit is available overnight or for a short period, and cannot be used by an institution more than occasionally. It is designed for institutions unexpectedly short of needed funds in circumstances that make it difficult or impossible to obtain financing from normal market sources, such as at the end of a day, when markets are thin or closed. Loans must be collateralized, and the rate charged is the familiar basic discount rate.

Extended credit, on the other hand, may be outstanding for many months. It is designed for an institution in exceptional circumstances—one working closely with or under the control of supervisory authorities to resolve financial difficulties that limit its access to normal market sources of funds. Loans are fully collateralized, and usually are made at a variable rate that is above market rates and at least 50 basis points above the basic discount rate.

Seasonal credit is designed to supply the predictable needs of healthy institutions that are thought to be too small and isolated to have access to sources of short-term credit comparable to that of larger institutions. Maturities are tailored to the pattern of an institution's seasonal funding gap. To qualify, an institution normally must have total deposits of less than $500 million and must demonstrate a recurring pattern of seasonal swings in the net availability of lendable funds, measured as total deposits minus total loans. An institution qualifying for a seasonal line must fund a portion of its seasonal funding need, calculated as 2 percent of the first $100 million of its deposits, 6 percent of the next $100 million, and 10 percent of its deposits in excess of $200 million. Loans must be collateralized, and are made at the same basic discount rate as is charged for adjustment credit.

Seasonal borrowing in the aggregate has displayed two regularities: a pronounced seasonal pattern, and a response to the economic incentive to borrow (see figure 1). The seasonal pattern shows borrowing growing to a peak in the summer and then falling away to a minimum in the winter, with the peak being about five times larger than the succeeding minimum in recent years. The seasonal pattern is thought to reflect an agricultural credit cycle, because most borrowing banks are in agricultural regions of the country.

At the same time, and sometimes overriding the seasonal pattern, the total amount borrowed seems to respond to the size of the spread between market interest rates and the discount rate charged for seasonal borrowing. For example, market rates were *lower* than the discount rate during 1975-76, and borrowing declined to minimal levels. The 1975 and 1976 seasonal peak monthly amounts of borrowing averaged only 30 percent of peak levels during the preceding two years. Again, in the four months after April 1980, the federal funds rate moved from about 400 basis points *higher* than the discount rate to almost 200 basis points *lower*. At the same time, seasonal borrowing declined in a counterseasonal movement that brought it to the second-lowest monthly level on record.

Reviewing past movements in seasonal borrowing also suggests the relatively small scale and limited role the program plays within the banking and monetary system (see table 1). Fewer than 5 percent of commercial banks were borrowers in 1988, when aggregate borrowing

2 Federal Reserve press release, April 12, 1973.

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TABLE 1

Use of the Seasonal Borrowing Program

	1973	1979	1988
Number of borrowing banks	205	482	616
As a percent of all commercial banks	1.4	3.3	4.6
As a percent of potential borrowers	10.0	20.8	n.a.[a]
Average aggregate borrowing in peak month			
$ millions	163	193	420
Average annual borrowing			
$ millions	89	147	235
$ per borrower	434,000	304,000	382,000

a. See footnote 3.
SOURCES: Melichar (1980), Timenes and Melichar (1973), and Board of Governors of the Federal Reserve System.

was at its then-record high. This was most likely a smaller percentage of the number of banks potentially qualified to borrow than the 21 percent of potentially qualified banks that borrowed in 1979.[3] Reflecting the small size of eligible banks, as well as the low incidence of borrowers among those banks eligible to borrow, seasonal borrowing never has accounted for as much as 1 percent of the total stock of bank reserves.

II. Rationale for the Seasonal Borrowing Program

The market economy of the United States relies heavily on the decisions of private owners of resources, in response to market signals, to determine how and what goods and services get produced. All else being equal, if owners of small banks were unable to earn a competitive rate of return while meeting seasonal credit demands in their chosen market areas, they would be expected to turn their resources to some alternative use. Their potential customers would seek out other lenders to meet their credit needs or, if unable to find satisfactory accommodation elsewhere, they would likewise be expected to turn their resources to some alternative use. Subjecting the ongoing process of resource management to this competitive market discipline is the fundamental test for wise resource allocation.

Government intervention in the operation of a market rests on the political judgment that there would be something unwise about the pure market outcome. More than that, it can be argued, evidence that the pure market outcome is deficient must be sufficiently compelling to accept the risk that tinkering will create new and unforeseen distortions that are worse than the original deficiency.

