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Money Market Mutual Funds: An Experiment in Ad Hoc Deregulation: A Note

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THE ASTOUNDING GROWTH OF money market mutual funds (MMMFs) in the late 1970s and early 1980s, and their interaction with regulated financial institutions, has become a classic case study of the process of financial market innovation and consumer economic education. MMMFs grew from $2.2 billion in assets at the end of 1974 to $74.4 billion in assets at the end of 1980. By the middle of 1982, they have further tripled in asset size to over $200 billion.

Money market mutual funds arose primarily because of deposit rate ceilings and other liability regulations which prevented the traditional financial intermediaries from offering the public a market rate and a highly liquid deposit-type account. The growth of MMMFs, however, was caused not merely by the availability of a more desirable financial instrument, but was actually accelerated by the piecemeal nature of the financial deregulation process. The introduction of the money market certificate (MMC) at commercial banks and thrift institutions appears to have greatly accelerated consumer interest rate sensitivity. The massive advertising campaign for money market certificates that accompanied the introduction of the MMCs not only led to a large growth in these account types, but also led to an explosive spillover growth in money market mutual funds. Thus, the partial deregulation of deposit liabilities meant to alleviate the competition of MMMFs appears to have greatly accelerated their appeal to the consumer. In attempting to control the slow hemorrhaging of the regulated financial institutions, the regulators (or deregulators as the case may be) created a new highly pressured environment which has resulted in a massive leakage of funds from financial institutions. By deregulating only short-term liabilities of regulated financial institutions, the regulators, in essence, allowed most consumers to receive market interest rates only on short-term deposits. This piecemeal deregulation, in conjunction with an inverted yield curve, led to a surge in the supply of funds to the short end of the market. This shortening of the liability structure of financial institutions has substantially worsened the maturity mismatch of these financial institutions. This is especially true of thrift institutions whose ability to acquire assets other than long-term fixed rate mortgages was greatly restricted until recently. It is in this environment that we examine the growth of the MMMF.

The first portion of this paper derives a theoretical model of household portfolio allocation to MMMFs. Section II specifies an empirical version of this model. Section III presents our empirical results and Section IV provides a summary and conclusions.

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I. Theoretical Specification of the Model

The basic foundation of the money market funds model is the theory of portfolio selection.[1] This theory assumes that households arrange their asset holdings so as to maximize utility, subject to the wealth constraint that the sum of all net asset holdings is identically equal to net worth. Thus, the demand for money market fund shares depends on the utility maximization decisions of households with respect to their allocation of overall wealth. This reasoning assumes that households make their multiperiod consumption decisions, determining their dynamic levels of consumption and wealth holdings, prior to making their portfolio allocation decisions.

Portfolio theory models the household's demand for assets as a function of the household's tastes and preferences concerning risk factors and liquidity, the relative prices (expected rates of return) of assets, and the household's wealth constraint. This formulation leads to the standard conclusion of portfolio theory that the household's allocation of net worth is based on risk-return considerations, subject to a wealth constraint. Thus, the proportion of net worth held in any particular asset should be a function of the expected rate of return on the asset, the expected rates of return on alternative assets, the covariance of the rate of return on the asset with that of every other asset, and some measure of risk aversion or risk preference.

This type of portfolio theory analysis has typically been implemented through a relatively simple stock demand model. The optimum or desired proportion of total wealth to be held in any asset, a_i^*, is positively related to the own rate of return on the asset and inversely related to the rates of return on competing assets. Thus,

$$a_i^* = f(r_1^e, \cdots, r_i^e, \cdots, r_n^e), \qquad \text{where}$$
$$r_i^e = \text{the perceived or expected rate of return on asset } i \tag{1}$$

