Berichte

Monetary Policy and Financial Deregulation in the United States

By Robert H. Rasche, East Lansing / Mich.

This study examines the implications for monetary policy of the financial innovation and deregulation that occurred in the United States over the past decade. In section I an outline of the history of financial innovation and deregulation in the United States is presented. In section II a framework for examining how financial innovation and deregulation could generate problems for monetary control is developed. In section III the conventional wisdom in the United States about the impact of deposit rate deregulation on the demand for money is reviewed. In section IV, some evidence is examined on the hypothesis that deregulation has caused the relationship between the money stock and various reserve aggregate operating instruments to become so unstable that control of the growth of monetary aggregates is impractical or impossible. The evidence presented refutes this hypothesis. In section V the question of the stability of the demand function for narrowly defined money (M1) or the stability of velocity is investigated. The evidence presented here suggests that, with one notable exception, the money demand function in the United States has been extremely robust in the face of financial innovation and deregulation. The one change that apparently occurred in that function as a result of deposit rate deregulation was an increase in the interest elasticity of velocity. This effect directly contradicts the conventional wisdom in the United States about changes in the money demand function with deposit rate deregulation.

I. The Nature of Financial Innovation and Deregulation in the United States

The process of financial innovation in the United States can be traced back at least twenty-five years, to the reorganization of a market in large negotiable certificates of deposit. Some would trace the process back into the late 1950s with the organization of an active market in federal funds.

The appearance of the market in large CDs was the harbinger of all the financial innovation that occurred in the next twenty years in the United States. This innovation attempted to circumvent the then simple deposit interest rate ceiling imposed by Regulation Q. Subsequent innovations proved to be increasingly imaginative attempts to avoid the ever increasing complexity of deposit interest rate regulation.

This innovation process culminated in 1980 with the passage of the Depository Institutions Deregulation and Monetary Control Act of 1980, which was followed by the Garn – St. Germain Depository Institutions Act of 1982. Space constraints preclude a detailed description of all the regulatory changes introduced by these acts.[1] Three aspects of these acts are directly relevant to the conduct of monetary policy. First, the 1980 Act provided for the gradual phase out of all interest rate ceilings and allowed depository institutions, regardless of geographical location, to offer an interest bearing checkable account to households beginning in 1981. Second, the 1980 Act extended the reserve requirement authority of the Federal Reserve to all depository institutions that offered transactions accounts (checkable accounts) regardless of their charter or membership status in the Federal Reserve System. Third, subsequent to the 1982 Act, depository institutions were able to offer short-term time deposits (Money Market Deposit Accounts) and checkable deposits (Super NOW accounts) without legal restriction on interest rates, so long as other regulatory restrictions such as minimum number of withdrawals or minimum average balance requirements were observed. Other aspects of the regulatory changes of the early 1980s are less significant for monetary policy in the United States.

It is also important to recognize that significant aspects of the regulatory structure imposed on the United States financial system in the 1930s still remain in place and continue to provoke controversy. In particular, severe restrictions still exist on the "non-banking" activities of banks and bank holding companies. Presently the issue of separation of investment banking and commercial banking activities is the subject of heated debate. The status of banking services offered by nonfinancial businesses through "non-bank banks" is not yet resolved. Finally, financial innovation and deregulation continue to evolve with regard to geographical restrictions on banking. The center of activity in this aspect of deregulation has been at the regional, or state, level rather than at the federal level. Federal law with respect to bank branching has remained unchanged since 1928, and Congress has

[1] An excellent analysis of the regulatory changes affecting United States financial markets can be found in *T. F. Cargill* and *G. G. Carcia,* Financial Reform in the 1980s, Stanford CA: Hoover Institution Press, 1985.

assumed a passive role with respect to the deregulation of geographical restrictions. Within this static Federal framework, a tremendous amount of change has occurred at the state and regional level, to the point where interstate banking is now reality at the regional level and will become largely nationwide in the next several years.

II. Sources of Difficulty for Monetary Control Posed by Financial Deregulation

A frequent theme in discussions of the monetary policy experience of the United States in the early 1980s is financial innovation and/or deregulation. A prevalent conclusion is that these forces were a major contributing factor to the difficulties encountered by the Federal Reserve in attempting to control the growth of monetary aggregates, particularly $M1$, under the new operating procedures that were in effect during 1979 - 82. There are two separate aspects of the discussion of the alleged problems. These can be seen by considering two relationships:

$$M1_t = R_t * m_t \tag{1}$$

or in log difference form:

$$\Delta \ln (M1_t) = \Delta \ln (R_t) + \Delta \ln (m_t) \tag{1a}$$

where $M1_t$ measures the narrowly defined money stock, R_t measures some reserve aggregate that can be used as an operating instrument by the Federal Reserve System, and m_t measures the reserve aggregate multiplier. During the 1979 - 82 period, nonborrowed reserves was the operating instrument used by the Federal Reserve, and thus is the appropriate measure of R in the historical context.

Second:

$$Y_t = M1_t * v_t \tag{2}$$

or in log difference form:

$$\Delta \ln (Y_t) = \Delta \ln (M1_t) + \Delta \ln (v_t) \tag{2a}$$

where Y_t is a measure of nominal income and v_t is a measure of the income velocity of $M1$.