Financial market regulation is a familiar example. The structure of financial markets in the United States was influenced in basic ways by regulations originating in legislation of the 1930s. More recently, legislation has been reshaping that financial structure, with an emphasis on deregulation. An important objective has been to reduce distortions emanating from regulation in order to allow fuller reliance on private decisions and market discipline in determining the structure of financial markets, including the number and size of depository institutions and their geographical extent, product lines, and pricing.

The seasonal borrowing program originated during the 1960s as a result of concerns about whether private financial markets were equipped to finance the long-term capital needs of the agricultural sector and, in that context, whether small banks would have sufficient liquidity to meet seasonal needs of agricultural borrowers.[4] Banks had accumulated large portfolios of liquid assets during the previous 30 years, including large holdings of U.S. government securities acquired during World War II. This meant that banks had been able to fund even very large seasonal swings in loans relative to deposits by selling liquid assets, for which there was an active national market accessible by the smallest of banks.

■ 3 "Most likely" because the Monetary Control Act nearly doubled the number of banks eligible to seek qualification by extending the program to nonmember banks. Had the percentage of qualified banks actually borrowing remained unchanged at 21 percent in 1988 and the number of qualified member banks remained about the same, the implication would be that only about 8.5 percent of 7,600 nonmember banks qualified for the program. This seems so implausible—because nonmember banks tend to be smaller and less urban than member banks—that the alternative conclusion seems most likely. Only commercial banks are considered, even though other depository institutions also gained access to the discount window through the Monetary Control Act of 1980. Typically, the program is not used by these nonbanks because credit is available from special industry lenders, such as the Federal Home Loan Banks.

■ 4 Melichar and Doll (1971).

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By the 1960s, these large portfolios had been worked off by most banks. Those facing disproportionately large seasonal funding needs either would have had to retain disproportionately large portfolios of low-yield liquid assets, on average, or they would have had to rely on alternative markets in which to sell loans or purchase funds if they were to meet seasonal needs. Research findings in the 1960s suggested that "...a significant proportion of banks [had] large relative seasonal outflows of funds; that these banks tend[ed] to be small, presumably with limited access to financial markets that larger banks could use to meet such pressures."[5]

The presumption that the relevant small banks had more limited access to financial markets than did other banks was familiar during the late 1960s and the early 1970s, when the seasonal borrowing program was devised and put into place. Small banks with disproportionately large seasonal needs for funds were mostly rural banks in agricultural areas where the "spatial allocation of bank credit" through markets was thought to be an imperfect means of attracting surplus funds from other areas. The interbank market was limited, except perhaps for overnight federal funds and through the correspondent banking system. Only recently had Regulation Q governing deposit-rate ceilings been relaxed, providing large banks, at least, with new power to use deposit rates on large certificates of deposit (CDs) to attract funds. Correspondent banks were seen as sometimes unreliable sources of support, especially where their interests were in competition with those of their respondents.[6]

The seasonal borrowing program was designed for small banks with large seasonal outflows of funds and "limited access to financial markets."[7] When Federal Reserve Banks lend to these small banks, the resulting increased stock of bank reserves must be absorbed by equivalent Federal Reserve open market sales in the government securities market in order to maintain monetary policy unchanged. In effect, the program provides borrowing banks with a nonmarket, assured conduit to the money market. Eligibility depends on the size of a bank and on the seasonality of its loans relative to deposits, not on an explicit demonstration of "limited access to financial markets."

Is the Rationale Compelling?

Recent large aggregate amounts of seasonal borrowing might be interpreted as prima facie evidence that the original rationale for the program remains compelling. However, this need not be so. The number of borrowers remains low relative to the number that are likely to be qualified to borrow, there is a clear rate incentive to borrow, and changes in financial market structure since 1973 should be expected to have reduced the need to rely on the program.

The number of banks taking advantage of the seasonal borrowing program seems to have been lower than expected from the outset of the program. Initial estimates were that approximately 2,000 banks had substantial seasonal calls for funds and that the vast majority of these had less than $50 million in assets, implying that a large number of banks might take advantage of the new program.[8] However, only 205 banks actually borrowed during the first (abbreviated) year of the program, and only 155 of those were among the 2,000 banks that had been identified as potential users.[9]

Although the number of borrowers had more than doubled by 1979, borrowers still represented only 21 percent of the banks potentially eligible to use the program. In 1980, the number of banks potentially eligible to borrow was substantially augmented by the Monetary Control Act, which opened the program to nonmember commercial banks. As a result, the number of potentially eligible institutions had probably about doubled by 1988, although no systematic estimate is available.[10] Despite the expanded pool of potential borrowers, the number of actual borrowers was only 40 percent greater than in 1979. In short, despite indications that size and seasonality would qualify a few thousand banks

■ 5 Melichar (1971), p. 95.