This means that the optimum or desired stock for asset type i is positively related to the own rate of return for the asset, inversely related to the rates of return on competing assets, and positively related to the household's wealth. The relationship between the desired stock of asset i and the desired proportion of net worth to be allocated to asset i can be summarized as follows:

$$A_i^* = a_i^* W, \qquad \text{where}$$
$$A_i = \text{holdings of asset } i\text{; the asterisk denotes the desired value}$$
$$W = \sum_{i=1}^{n} A_i = \text{wealth (net worth).} \tag{2}$$

Substituting (1) into (2), we obtain:

$$A_i^* = f(r_1^e, \cdots, r_i^e, \cdots, r_n^e) W \tag{3}$$

More generally, portfolio theory also implies that the desired proportion of net

[1] The analysis used in this section for developing the money market funds flow model follows the general outline of the portfolio theory analysis utilized by a number of authors, such as Rosen [6], Modigliani [5], Gibson [3], and Fortune [2], in deriving models of the demand for savings deposits.

worth to be held in a given asset should also depend on the variance of the return on that asset and the covariance of the rate of return of that asset with that of every competing asset. Yet, in most specifications of savings deposit flow models (the models most closely akin to our money market fund flows model), the risk element of portfolio theory is ignored or assumed constant. This treatment has been justified by the small variance and covariance terms for assets like S&L deposits and close risk substitutes such as commercial bank deposits, Treasury Bills, money market fund shares, and commercial paper. Our model of money market fund shares follows this conventional treatment and assumes that both risk and liquidity differences between asset types are constant. Thus, our model will only capture these differential characteristics of assets to the extent they are reflected in households' perceptions of interest rate differentials.

Using the desired stock demand function specified in Equation (3), it is then possible to specify a dynamic money market fund model. Equation (3) describes the equilibrium holdings of each asset i, but actual stocks may not instantly adjust to these desired values. Delays in the adjustment to equilibrium stock levels may be caused by delays in adapting perceived or expected interest rates to changes in actual rates, inertia in habits, the preferences of individuals to spread some adjustments over time, and the transactions costs of reallocating wealth among different assets. The lower the transactions costs, the larger and more rapid is the adjustment. The delays caused by lags in adjusting perceived interest rates to changes in actual rates are incorporated directly into the model by the approximations of perceived rates of return. The other causes of delayed adjustment can be handled through the traditional stock adjustment model, in which the adjustment per unit of time is hypothesized to be some function, $\lambda(0 < \lambda \leq 1)$, of the gap between the long-run equilibrium value and the beginning of period value of the relevant variable. Following this specification, we can rewrite Equation (3) as follows:

$$\Delta A_{it} = A_{it} - A_{it-1} = \lambda(A_{it}^{*} - A_{it-1}), \qquad 0 < \lambda \leq 1 \tag{4}$$

where t denotes time. Rewriting (4), we obtain

$$A_{it} - A_{it-1} = \lambda A_{it}^{*} - \lambda A_{it-1} \tag{5}$$

Substituting (2) into (5) we obtain

$$A_{it} - A_{it-1} = \lambda a_{it}^{*} W_t - \lambda A_{it-1} \tag{6}$$

which can also be written

$$\frac{A_{it} - A_{it-1}}{W_t} = \lambda a_{it}^{*} - \frac{\lambda A_{it-1}}{W_t} \tag{7}$$

Substituting (1) into (6) and (2), we derive the following flow equation:

$$\frac{A_{it} - A_{it}}{W_t} = \lambda f(r_1^e, \cdots, r_i^e, \cdots, r_n^e) - \frac{\lambda A_{it-1}}{W_t} \tag{8}$$

One qualification must be made concerning the traditional stock adjustment model. This qualification can be seen by following Modigliani [5] and rewriting

Equation (6) as

$$A_{it} - A_{it-1} = \lambda a_{it}^{*} \Delta W_t + \lambda(a_{it}^{*} W_{t-1} - A_{it-1}) \tag{9}$$

Equation (9) reveals that this model implies an equally slow adjustment in correcting the initial stock imbalance and in the allocation of a new flow of wealth. Yet, since the adjustment lag arises largely from the costs of shifting from previously held assets into new ones, the lag should not be as great for newly accumulated wealth that does not accrue in the form of capital gains. As Modigliani [5] points out, the result is that when equations of form (6) are estimated, the speed of adjustment tends to be underestimated.