Combining the two equations, (1a) and (2a), gives:

$$\Delta \ln (Y_t) = \Delta \ln (R_t) + \Delta \ln (m_t) + \Delta \ln (v_t) . \tag{3}$$

Thus the issue of the accuracy of control of nominal income growth using a reserve aggregate operating procedure ultimately involves the forecasting precision for both the reserve aggregate multiplier and the income velocity of $M1$. If stable relationships exist for the latter two variables, and if the forecast errors for these variables are not serially correlated, then control of nominal aggregates through a reserve operating procedure with an intermediate target variable such as $M1$ is feasible over medium-term horizons, even if the short-run forecast errors are so large that short-run control of nominal aggregates or even the intermediate target variable is very imprecise.

Part of the discussion of the problems facing the Federal Reserve in the early 1980s has focused on instability of the multiplier of the operating instrument, m_t, in the face of financial deregulation. It is argued that the nonborrowed reserves multiplier was so unstable that reasonable monetary control proved impossible.

Instability of the nonborrowed reserves multiplier, if it was a significant problem for monetary control under the new operating procedures, cannot be blamed solely on financial innovation or deregulation. Monetary policy during this time period continued to be conducted under the lagged reserve accounting regulations first introduced in 1968. These regulations were introduced while the Federal Reserve was using various interest rate measures such as the federal funds rate as its operating instrument and were innocuous in that environment. Many analysts, including some economists within the Federal Reserve System, concluded that the structure of this regulation precluded any reasonable short-run monetary control, because on a week-to week basis required reserves were a predetermined variable. Thus the Federal Reserve was faced with a minimum amount of reserves that it must supply to the banking system, either through open market operations or the discount window within a reserve settlement week. This is an example where a change in regulation, if not outright deregulation could have facilitated monetary control. Yet a return to contemporaneous reserve requirements such as prevailed before 1968 was not implemented before new operating procedures were abandoned.

This is ironic for two reasons. First, the Federal Reserve had long given lip service to the importance of a stable relationship between the deposit component of $M1$ and total reserves. Throughout the 1970s representatives of

the Fed consistently argued before Congress that the declining fraction of banks that were members of the Federal Reserve System, and the accompanying decline in the fraction of checkable deposits that were subject to Federal Reserve reserve requirements presented a major impediment to effective monetary control. Apparently this line of reasoning was responsible for the inclusion in the Depository Institutions Deregulation and Monetary Control Act of 1980 of the provisions that extended Federal Reserve reserve requirements to all checkable deposits.

The second irony of this situation is that when contemporaneous reserve accounting was finally restored in February, 1984, the question was irrelevant from the perspective of monetary control. By this time, if the Fed had not abandoned any pretext of controlling monetary growth, it certainly had reverted to the credit market operating procedures that prevailed in the late 1960s and the 1970s. Under such operating procedures, the reserve accounting regulations have no impact on the precision of monetary control.

The second aspect of the discussion of the impact of financial innovation and deregulation on monetary control has focused on the velocity of $M1$, or more generally on the stability of the demand function for $M1$. Considerable evidence has been presented since the mid 1970s in favor of the hypothesis that the demand function for $M1$ in the United States is very unstable in the face of financial innovation and deregulation. In the middle of the 1970s innovations in corporate cash management techniques, the evolution of repurchase arrangement and the emergence of Money Market Mutual Funds were cited as sources of the instability of this function. In the early 1970s the rapid proliferation of NOW accounts, All Savers Certificates, Money Market Deposit Accounts and Super NOW Accounts were cited as new sources of instability of the money demand function.

These arguments still persist in the literature on monetary policy and monetary control in the United States. Some evidence to the contrary, in favor of the stability of operating instrument multipliers and $M1$ velocity is presented in sections IV and V below. In the next section various conjectures by economists about the effect of the introduction of interest bearing transactions deposits on the demand function for transactions deposits are reviewed.

III. Conjectures About the Effect of Deposit Rate Deregulation on the Demand Function for Transactions Deposits

The debate about how the spread of checkable deposits that carried explicit interest would impact upon the demand function for narrowly

defined money in the United States started in the late 1970s. The initial investigations of this question did not reach a strong conclusion. A Federal Reserve Staff study concluded that:

> "Payment of interest on demand deposits may somewhat increase the speed with which the economy responds to monetary policy to the extent that explicit rates are adjusted more promptly than implicit returns have been to changing market interest rates. A more flexible adjustment of explicit rates would reduce the extent to which changes in the velocity of money would offset changes in the money supply."[2]

My interpretation of the inference about the size of the offsetting response of velocity to changes in the money stock is that the interest elasticity of velocity was presumed to be lower with explicit interest payments than with implicit interest payments, though other interpretations are possible. Subsequent investigations reached more explicit conclusions until by the mid 1980s

> "the profession's consensus view is that permission to pay market-determined rates on transactions deposits will reduce the opportunity cost of holding money. If money demand retains the same interest elasticity with respect to this opportunity cost, it will be less elastic with respect to changes in the level of interest rated paid on money substitutes. The traditional LM function will become less interest elastic ..."[3]