■ 6 Modigliani (1971).

■ 7 This was not a unanimous interpretation of the rationale at the outset. It was not until 1980 that the Monetary Control Act removed membership in the Federal Reserve System as an issue thought to be relevant to many System decisions. Prior to that, the seasonal borrowing program was available only to member banks, and some perceived the basic motivation for the program as an effort to "...offset the growing net tax [primarily of reserve requirements] on member banks, thereby reducing their incentive to quit the System" (Kane [1974], p. 846).

■ 8 Federal Reserve press release, April 5, 1973.

■ 9 Timenes and Melichar (1973).

■ 10 See footnote 3.

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to overcome "limited access to financial markets," evidence from actual use of the seasonal borrowing program suggests that the competitive disadvantage of limited access never has been as extensive as might have been supposed.

The perception that limited access has not been widespread was reinforced by nationwide experience with the Temporary Simplified Seasonal Credit Program, which began in 1985. The simplified program was made available to banks with deposits of less than $200 million that had an above-average concentration of farm loans and a loan-to-deposit ratio of at least 55 percent (initially 60 percent). Eligibility required no detailed calculations showing a historical seasonal pattern of need for funds.

A reported expectation was that total seasonal borrowing might triple during the first year of the simplified program, but the actual level of seasonal borrowing remained below that of the previous year.[11] In the three-year life of the simplified program, borrowing never exceeded a monthly average of $14 million, even during the years of severe agricultural distress for which the program was designed. Apparently, markets were not failing to supply funds to agricultural banks, although it may be that banks were not receiving bankable loan requests from potential borrowers.

The fact remains, however, that some banks *do* use the seasonal borrowing program. The question, then, concerns the extent to which their use provides evidence of limited access, for typically there is a clear economic incentive to use the program.[12] The program represents a "good deal" when the discount rate is lower than market rates. If banks borrow in response to the favorable rate spread, the implication is that they find market sources of funds, or do not lend, when the rate spread is less favorable; expected profit, not limited access, generates use of the program.

The two periods of pronounced minimal use (1975-76 and 1980) also were the only sustained periods since 1973 during which the discount rate actually was higher than the federal funds rate. But there is a counterargument: These also were periods of loose monetary policy, in which correspondent banks might have been expected to service smaller banks with seasonal needs because correspondents did not have better alternatives in the money and loan markets. That is, limited access would not occur unless monetary policy were restrictive.[13]

The restrictiveness of monetary policy, however, is not an either/or matter, and the rate spread is not necessarily an indicator of policy restraint. Restrictive policy refers jointly to a restrained supply of base money (relative to demand) and to the high federal funds rate required to equilibrate the market for base money. The supply of base money could be quite restrictive, even with no borrowing, if the discount rate were high relative to the high federal funds rate, choking off the demand for borrowing. Under these circumstances, the supply of base money would include a large proportion of nonborrowed reserves and few borrowed reserves. Alternatively, the same degree of restraint could be achieved with fewer nonborrowed reserves and correspondingly more borrowing if the discount rate were far below a very high federal funds rate, accommodating a large demand for borrowing.

The rate spread simply measures the cost advantage of discount borrowing, including the cost advantage of using the seasonal borrowing program, and there is evidence of a consistent positive relationship between the aggregate amount of seasonal borrowing and the rate spread. Econometric estimates of the demand for seasonal borrowing for the period 1984-88 find that the rate spread was a statistically significant explanatory variable (see box 1). Thus, at least some of the actual seasonal borrowing may not reflect borrowers' limited access to financial markets, but simply the fact that size and seasonality make the borrowers eligible for the attractive interest rate available through the program.

Declining Relevance of Limited Access

The evolution of financial market structure since 1973 makes limited access seem a more tenuous rationale for the program now than originally. No single dramatic development can be cited as removing limits on small banks' access to financial markets for seasonal funding. Rather, an

■ 11 *Wall Street Journal*, March 11, 1985.

■ 12 A related question is not addressed here. As indicated in table 1, the number of banks and percent of all commercial banks borrowing have increased over the life of the program. Some banks truly may have the "need" for seasonal borrowing as envisioned in the program, but it is not clear how heavily the needs of a few borrowers should be allowed to weigh in providing a special program.

■ 13 Melichar (1971, 1980) makes this argument.

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BOX 1

Determinants of Seasonal Borrowing (Two-week reserve maintenance periods, 1984–88)

The equation below shows the estimated relationship between seasonal borrowing and the spread between the federal funds rate and discount rate, plus three variables capturing temporary or permanent shifts in the relationship prior to 1988. The demand for seasonal borrowing was not significantly affected during the Continental Illinois period (June–September 1984), but has shown two more recent shifts.