II. Empirical Specification of the Model

The basic model estimated is derived from Equation (8):

$$\frac{\Delta A}{W} = \lambda f(r^m, r^s, r^{tb}) - \frac{\lambda A(-1)}{W} \tag{10}$$

where

A = money market funds total assets, in billions of current dollars, *Donoghue's Money Fund Report* (DMFR);
r^m = expected or perceived money market funds average yield in percentage points, raw data from DMFR;
r^s = expected or perceived interest rate on savings deposits at S&Ls in percentage points, Federal Reserve Bulletin (FRB);
r^{tb} = expected or perceived six-month Treasury bill certificate rate in percentage points, raw data FRB; and
W = net worth of households in trillions of current dollars, Board of Governors Federal Reserve System.

The exact specification of the basic equation is as follows:

$$\frac{\Delta A}{W} = b_0 + b_1 \frac{A(-1)}{W} + b_2[r^m(-1) - r^s(-1)] + b_3[r^m(-1) - r^{tb}(-1)] + \epsilon_t \tag{11}$$

Since our stock adjustment model is really concerned with the reallocation of the household's portfolio resulting from changes in relative interest rates, we utilize interest rate spread terms rather than entering each relevant rate of return separately in our empirical implementation. Additionally, although our estimating equations include only the ceiling rate of passbook accounts, money market fund yield, and the six-month Treasury bill certificate rate, these rates are good proxies for returns on other assets that are closely substitutable with money-market fund shares. In a fully specified flow of funds system, a full set of asset equations would be specified with each equation utilizing a full set of alternative rates of return. As Gramlich and Hutlett [4] and Brainard and Tobin [1] have discussed, this type of fully specified system yields estimations which contain coefficient restrictions dictated by the risk-return portfolio model and balance sheet identities. Yet, because the correlation among the interest rates of

Table I

Money Market Fund Flow Equations[a]

Variable	I	II	III	IV	V
Method	GLS	OLS	GLS	GLS	GLS
Range	1975:11–1981:4	1975:11–1981:4	1975:11–1978:5	1978:6–1981:4	1975:11–1981:4
b_1	−.0352	−.0344	.0295	−.03413	−.03268
	(3.10)	(4.10)	(.31)	(2.43)	(2.93)
b_2	84.43	85.19	39.83	88.80	87.65
	(6.66)	(8.97)	(2.16)	(4.34)	(7.04)
b_3	200.12	187.2	7.42	205.76	42.08
	(9.73)	(10.24)	(.54)	(7.05)	(.54)
b_4	—	—	—	—	162.4
					(2.09)
Constant b_0	108.1	102.3	−2.77	98.07	61.5
	(3.12)	(4.33)	(.04)	(1.11)	(1.52)
$\bar{R}^2$	.902	.886	.766	.869	.907
SER	117.7	127.0	112.7	158.7	114.7
D.W.	2.12	1.25	2.29	1.97	2.16
ρ^2	.4	—	.8	.3	.4

[a] t-statistics in parentheses.
MMCDUM = 1, June 1978 to April 1981.

$$\frac{\Delta A}{W} = b_0 + \frac{b_1 A(-1)}{W} + b_2[r^m(-1) - r^s(-1)] + b_3[r^m(-1) - r^{tb}(-1)] + b_4[r^m(-1) - r^{tb}(-1)] * \text{MMCDUM}$$

the set of assets substitutable with money market fund shares is so high, multicollinearity prevents additional interest rate spread terms from entering our estimated equations significantly.

III. Empirical Results

The specification described in Equation (11) of the previous section was estimated by both ordinary least squares regressions and generalized least squares regressions using the Hildreth-Lu autocorrelation correction on monthly data for the period from 1975:11 to 1981:4.