This consensus is reflected by a number of contributors to a Federal Reserve Bank of San Francisco Conference on "Interest Rate Deregulation and Monetary Policy", held in 1982. In the keynote address at that conference, *Stephen Axilrod* noted:

> "Institutions over time may also be sluggish in adjusting the price of transactions accounts to market rate changes. Even so, the interest-elasticity of $M1$ demand will still probably be reduced, and possible also made less certain than it now is because decisions about offering rates on the part of depository institutions represent an additional uncertainty to the ever-present doubts about the public's attitude to money as income and interest rates change."[4]

In his presentation at the same conference, *Richard Davis* writes:

> "In any case, the interest elasticity of demand for a comprehensive transactions money measure including the new instruments clearly would decline as a larger and

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[2] Staff Study of the Board of Governors of the Federal Reserve System, "The Impact of the Payment of Interest on Demand Deposits", January 31, 1977, p. 104.

[3] *T. F. Cargill* and *G. G. Garcia,* Financial Reform in the 1980s, Stanford CA: Hoover Institution Press, 1985, p. 114.

[4] *S. H. Axilrod,* "Defining the Issues: Monetary Aggregates and Monetary Policy in a Deregulated Financial World", Asilomar Conference on Interest Rate Deregulation and Monetary Policy, Federal Reserve Bank of San Francisco, November 28 - 30, 1982, p. 8.

larger fraction of the funds included in this total paid 'own rates' that move more or less in tandem with short-term market rates"[5]

This opinion was also supported in the contribution by *John Judd* and *John Scaddings:*

"The issue under consideration is how will the demand for $M1$ behave when its own yield begins to vary more flexibly with market rates? The answer should be qualitatively the same for $M1$ and $M2$. Deregulation should cause an upward level effect on the demand for both M1 and $M2$. The elasticity of both $M1$ and $M2$ with respect to market rates should be lower than before deregulation."[6]

The sole dissent recorded at that conference from the prevailing view that interest rate deregulation would reduce the interest elasticity of the demand for transactions deposits was drawn from an analysis of the Canadian experience under financial innovation, and reached exactly the opposite conclusion:

"If fact, in Canada the growth of bank accounts paying market rates of interest actually increased rather than decreased the interest sensitivity of the demand for $M1$ as currently defined ..."[7]

Thus, the professional consensus that has emerged in the United States about the effect of interest rate deregulation on the demand function for transactions deposits may be premature, and in any case needs to be carefully examined.

IV. Some Evidence of the Impact of Financial Innovation and Deregulation on Reserve Multipliers

A considerable body of evidence is available on the behaviour of various reserve aggregate multipliers in the United States throughout the last decade. In particular, the questions of how well these magnitudes can be forecast and the stability of such forecasting models over the past decade are investigated by *Rasche* and *Johannes*.[8] In particular the ex-ante forecasting

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[5] *R. G. Davis,* "Monetary Targeting in a 'Zero Balance' World", Asilomar Conference on Interest Rate Deregulation and Monetary Policy, Federal Reserve Bank of San Francisco, November 28 - 30, 1982, p. 27.

[6] *J. P. Judd* and *J. L. Scaddings,* "Financial Change and Monetary Targeting in the United States", Asilomar Conference on Interest Rate Deregulation and Monetary Policy, Federal Reserve Bank of San Francisco, November 28 - 30, 1982, p. 96.

[7] *D. H. Howard* and *K. H. Johnson,* "Financial Innovation, Deregulation, and Monetary Policy: The Foreign Experience", Asilomar Conference on Interest Rate Deregulation and Monetary Policy, Federal Reserve Bank of San Francisco, November 28 - 30, 1982, p. 170.

[8] *R. H. Rasche* and *J. M. Johannes,* Controlling the Growth of Monetary Aggregates, Boston, MA: Kluwer Academic Publishers, 1987.

performance of various time series models of reserve aggregate multipliers are examined in that study for five particular incidents of financial deregulation or regulatory change in the United States. These four incidents are the introduction of Automatic Transfer Accounts (ATSs) in 1978, the legalization of NOW accounts on a nationwide basis in 1981, the end of the All-Savers Certificate experiment in late 1982, the introduction of Money Market Deposit Accounts and Super NOW accounts in December, 1982 and January, 1983 respectively, and the change from lagged reserve requirements to contemporaneous reserve requirements in February, 1984.

The conclusion from these analyses is that, with the exception of the nationwide legalization of NOW accounts in 1981, none of these regulatory changes had any significant impact on the precision of the forecasting models for various reserve aggregate multipliers, including the model of the multiplier for nonborrowed reserves. In the NOW account case, a substantial bias was introduced into the ex-ante forecasts of the reserve multipliers in early 1981 when no information was available to reflect the effects of deregulation. However, this problem proved extremely transitory. The available evidence suggests that the "shift-adjustment" that was constructed by the Staff of the Board of Governors, and which was available no later than May, 1981, is an appropriate measure of the magnitude of the portfolio shifts that occurred as a result of the deregulation.[9] When this independent information is incorporated into the forecasting model for the period subsequent to May, 1981, the bias of the ex-ante multiplier forecasts is reduced to zero, and the precision of the forecasts is comparable to that observed in the late 1970s.