Right-Hand Variable	Estimated Coefficient	Standard Error	T-statistic
Constant	90.3945	15.0550	6.00429
Rate spread	97.1547	15.2579	6.36749
Shift 1 (6/20/84–9/26/84)	-6.6493	38.8060	-.17134
Shift 2 (1986–1988)	-36.166	15.8837	-2.2769
Shift 3 (1987–1988)	42.651	19.3694	2.2020

R-squared = 0.4478
Durbin-Watson statistic (adjusted for 0 gaps) = 0.2334
Sum of squared residuals = 630807
Standard error of the regression = 74.0626
F-statistic (4, 115) = 23.316
Significance level = 0.0 percent

SOURCE: Board of Governors of the Federal Reserve System.

accumulation of a variety of market developments has moderated the concern about limited access to financial markets that provided the original rationale for the seasonal borrowing program.

Developments in the federal funds market itself should have reduced seasonal inflexibility. By 1981, a year of peak participation in the funds market, almost 85 percent of small U.S. banks (with assets less than $300 million) were participants in the federal funds market on the selling side, and 40 percent on the buying side. Although most of the volume being sold undoubtedly represents the upstream flow of balances from smaller banks to their larger correspondent banks, nonetheless, more than half of the small *purchasing* banks were independent banks, the category most likely to fit the limited-access rationale behind the program.[14]

Regulation Q, which set ceilings on deposit interest rates, has been phased out completely. The prohibition of explicit interest payments on narrowly defined demand deposits is the only remaining regulation that might constrain depository institutions from setting rates competitive enough to attract deposits away from the national markets. Reliance on brokered deposits may be inappropriate for small institutions from a supervisory point of view, but widespread reliance on term consumer CDs has strengthened the ability of even the smallest of insured institutions to attract and manage liabilities in competition with other depository institutions and securities.

Within the banking industry, changes in market structure have reduced the market isolation that might have produced seasonal inflexibility in the balance sheets of lending banks. The proportion of independent banks fell by more than half between 1973 and 1987, from 78 percent to 32 percent of all banks. Absorption into one-bank holding companies accounted for 27 percentage points of this decline, while the other 19 percentage points resulted from affiliation with multibank holding companies.[15] Compared to a correspondent relationship, affiliation with a multibank holding company would increase the seasonal flexibility of acquired banks through improved access to federal funds, jumbo CDs, and holding-company debt markets, as well as through more assured profit-maximizing geographic distribution of funds.

Relevant changes in market structure are not limited to those that directly affect small banks with large seasonal pressures. When nonbank lenders enter the credit markets, there may be less basis for concern about the adequacy of bank lending because potential borrowers can be served by other lenders. Federal lending, including that of the Federal Intermediate Credit Banks, represented a modestly larger share of the debt of the farm business sector in 1988 than in 1973. However, the new federal "Farmer Mac" program might provide an even better means of offsetting any market deficiency that impedes seasonal lending at small agricultural banks. The Agricultural Credit Act of 1987 established the Federal Agricultural Mortgage Corporation, or Farmer Mac. This new federally chartered instrumentality is designed to provide liquidity to agricultural lenders by issuing guaranteed securities collateralized by farm mortgage loans, and by

■ 14 Year-end Reports of Income and Condition, Federal Financial Institutions Examination Council.

■ 15 Year-end Reports of Income and Condition, Federal Financial Institutions Examination Council.

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facilitating the establishment of a secondary market in agricultural mortgages. The secondary market allows banks to sell loans rather than finance them with seasonal borrowing, eliminating the need for the collateral required in discount window lending.

In sum, the evolution of financial market structure since 1973 has been toward deregulation, by removing constraints that once might have limited the response of lenders to seasonal farm credit demands. This serves to reinforce the implications drawn from apparently limited use of the seasonal borrowing program, and suggests that the rationale for the program may not be as compelling now as it might have seemed in 1973.

III. The Monetary Policy Connection

Before the seasonal borrowing program was introduced in 1973, background studies had considered whether unforeseen changes in seasonal borrowing might make the appropriate amount of open market operations more difficult to determine. On balance, the problem was not expected to be serious.