The results of estimating our basic equation are shown in Table I. Columns I and II show the results for the OLS and GLS version of Equation (11) over the entire sample period. The spreads between money market mutual fund interest rates and MMC interest rates and passbook account interest rates are highly significant. This strongly confirms our hypothesis that consumers and investors are reacting to interest rate differentials when choosing among financial assets. The regression results are completely consistent with a careful examination of the actual data used in the regression. The larger the interest spreads between the unregulated MMMF accounts and the regulated financial institution accounts, the greater the percentage of MMMF flows. The periods of massive increases in MMMFs' assets, in the late spring and early summer of 1980, and in the first half of 1981, coincided with rate spreads in favor of MMMFs of 200 to 400 basis points over MMC's and 800 to 1,100 basis points over passbook

accounts. Regulated financial institutions clearly could not meet this rate competition (because of existing interest rate regulations).

In addition to the rate spread variables, the lagged stock and the constant were also significant. Attempts to introduce the expected rate of return on other assets were unsuccessful, primarily because of the multicollinearity discussed earlier. The addition of the AAA bond rate, the 90-day Treasury bill rate, the commercial paper rate, and the expected return on stock investment added no explanatory power to the estimated equations.[2] Overall, the basic MMMF equations explain about 90 percent of the variance in the flow of assets into MMMFs.

A second hypothesis, that flows into MMMFs greatly accelerated after the introduction of money market accounts (MMCs) in June of 1978 at financial institutions, was also tested. Column III shows the base equation from 1975:11 to 1978:5, while Column IV shows the same equation from 1978:6 to 1981:4. An examination of the coefficients would appear to show a major structural shift in the equation. However, applying the Chow test for a linear restriction on *all* parameters indicates that we cannot reject the hypothesis that the relationship is stable.[3] However, testing for equality of *the* coefficient on the interest rate spread term between money market fund rates and MMC interest rates, we find a significant upward shift in the coefficient in the post 1978:6 period.[4] Column V, in which we include a dummy variable for the introduction of the money market certificate account at regulated financial institutions, strongly confirms this result. The introduction of the MMC leads to a four-fold increase in consumer and investor sensitivity to interest rate differentials among asset types. The advertising and education effect which accompanied the MMC had a substantial impact on consumers and led to a sharp acceleration in MMF growth.

IV. Conclusions

The rapid growth and proliferation of the money market mutual fund is a rational response of the consumer investor to the inability of regulated financial institutions to offer market interest rates on deposit accounts. It appears from our results that the piecemeal deregulation of the deposit market has, in fact, accelerated the growth of MMMFs through a "demonstration or consumer education effect" arising from the introduction and extensive advertising of the money market certificate.

The consequences of this ad hoc deregulation of the financial markets has led to a major and probably unnecessary distortion of credit flows. Money market funds have, for the most part, attracted funds from the regulated financial sector and merely recycled them back to the commercial lending system. The large

[2] Additionally, replacing the six-month Treasury bill rate with the 90-day Treasury bill rate yields virtually identical results in each of the estimated equations.

[3] Chow test: $F = \dfrac{(860{,}000 - 788{,}000)/4}{788/58} = 1.32\ (4, 57)$

[4] First period coefficient 95 percent confidence range: 7.42 ± 12.86; second period coefficient 95 percent confidence range: 205 ± 29.1.

commercial banks are probably indifferent to the process, but small commercial banks and savings and loans received little of money market fund investments. The consumer investors, as long as they are investing with full knowledge of the risks they are assuming, are clearly better off because of the new investment choices available. Finally, in a macroeconomic sense, the piecemeal deregulation which has led to the rise of MMMFs has unfortunately created a dangerously unbalanced financial system with investments being concentrated in the short end of the market. A full deregulation of the deposit markets would allow financial institutions and consumer-investors to choose among market rate insured deposits over the full deposit maturity range. Full deregulation of financial institutions will, in all likelihood, in turn, lead to the end of the money market mutual fund experiment in ad hoc deregulation.

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