A second result that emerges from the analysis of ex-ante time series forecasts of various reserve multipliers is that throughout the late 1970s and early 1980s it was possible to produce forecasts whose errors exhibited little if any serial correlation. The standard errors of such forecasts on a monthly basis are substantial, which implies that very precise short-term monetary control would not be feasible using such forecasting techniques in equation (1a). However, the very low serial correlation of the forecast errors of such models suggests that highly precise monetary control is achievable over horizons of six months or a year in the United States. Such results were feasible even with the presence of financial innovation and deregulation in the late 1970s and early 1980s. This suggests that the failure to achieve reasonable monetary control during this period cannot be attributed to these phenomena.

[9] *B. A. Bennett,* "'Shift Adjustments' to the Monetary Aggregates", Federal Reserve Bank of San Francisco Economic Review, Spring, 1982.

V. The Impact of Financial Deregulation on the Velocity of *M*1

The question of impact of ongoing financial deregulation on the relationship between the nominal money stock in the United States (particularly the narrowly defined measure of money, *M*1) and measures of nominal income has been one of the most troublesome questions facing those involved in the conduct of monetary policy. Indeed, uncertainty over this relationship was cited by the Federal Reserve in October, 1982, as the reason for the abandonment of the "New Operating Procedures" that had been adopted in October, 1979.

> "With respect to the period ahead, the Committee continued to face uncertainties about the interpretation of the behavior of the monetary aggregates in general, arising from the impact of the current economic environment on precautionary demands for money and liquidity. Moreover, the behavior of *M*1 in particular during the final three months of the year would inevitably be distorted by two institutional developments. First a very large volume of all savers certificates would mature in the first part of October, and disposition of the proceeds could be expected to induce temporary bulges in both the demand deposit and NOW account components of *M*1. Second, later in the quarter, as the Depository Institutions Deregulation Committee (DIDC) implemented recent legislation, depository institutions would be authorized to offer a new account (or accounts) that would be free from interest rate ceilings, would be usable to some degree for transaction purposes, and would be competitive with money market mutual funds. The new account was likely to have a substantial impact on the behavior of *M*1, but no basis existed for predicting its magnitude. ... Because of these difficulties in interpreting the behavior of *M*1 during the fourth quarter, the Committee decided that it would place much less than the usual weight on that aggregate's movements during this period and that it would not set a specific objective for its growth. ... The Committee agreed that in all the circumstances, it would seek to maintain expansion in bank reserves needed for an orderly and sustained flow of money and credit ... taking account of the desirability of somewhat reduced pressures in private credit markets ..."[10]

This uncertainty about the behavior of monetary aggregates under financial deregulation has continued to influence monetary policy decisions in the United States up to the present time. In his final *Humphrey-Hawkins* testimony, Chairman *Volcker* stated:

> "However, it is also true that, with institutional and market developments importantly affecting the relationships between the various measures of money and the variables we ultimately care about, judgements about the appropriate growth of the aggregates have become both more difficult and more dependent upon prevailing economic and market circumstances."[11]

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[10] Record of Policy Actions of the Federal Open Market Committee, October 5, 1982, Federal Reserve Bulletin, December, 1982, pp. 764 - 5.

[11] Statement by *Paul A. Volcker* before the Committee on Banking, Finance and Urban Affairs, U. S. House of Representatives, July 21, 1987. Federal Reserve Bulletin, September, 1987, p. 703.

The controversy over the stability of an aggregate demand function for narrowly defined money in the United States did not begin with the deregulation of deposit rates in the early 1980s, but dates back to the mid 1970s.[12] A voluminous empirical literature on this subject has developed.[13] My research on this issues indicates that there was a change in the $M1$ velocity relationship, whether measured against GNP or various income or sales measures, but that this change occurred quite abruptly around the end of 1981, and since then a new stable $M1$ velocity relationship has emerged in the United States. In my Carnegie-Rochester Conference Series paper I concluded that the $M1$ velocity function is most appropriately estimated in first difference form, and that after allowance is made for a change in the drift parameter of this equation (a shift in the constant term) in late 1981, the function remains stable in all other respects throughout the 1982 - 5 period. I also reviewed a number of hypotheses that have been advanced about the effect of financial innovation and deregulation on $M1$ velocity and concluded that most of them were inconsistent with the observed behavior of that relationship in the 1980s. The one hypothesis that I was unable to conclusively reject is that the "shift in the drift" that I identified was related to a change in the interest elasticity of $M1$ velocity that occurred after the introduction nationwide of personal checkable deposits that allowed explicit payment of interest.