> Since the banks will be expected to negotiate their seasonal borrowing needs with their Reserve Banks over their full seasonal period insofar as is feasible, the general timing and amount of reserve injections from this source should be fairly well defined in advance....
>
> So long as the business of the Nation's largest banks is such that these banks are unlikely to meet the terms of the regulation and therefore are prevented from suddenly becoming seasonal borrowers, the *total dimensions and variability of seasonal credit assistance* at the discount window should be well within a scope that *can be handled by present methods of open market operations...* (emphasis added).[16]

This original expectation about "total dimensions and variability of seasonal credit" cannot be faulted. Typically, the program has provided less than half of 1 percent of total bank reserves. Even in peak months, it has never produced more than 0.85 percent of total reserves, or about two-tenths of 1 percent of base money. The problem, however, arises from the combination of even more modest "total dimensions...of seasonal credit" than might have been anticipated and a *different* method of open market operations than was foreseen when the program was adopted.

In its broadest sense, monetary policy operates by controlling the stock of base money—currency plus bank reserves—available to the economy. Base money is the liability of Federal Reserve Banks, consisting of Federal Reserve notes plus Federal Reserve deposits owned by depository institutions.

The stock of base money increases or decreases when the Federal Reserve buys or sells Treasury securities through domestic open market operations, as well as when Federal Reserve Banks lend to or are repaid by depository institutions at the discount window. This is because the amounts purchased and loaned are added directly to the deposit accounts of depository institutions, just as sales and loan repayments are subtracted directly from those accounts. Clearly, controlling the stock of base money requires a procedure for policy implementation that coordinates the open market and discount window functions.[17]

What was not foreseen in 1973 was that in 1982, the Federal Open Market Committee (FOMC) would adopt a borrowed reserve procedure for implementing monetary policy. This involves specifying an objective for the level of adjustment plus seasonal borrowing to be achieved by the manager of the System Open Market Account through open market operations occurring between FOMC meetings. The manager can achieve a borrowed reserve objective because, by the end of a reserve maintenance period, initial estimates are available of the actual amount of reserve deposits that institutions need to satisfy their reserve requirements. In addition, demand for excess reserves can be estimated with reasonable accuracy. Supplying less than this combined need for reserves through open market operations makes it necessary for some combination of institutions to borrow the remainder at the discount window.[18]

The borrowed reserve procedure is a way of controlling the federal funds rate; the policy-

■ 16 Holland and Garvy (1972), pp. 193-94.

■ 17 At the direction of the Treasury, the Federal Reserve sometimes intervenes in foreign exchange markets, buying or selling dollars. Controlling the stock of base money also requires coordination of domestic open market operations with these foreign exchange market operations.

■ 18 Extended credit is not included in the borrowing target, but is treated as a component of nonborrowed reserves. This means that increases in extended credit are a substitute for open market purchases of securities in carrying out open market operations.

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desired stock of base money is the amount consistent with the policy-intended level of the federal funds rate. A higher borrowing objective, generally described in the FOMC's policy directive as a higher "degree of reserve restraint," normally would be associated with a higher expected spread of the federal funds rate above the discount rate. This is because institutions are reluctant to use their adjustment borrowing privilege, lest it preclude borrowing in a future period of greater (or more profitable) need. In the attempt to avoid borrowing, institutions bid for federal funds in the interbank market where they buy and sell reserves, until the rate rises enough to induce them to borrow the necessary amount of reserves at the discount window. Similarly, at higher market rates relative to the discount rate, the seasonal borrowing option becomes more attractive, adding to borrowed reserves.

Controlling the federal funds rate by controlling borrowing depends on the existence of a predictable relationship between the amount of adjustment plus seasonal borrowing and the average spread of the funds rate above the discount rate. Transitory variations in reserve demand and supply may be associated with transitory variations in the federal funds rate; on average, however, the rate will be at the intended level. An alternative way to control the rate would be by frequent, perhaps small, open market purchases and sales that would counteract transitory rate pressures arising from fluctuations in demand and supply, and that would signal to the market when the funds rate is above or below the policy-intended level.

With either procedure, transitory variations in the funds rate would be damped to the extent market participants had rather firm expectations about the equilibrium level of the rate. Relative to the alternative, the borrowed reserve procedure relies more heavily on private market adjustments in the funds rate to accommodate transitory deviations of reserve demand and System supply from levels that, on average, are consistent with monetary policy. The alternative funds rate procedure would be more likely to accommodate those transitory deviations through open market operations.[19]

The potential advantage of a borrowed reserve procedure is in allowing changes in market perceptions of basic money and credit demand to feed into the reserves market and to cumulate in funds rate movements without delay. A funds rate procedure, on the other hand, would prevent rate movements resulting from changes in basic money and credit demand and would delay balance sheet adjustments by depository institutions. Only the frequency and direction of open market operations might still communicate their presence.[20]

A disadvantage of the borrowed reserve procedure is that policy could become poorly defined or communicated if the borrowing/funds rate relationship shifts. An unexpected shift will lead to some mix of persistent deviations of the funds rate and borrowing from the values intended by the FOMC, until this shift is identified and the borrowing objective adjusted.

In the very short run, this mix depends on the degree of confidence the manager places in daily reserve projections relative to signals from the funds market as competing guides to the sign and size of needed open market operations during a reserve maintenance period. During an *intermeeting* period, a shift in the borrowing/funds rate relationship might place the manager in the awkward position of having to choose between the FOMC's specified borrowing objective and intended funds rate as the relevant measure of reserve restraint to be achieved through open market operations. Clarification from the FOMC might be needed to avoid a misunderstanding about the manager's stewardship in carrying out the policy directive.

Uncertainty about the reliability of the borrowing/funds rate relationship also could add an extra layer of complexity to FOMC deliberations. Members who already must reconcile their individual policy predilections into a single policy directive also would have to reconcile their individual views about the relative merits of risking unexpected changes either in the funds rate or in borrowing when instructing the manager. Moreover, in the markets, policy signals also would become less clear under these circumstances, reflecting market uncertainty about whether the

■ **19** Thornton (1988) provides a useful examination of these alternative operating procedure matters.

■ **20** A second possible advantage might be that a borrowed reserve objective leaves the federal funds rate implication of monetary policy decisions slightly ambiguous in the very short run. This has the disadvantage that market observers cannot distinguish immediately between funds rate changes intended by policy and changes induced by market pressures. However, this ambiguity might facilitate reaching a consensus when monetary policy decisions are made infrequently (FOMC meetings typically are scheduled six to eight weeks apart) and are contingent on forecasts of near-term economic developments. Members may agree on a course of action more readily if the implication of their action includes slightly different funds rate preferences or somewhat different anticipations for the economy by various members.

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TABLE 2

Complications in Policy Implementation: Flexibility and Technical Changes in the Borrowed Reserve Objective (November 1988–December 1989)

Intermeeting Period Ending	Flexibility[a]	Technical Change[b]
Dec. 13, 1988	Not mentioned	"Lower level"
Feb. 7, 1989	"Special degree of flexibility"	Not mentioned
March 28, 1989	"Some flexibility"	"Adjusted downward"
May 16, 1989	"Shortfall ...diminished"	Not mentioned
July 5, 1989	Not mentioned	"Upward revision"[c]
Aug. 22, 1989	Not mentioned	"Upward revision"[c]
Oct. 3, 1989	Not mentioned	Not mentioned
Nov. 14, 1989	Not mentioned	"Several technical reductions"[c]
Dec. 18, 1989	Not mentioned	"Technical reductions"[c]

a. Diminished focus on borrowing objective in supplying nonborrowed reserves.
b. Change in borrowing objective to reflect change in willingness to borrow.
c. Explicitly attributed to seasonal borrowing.
SOURCE: Record of Policy Actions of the Federal Open Market Committee.

observed level of borrowing or of the funds rate represented the intention of policy.[21]

Responding to Shifts in Borrowing Demand

Open market operations today are conducted within a policy milieu that perceives a lasting change in the federal funds rate of about 25 basis points as evidence of a meaningful change in reserve restraint. In recent years, a $100 million (or perhaps smaller) change in the target for adjustment plus seasonal borrowing normally would have been expected to produce such a change in the rate spread. On that basis, a shift in the demand for borrowed reserves on the order of $100 million, unless offset by a comparable change in the borrowing objective, might be mistaken in markets for a change in policy.

Unexpected shifts in the borrowing/funds rate relationship have occurred in the past, although they were not necessarily related to the seasonal borrowing program. A temporary reduction in willingness to borrow was observed during the summer of 1984, in apparent reaction to problems at the Continental Illinois Bank. In early 1986 and again in late 1987, apparently permanent changes in the demand for discount-window credit were observed. In each case, the estimated magnitude of the shift was substantial in the sense that, had the shift not been offset by adjusting the target for borrowing, the potential change in the funds rate would likely have been interpreted as a change in policy.

Between the October 1988 and February 1990 meetings, the record of FOMC policy actions frequently noted apparent or potential shifts in the borrowing/funds rate relationship. These shifts were, in part, associated with the seasonal borrowing program (table 2). As shown in figure 2, the decline in adjustment plus seasonal borrowing from late summer 1988 to early spring 1989, despite an *increase* of 100 basis points in the rate spread, suggests the magnitude of the shift in the borrowing function that the Committee offset. While adjustment borrowing rose, consistent with a larger rate spread, seasonal borrowing declined by more than enough to offset that increase.