This question is pursued further in the estimates reported in Tables I, II, and III. The estimates reported there are constructed on quarterly and monthly data of a dynamic money demand equation of the form:

$$(4) \qquad \Delta \ln Y_t - \Delta \ln M1_t = \alpha + \sum_{i=0}^{n} \beta_i \Delta \ln RTB_{t-i} + \sum_{i=0}^{n} \theta_i \Delta \ln Y/P_{t-i} + \\ + \phi \mathrm{DINFU}_t + \delta \mathrm{D82}_t + e_t$$

where the β_i and θ_i are the estimated coefficients of unrestricted distributed lags on the Treasury bill rate and a measure of real personal income respectively. DINFU is a measure of the unanticipated rate of inflation constructed as the residual of an MA(1) ARIMA model of the second difference of the $\ln P_t$, the personal income deflator, and D 82 is a dummy variable that

[12] *S. M. Goldfeld,* "The Case of the Missing Money", Brookings Papers on Economic Activity, 1976: 3, pp. 683 - 730.

[13] For an extensive bibliography of this literature see *J. P. Judd* and *J. L. Scaddings,* The Search for a Stable Money Demand Function: A Survey of the Post 1973 Literature, Journal of Economic Literature, September, 1982, 20, pp. 993 - 1023 and *R. H. Rasche,* "$M1$-Velocity and Money Demand Functions: Do Stable Relationships Exist", Carnegie-Rochester Conference Series on Public Policy, Volume 27, 1987.

assumes a value of 1.0 after the end of 1981.[14] This specification has been estimated on samples ending with 1974 and 1981 omitting the variable D 82 and on a sample ending with 1985 including this variable. The estimates of the coefficients in the specification have been found to be robust to changes in the sample period, a result which has been notably absent in most empirical studies of $M1$ demand equations for the United States.

A number of simple restrictions on the shapes of the distributed lags in the above specification cannot be rejected, which result in a very parsimonious specification of the money demand function:

$$\begin{aligned}\Delta \ln Y_t - \Delta \ln M1_t = {} & \alpha + [(n+1)^*\beta]\left[\sum_{i=0}^{n} \Delta \ln RTB_{t-i}/(n+1)\right] \\ & + \theta \Delta \ln Y/P_t - \theta\left[\sum_{i=1}^{n} \Delta \ln Y/P_{t-i}/n\right] \\ & + \theta \mathrm{DINFU}_t + \delta \mathrm{D82}_t + e_t\end{aligned} \tag{5}$$

This restricted specification has been extended to incorporate a covariance analysis that allows for different estimated parameter values in each of three subsamples, 1953 - 74, 1975 - 81 and 1982 - 85, by including the interaction of the D82 dummy variable with each of the regressors, and by adding a second dummy variable D75 that assumes the value of 1.0 from 1975 - 81 and including the interaction of this new dummy variable with each of the regressors. The expanded specification was estimated over the 1953 - 85 sample period. These extended regression are included in Table III. In both cases, the hypothesis that the estimated coefficient on the D75 variable by itself and the estimated coefficients on the interaction of this variable with all of the other regressors were all equal to zero cannot be rejected. This is consistent with the stability of the specification and the estimated coefficients across the 1952 - 74 and 1952 - 81 sample periods. A second F test of the hypothesis that the estimated coefficients on the D82 variable and on the interaction of the D82 dummy variable with the Treasury bill rate are zero can be rejected. The rejection of this hypothesis is the result of a change in the interest elasticity of the money demand function after 1981, since a separate test of the constancy of the estimated real income coefficient (and unexpected inflation coefficient) is not rejected. The restricted estimates are also presented in Table III.

[14] Similar results have been found on a quarterly basis for GNP and final sales to domestic producers. See *Rasche,* op. cit. The velocity measures based on personal income are presented here to show the consistent implications of this specification across different levels of time aggregation.

The constrained quarterly and monthly equations in Table III exhibit an amazing amount of consistency, something that frequently is lacking in econometric investigations that test the same hypothesis at different levels of time aggregation. The estimated constant in each equation is virtually identical, as is the estimated shift in the constant after 1981. The long-run interest elasticities are also consistent between the two specifications. The estimated long-run interest elasticity in the quarterly (monthly) equation prior to 1982 is .0420 (.0477), while the shift in the interest elasticity in 1982 is estimated in the quarterly (monthly) equation to be .0948 (.0918). The relevant comparison of the estimated short-run real income elasticities is in terms of 1.0 – the estimated coefficient of the $\Delta \ln Y/P$ term. Consistency across time aggregation requires that this estimate from the quarterly data(.5278) be approximately three times the estimate from the monthly data(.1687) in terms a short-run money demand model that represents the change in observed real balances as the sum of the change in equilibrium real balances plus the response to contemporaneous interest rate, real output, and unexpected inflation shocks.[15]

The inexplicable "shift in the drift" of the $M1$ velocity function that was found in earlier work appears to be symptomatic of a rotation of the velocity – interest rate relationship. This is illustrated in Figure 1, where the estimated long-run relationship between velocity and interest rates in the period 1952 - 81 is plotted together with the estimated long-run relationship for the period 1982 - 85. In the earlier period the function is seen to be relatively flat and has a positive vertical intercept. The latter property accounts for the upward drift in $M1$ velocity during the period from the Federal Reserve-Treasury Accord in 1951 until the introduction of interest bearing checkable deposits in 1981. Subsequent to 1981, the function is steeper and goes through the origin of the graph. This suggests that the effect of deposit rate deregulation in the United States has been to increase the sensitivity of velocity to cyclical fluctuations in short-term interest rates, but that when averaged in the long run over periods of comparable nominal short-term interest rates, $M1$ velocity will not exhibit any drift. This result stands in direct contradiction to the prevailing wisdom in the United States about the effect of interest rate deregulation on the interest elasticity of the demand for real balances, though it appears to be consistent with the Canadian experience.

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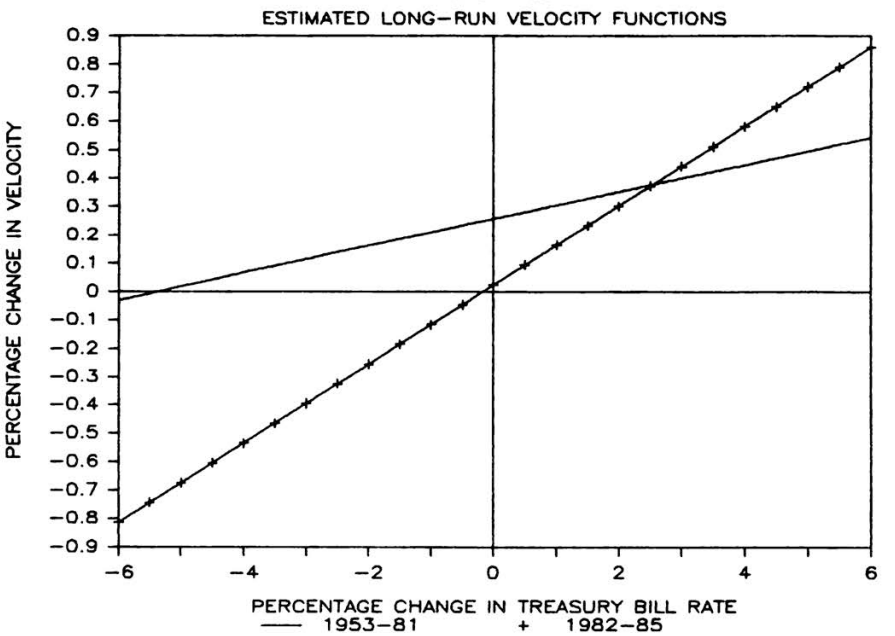
[15] For a derivation of this form of the estimated equation see *R. H. Rasche,* "An Update on Velocity Behavior", Policy Statement and Position Papers, Shadow Open Market Committee, March 8 - 9, 1987, Center for Research in Government Policy and Business, University of Rochester, PPS 87 - 01, pp. 26 - 29.

FIGURE 1



A second issue that can be investigated with the estimates in Tables I through III is the question of increased uncertainty with respect to velocity behavior cited by *Axilrod* in the quotation noted in Section III. In the regressions reported in Tables I and II, it is clear that the standard error of the regressions increase uniformly as the sample period is extended from 1974 to 1981 to 1985. The increase in this standard error from the 1981 sample to the 1985 sample could be viewed as representing velocity uncertainty introduced by deposit rate deregulation. The evidence presented at the bottom of Table III suggests that such an interpretation is not warranted. The nature of the heteroscadesticity appears to be a sharp increase in the variance of the estimated residuals around the middle of the 1970s. Subsequently the variance of the estimated residuals appears to remain very constant. There is a small increase in the estimated variance from 1975 - 81 to 1982 - 85 in the quarterly regression, but there is a minor decrease in the estimated variance in the latter period in the monthly regression. In both the quarterly and monthly regressions, there is a substantial increase in the estimated residual variance from the pre-1975 to post-1975 periods. The source this heteroscadesticity is the subject of a continuing research effort.