The same may be said of the increase in adjustment plus seasonal borrowing after spring 1989, despite a 70-basis-point *decrease* in the rate spread. While adjustment borrowing fell, consistent with a reduced rate spread, seasonal borrowing increased by more than enough to offset that decline. It was not the seasonality of program borrowing that was a problem, but the unexpected *amplitude* of the seasonality in conjunction with low levels of adjustment borrowing that, if not offset, might have produced a noticeable deviation of the funds rate from its intended setting.

The onset of this extended episode was noted in a November 1988 Committee conference call when "...it became increasingly evident in the implementation of policy that depository institutions had reduced their demands on the discount window..." and the System Open Market Account manager "...adjusted the reserve paths to incorporate a lower level of borrowing...." The Committee "...agreed that the factors relating to the apparent change in the relationship between

21 There was a time when the FOMC was willing to accept a federal funds rate outcome between meetings within a range of several hundred basis points without reconvening for further deliberation. However, this was in the period of strict monetary targeting between late 1979 and late 1982, when open market operations were guided by yet a third method, with a *nonborrowed* reserve policy objective. Under that procedure, however, the 400-basis-point range was not the deviation from the expected funds rate acceptable in *setting* reserve restraint. Rather, 400 basis points was the range within which the FOMC was willing to allow the reserve restraint setting itself to *vary* in response to monetary growth.

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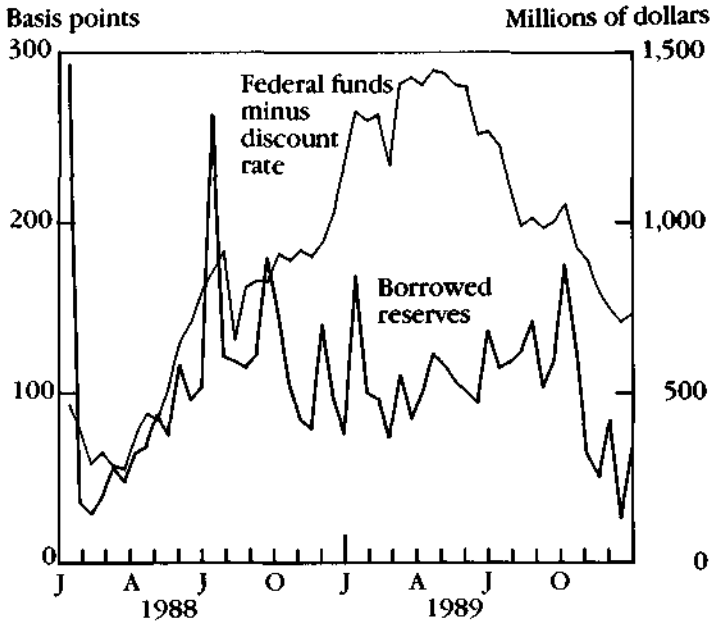
FIGURE 2

Adjustment Plus Seasonal Borrowing, 1988–89 (Two-week reserve maintenance periods)



SOURCE: Board of Governors of the Federal Reserve System.

borrowing and the federal funds rate, and the broader implications for the conduct of open market operations, would be reviewed further at the December meeting." The December record indicated that "...the procedure of focusing on the degree of reserve restraint, as indexed by borrowed reserves, had been implemented with some flexibility in recent weeks in light of the substantial shortfall of borrowing in relation to expectations."

After discussion at the December meeting, "...[the] Committee concluded that no changes in the current procedure were needed at [that] time, but that flexibility would remain important in accomplishing Committee objectives under changing circumstances." At each of its next three meetings, in February, March, and May of 1989, it was "understood" or "accepted" that open market operations would be conducted with "flexibility" in the light of "uncertainties" in the borrowing/funds rate relationship.

By May, the reduced demands on the discount window appeared to be passing, "...largely because of a surge in seasonal borrowing—and, according to a staff analysis, unchanged reserve conditions over the upcoming intermeeting period might encompass somewhat higher average borrowing." For the remainder of 1989, "flexibility" in response to "uncertainty" was succeeded by "technical upward revisions" (July and August meeting records) and then "technical reductions" (November and December meeting records) in the level of adjustment plus seasonal borrowing used in setting reserve objectives for open market operations. These adjustments to the index of reserve restraint reflected "unusual strength/strength" and then "a decline/a continuing decline" in seasonal borrowing.

Flexibility in policy implementation can be achieved because daily decisions about open market operations can reflect a mixed strategy. Daily estimates of the demand for total reserves relative to the estimated actual supply of nonborrowed reserves suggest the amount of open market operations needed to achieve a borrowed reserve objective for a reserve maintenance period. However, inconsistent behavior of the federal funds rate may suggest the possibility of errors in estimates of reserve demand or supply, or in the estimated borrowing/funds rate relationship, and can lead to open market operations being shaded accordingly. Conceptually, a pure borrowed-reserve objective would have no such contingency for using funds-rate information. The degree of flexibility in implementation might be judged by the extent to which the funds rate diverges from its expected level without triggering open market operations that are not strictly consistent with reserve estimates.

The complicating factors for monetary policy associated with the seasonal borrowing program are the need for flexibility in policy implementation and for technical changes in the borrowing objective. Complicating policy implementation is not the same as thwarting policy implementation. The Committee can and apparently did achieve intended levels of the federal funds rate despite uncertainty about, and shifts in, the borrowing/funds rate relationship, which emanated in part from the seasonal borrowing program. Complicating policy implementation simply avoids a disadvantage of the borrowed reserve procedure — unintended changes in the federal funds rate occurring as a result of changes in the borrowing/funds rate relationship. At the same time, however, complicating monetary policy may mean losing the advantage of the borrowed reserve procedure—rapid response of the funds rate to changing market perceptions of underlying demands for money and credit.

Nothing need be lost if the borrowing objective requires only frequent technical changes to incorporate a predictable seasonal pattern of seasonal borrowing. In fact, if the seasonal process could be predicted with sufficient accuracy, the borrowed reserve index of reserve restraint

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might better be expressed in seasonally adjusted levels. This would avoid any potential confusion between technical and policy changes in the index of reserve restraint. Other than that step, the borrowed reserve procedure could operate unchanged, allowing changing market perceptions of basic money and credit demand to feed into the funds rate in the very short run.

Of course, it may not be possible to predict the seasonal process with such reliability. The less predictable the seasonal changes in seasonal borrowing, the more difficult it must become to estimate the short-term technical changes required to avoid inadvertent policy changes in the borrowed reserve index of reserve restraint. In the past, when the level and amplitude of seasonal movements in seasonal borrowing were small relative to adjustment borrowing, this problem appears to have been eclipsed or offset by movements in adjustment borrowing. Now, flexibility becomes more important in achieving the intended funds rate when uncertainty obscures the expected level of seasonal borrowing. What is lost is simply the possibility of a response of the funds rate in the very short run to changing market perceptions of underlying demands for money and credit.

Upon closer inspection, this seeming loss actually may be a gain. Seasonal borrowing has become a substantially larger, frequently dominant, share of total adjustment plus seasonal borrowing used as the guide for open market operations. Without flexibility, the danger is that the funds rate would be responding in the very short run largely to unexpected changes in underlying demands for credit in the agricultural sector of the economy. The rationale for the seasonal borrowing program is that eligible borrowers are thought to have limited access to the financial markets that other institutions use. To the extent that agricultural credit conditions were not representative of those in the economy at large, the Committee would not want to allow changes in seasonal borrowing originating in the agricultural sector to show through in short-run movements in the federal funds rate.

IV. Conclusion

The Federal Reserve's seasonal borrowing program was designed for small banks with marked seasonal needs for funds and was intended to remedy their presumed limited access to financial markets upon which larger banks relied for liquidity. Use of the program has been light relative to the number of banks likely to be eligible, especially considering the cost advantage typically available to borrowers. Evolution of financial market structure since the program began in 1973 should have had the effect of reducing market isolation of eligible banks, weakening limited access as the rationale for the program. Light usage and reduced isolation suggest that the need for the program may be confined to a relatively small number of banks for which the original program rationale may still apply.

Rapid growth of peak-period seasonal borrowing in recent years is said to have complicated monetary policy implementation, contrary to expectations that existed when the program was introduced. These complications have arisen because the FOMC has been using a borrowed reserve procedure to guide open market operations since 1982. Technical changes in the Committee's borrowing objective can prevent unintended movements of the funds rate when there are predictable swings in seasonal borrowing over the course of a year. Similarly, flexibility in pursuing a borrowing objective can prevent unintended rate movements to the extent that seasonal borrowing cannot be predicted reliably.

Flexibility allows the FOMC to achieve an intended level of the federal funds rate when the appropriate borrowed reserve objective is hard to predict. In so doing, flexibility removes the borrowed reserve procedure's advantage of allowing the funds rate to be immediately responsive to changes in market perceptions of the underlying demand for money and credit. This seems entirely appropriate when borrowing is dominated by the seasonal borrowing of small, largely agricultural banks with limited access to financial markets.

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