Table I

Quarterly and Monthly Personal Income Velocity Equations
First Differences

	Unconstrained Distributed Lags					
Sample	53-74	53-81*	53-85*	53-74	53-81**	53-85**
	[--------Quarterly---------]			[----------Monthly----------]		
Constant	.0203 (.0033)	.0200 (.0034)	.0185 (.0035)	.0321 (.0047)	.0336 (.0047)	.0296 (.0048)
D82	--	--	.0402 (.0070)	--	--	-.0422 (.0071)
DIFU	.6830 (.1173)	.5120 (.1296)	.5145 (.1400)	1.0535 (.0826)	.8930 (.0853)	.8998 (.0841)
$\Delta \ln RTB_t$	.0114 (.0040)	.0044 (.0044)	.0045 (.0045)	.0044 (.0024)	.0032 (.0025)	.0030 (.0026)
$\Delta \ln RTB_{t-1}$	.0135 (.0039)	.0196 (.0043)	.0224 (.0045)	.0031 (.0025)	.0044 (.0027)	.0062 (.0028)
$\Delta \ln RTB_{t-2}$	.0164 (.0036)	.0116 (.0041)	.0126 (.0043)	.0054 (.0025)	.0061 (.0027)	.0076 (.0028)
$\Delta \ln RTB_{t-3}$				.0036 (.0025)	.0069 (.0027)	.0059 (.0027)
$\Delta \ln RTB_{t-4}$				.0033 (.0025)	.0055 (.0026)	.0052 (.0027)
$\Delta \ln RTB_{t-5}$				.0086 (.0025)	.0086 (.0026)	.0091 (.0027)
$\Delta \ln RTB_{t-6}$				.0012 (.0025)	.0027 (.0027)	.0019 (.0028)
$\Delta \ln RTB_{t-7}$				.0079 (.0025)	.0030 (.0026)	.0054 (.0027)
$\Delta \ln RTB_{t-8}$				.0030 (.0023)	.0027 (.0024)	.0017 (.0024)
$\Delta \ln Y/P_t$	.7005 (.0566)	.7543 (.0599)	.7622 (.0619)	.8617 (.0398)	.8346 (.0422)	.8396 (.0431)
$\Delta \ln Y/P_{t-1}$	-.2572 (.0622)	-.1961 (.0660)	-.1831 (.0674)	-.2027 (.0392)	-.2282 (.0421)	-.1863 (.0428)
$\Delta \ln Y/P_{t-2}$	-.1973 (.0643)	-.2009 (.0642)	-.1989 (.0652)	-.1371 (.0396)	-.1131 (.0421)	-.1022 (.0429)
$\Delta \ln Y/P_{t-3}$				-.1446 (.0394)	-.1373 (.0420)	-.1203 (.0430)
$\Delta \ln Y/P_{t-4}$				-.1057 (.0395)	-.0737 (.0418)	-.0769 (.0428)
$\Delta \ln Y/P_{t-5}$				-.0846 (.0383)	-.0777 (.0405)	-.0952 (.0415)
$\Delta \ln Y/P_{t-6}$				-.0598 (.0379)	-.0537 (.0406)	-.0627 (.0415)
$\Delta \ln Y/P_{t-7}$				-.0953 (.0378)	-.0960 (.0404)	-.0833 (.0413)

Table I: Continued

$\Delta \ln Y/P_{t-8}$				-.0630 (.0376)	-.1017 (.0406)	-.0755 (.0417)
$\bar{R}^2$	.77	.69	.70	.71	.61	.59
se	.0188	.0238	.0255	.0355	.0420	.0449
d-w	1.38	1.42	1.25	1.83	1.86	1.71

* Excluding 1980,1-80,3
** Excluding 1980,1-80,6

Table II

Quarterly and Monthly Personal Income Velocity Equations
First Differences

Constrained Distributed Lags

Sample	53-74	53-81*	53-85*	53-74	53-81**	53-85**
	[---------Quarterly---------]			[---------Monthly---------]		
Constant	.0298 (.0021)	.0317 (.0021)	.0312 (.0024)	.0308 (.0022)	.0315 (.0023)	.0306 (.0025)
D82	--	--	-.0454 (.0068)	--	--	-.0418 (.0070)
$\Delta \ln RTB_t$	.0137 (.0015)	.0140 (.0016)	.0155 (.0018)	.0049 (.0005)	.0053 (.0006)	.0057 (.0006)
$\Delta \ln Y/P_t$	.5030 (.0687)	.4612 (.0642)	.4843 (.0698)	.8781 (.0378)	.8347 (.0395)	.8353 (.0401)
$\bar{R}^2$	.60	.52	.60	.70	.60	.59
se	.0194	.0219	.0250	.0360	.0425	.0450
d-w	1.37	1.59	1.34	1.88	1.83	1.73

* Excluding 1980,1-80,3
** Excluding 1980,1-80,6

Table III

Covariance Analysis of Personal Income Velocity Specifications
1953 - 85

Dependent Variable: ΔlnY - ΔlnM1

	[Quarterly(n=2)]		[-Monthly(n=8)-]	
CONSTANT	.0294 (.0025)	.0315 (.0023)	.0293 (.0027)	.0309 (.0024)
$\sum_{i=0}^{n} \Delta \ln RTB_{t-i}$	.0138 (.0018)	.0140 (.0017)	.0050 (.0006)	.0053 (.0006)
$\Delta \ln(Y/P) + DINFU - (1/n) \sum_{i=1}^{n} \Delta \ln(Y/P)_{t-i}$	.4878 (.0791)	.4722 (.0656)	.8744 (.0463)	.8313 (.0395)
D75	.0096 (.0055)	--	.0066 (.0058)	--

Table III: Continued

$D75*[\sum_{i=0}^{n} \Delta \ln RTB_{t-i}]$	.0132	--	.0016	--
	(.0055)		(.0018)	
$D75*[\Delta \ln(Y/P) + DINFU - (1/n) \sum_{i=1}^{n} \Delta \ln(Y/P)_{t-i}]$	-.1024	--	-.1756	--
	(.1488)		(.1013)	
D82	-.0387	-.0312	-.0264	-.0280
	(.0120)	(.0074)	(.0079)	(.0078)
$D82*[\sum_{i=0}^{n} \Delta \ln RTB_{t-i}]$	.0267	.0316	.0105	.0102
	(.0093)	(.0080)	(.0027)	(.0027)
$D82*[\Delta \ln(Y/P) + DINFU - (1/n) \sum_{i=1}^{n} \Delta \ln(Y/P)_{t-i}]$	.2862	--	-.0814	--
	(.2724)		(.1462)	
$\bar{R}^2$	.64	.64	.61	.61
se	.0236	.0237	.0441	.0442
d-w	1.53	1.51	1.82	1.80
F	1.34		1.59	
(n_1, n_2)	(4,119)		(4,382)	
$s_{residuals\ (53,1-74,12)}$	.0193		.0359	
$s_{residuals\ (75,1-81,12)}$	.0273		.0579	
$s_{residuals\ (82,1-85,12)}$	.0329		.0550	

VI. Summary of the Recent Monetary Policy Experience of the United States

There is no doubt that the changing environment in which monetary policy in the United States has operated over the past decade is a contributing factor to the history of that policy. The perception that monetary aggregates are uncontrollable and that if controlled would not bring about the desired behavior of nominal income is a significant factor in the historical development of policy. Reserve aggregate operating instruments were abandoned in 1982 because of a prevailing belief that narrowly defined money could not be controlled through such instruments and that the velocity of narrowly defined money is so unstable that such control is meaningless. In 1985 and particularly in 1986 *M*1 monetary growth was allowed to accelerate rapidly under the excuse that the velocity of that aggregate was totally unstable. In the assumed absence of any systematic behavior of velocity and under the pretext that Monetarism had been tested and found wanting, credit market conditions reemerged as both the target and instrument of monetary policy in the mid 1980s. The criticisms of the Free Reserves Doctrine promulgated in the 1960s appear forgotten.

There is considerable evidence to support an alternative view of the recent monetary history of the United States. This view holds that the New Operating Procedures experiment was not an attempt to apply Monetarist principles.[16] Recent evidence also suggests that $M1$ velocity behavior in the United States has not been capricious, and that substantive systematic changes in the behavior of velocity as a result of financial deregulation and innovation have been infrequent. The only major effect of a continually changing financial environment on velocity over the past decade appears in late 1981.

It can be argued that since the evidence on the continued systematic behavior of velocity is only now emerging, that the past five or six years represent a transition period of uncertainty, which is a real cost of financial innovation and deregulation. While there is no doubt that this uncertainty did exist, it was probably in large part unnecessary. A number of empirical studies of the demand for real balances in the United States appeared in the late 1970s that suggested a fundamental problem with the then conventional money demand function.[17] These studies have some shortcomings. However, had evidence presented there on first difference money demand specifications been pursued during the early 1980s, the case for pervasive instability in the face of financial innovation and deregulation probably would never have achieved prominence.

Zusammenfassung

Geldpolitik und Deregulierung der Finanzmärkte in den USA

Diese Studie untersucht, ob die kontinuierliche Innovation und Deregulierung der Finanzmärkte in den Vereinigten Staaten von Amerika Ende der siebziger und zu Beginn der achtziger Jahre eine potentielle Quelle beachtlicher Schwierigkeiten in der Gestaltung der Geldpolitik gewesen ist. Es scheint bewiesen, daß für die Politiker aus diesen Quellen nur relativ wenige Probleme entstanden sind und daß der Strukturwandel, der mit der Einführung von NOW-Konten im Jahre 1981 einherging, relativ schnell aufgedeckt werden konnte. Bei diesem Strukturwandel handelte es sich um eine Erhöhung der Zinselastizität, die der vorherrschenden Meinung über die zu erwartende Auswirkung der Einführung von zinsbringenden Kontokorrentkonten auf die Geldumlaufgeschwindigkeit widerspricht.

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[16] See *A. H. Meltzer* and *R. H. Rasche,* "Is the Federal Reserve's Monetary Control Policy Misdirected?", Journal of Money, Credit and Banking, 14, February, 1982, pp. 120 - 124; 127 - 131.

[17] *R. W. Hafer* und *S. E. Hein,* "The Dynamics and Estimation of Short-Run Money Demand", Federal Reserve Bank of St. Louis Review, 62, March, 1980, pp. 26 - 35.

Summary

Monetary Policy and Financial Deregulation in the United States

This study examines whether the continuing financial innovation and deregulation that occurred in the United States in the late 1970s and early 1980s was a potential source of significant difficulty for the conduct of monetary policy. The evidence suggests that the problems for policymakers arising from these sources were relatively few, and that the major structural change associated with the introduction of NOW accounts in 1981 could have been detected relatively quickly. This structural change was an increase in the interest elasticity of velocity which is contrary to the prevailing opinion about the likely impact of the introduction of interest bearing transactions accounts on the velocity of transactions money.

Résumé

Politique monétaire et deregulation aux Etats Unis

La conduite de la politique monétaire a-t-elle été fortement compliquée par les innovations et la deregulation financière qui ont persisté aux Etats-Unis fin des années 70/début des années 80? Ce travail examine si ces deux facteurs ont vraiment été une source potentielle de difficultés. Les problèmes des politiciens causés par ces sources semblaient être relativement minimes. Le changement structurel principal, associé à l'introduction de comptes NOW en 1981 aurait pu etre détecté relativement vite. Ce changement structurel était un accroissement de l'élasticité de la vitesse par rapport aux taux d'intérêt; ce qui s'oppose à l'opinion dominante, affirmant que l'introduction de comptes de transactions portant des intérêts a probablement influencé la vitesse de transactions monétaires.