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ABSTRACT

A number of studies have attempted to determine why money market interest rates are positively correlated with unanticipated increases in the money stock by examining the response of the foreign exchange and stock markets to money announcements. They report a significant positive relationship between the trade-weighted exchange rate and unanticipated increases in the money stock and a significant negative relationship between unanticipated increases in the money stock and stock prices. These results are taken as evidence in favor of the "unanticipated-liquidity-effect" explanation of the money market's response. This paper analyzes the response of these markets and investigates the consistency of the response to unanticipated changes in the money stock across markets. We find that the results for the foreign exchange and stock markets are sensitive to a few "outliers" so that these markets do not respond strongly to unanticipated changes in the money stock. Furthermore, all three markets generally do not respond significantly to the same money announcements. We conclude that the often-cited evidence is not sufficient to differentiate the anticipated-liquidity-effect from competing explanations of the money market's response to unanticipated changes in the money stock.

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Since Urich and Wachtel (1981) found a positive and statistically significant relationship between changes in money market interest rates and unanticipated changes in the money stock, which they attributed to a "policy anticipations effect," a considerable amount of empirical work has been devoted to deepening our understanding of the money market's reaction to unanticipated changes in the money stock. Much of this effort has been devoted to differentiating among the three major competing hypotheses; the anticipated-liquidity-effect hypothesis, the expected-inflation hypothesis, and the real-activity hypothesis.[1/] Evidence in favor or against these hypotheses consists of the correlation between unanticipated changes in the money stock and movements in foreign exchange rates or stock prices. It is argued that if an unanticipated rise in the money stock gives rise to expectations of a more restrictive monetary policy, the real interest rate will be expected to rise. This will cause the real rate to rise immediately with a concomitant appreciation of the dollar. If, on the other hand, the rise in the interest rate were due to an expected-inflation effect, the market would anticipate a future depreciation of the dollar which would be reflected in the exchange rate immediately: nominal interest rates would rise and the dollar would depreciate. Hence, the often reported, e.g., Cornell (1982, 1983b), Engel and Frankel (1984), Hardouvelis (1984) and Hakkio and Pearce (1985), positive correlation between unanticipated changes in the money stock and the foreign exchange value of the dollar is taken as evidence in favor of the anticipated-liquidity-effect hypothesis over the expected-inflation hypothesis.

The correlation between unanticipated changes in the money stock and stock prices is then used to differentiate between the anticipated-liquidity-effect and real-activity hypotheses. It is argued that an unanticipated rise in the money stock that gives rise to expectations of a more restrictive monetary policy and higher real interest rates should result in lower stock prices if equity and debt are substitutes.[2/] Conversely, if an unanticipated rise in the money stock were to give rise to expectations of an increase in real economic activity, stock prices should rise. Cornell (1983b), Pearce and Roley (1983, 1985), Hafer (1986) and Hardouvelis (1985) report a significant negative correlation between unanticipated changes in the money stock and stock prices, indicating that the anticipated-liquidity-effect hypothesis is the preferred explanation.

As a result of this work, the anticipated-liquidity-effect hypothesis has become the conventional wisdom for explaining why the U.S. money market responds as it does to unanticipated changes in the money stock, despite the persistence of some anomalies.[3/] This acceptance, however, rests solely on the strength of the correlations between foreign exchange rates and stock prices, and unanticipated changes in the money stock. The purpose of this paper is to assess the strength of these relationships. This is done by a more careful analysis of the relationship between unanticipated changes in the money stock and the foreign exchange value of the dollar and stock prices, and by investigating the consistency of the response across the three markets.[4/] If the three markets responded simultaneously and in a way consistent with the

anticipated-liquidity-effect hypothesis to the same unanticipated change in the money stock, the evidence in favor of this hypothesis would be strong. On the other hand, if large responses to unanticipated changes in the money stock in the money market are not met by similar, contemporaneous changes in the foreign exchange value of the dollar and stock prices, the anticipated-liquidity-effect hypothesis would be deprived of much of its empirical support.

2. A CLOSER LOOK AT THE DATA

In much of the work, money market interest rates, the foreign exchange value of the dollar and stock prices are represented by the change in the 3-month Treasury bill rate (ΔTBR), the trade-weighted exchange rate (ΔTWEX) and the Standard and Poor's 500 stock price index (ΔSP500), respectively. The 3-month Treasury bill rate is taken at 3:30 p.m., E.S.T., the trade-weighted exchange rate is taken at noon and the Standard and Poor's 500 index is the same data used by Pearce and Roley (1985) and Hafer (1986) and is taken at market close, 4:00 p.m., E.S.T. In each instance, the change in the asset's price is taken as the price on the business day following the money announcement minus the price on the day of the announcement. During this period, money announcements were usually made at 4:10 p.m. E.S.T.

Most of the empirical work consists of estimating a simple reduced-form equation where the change in the market price or interest rate is regressed on the unanticipated change in the money stock (UM). The unanticipated change in the money stock is measured

by the actual change in the first-announced M1 minus the median forecasted change from a survey conducted by Money Market Services, Inc. That is, the equation

(1) $\Delta AP_t = \beta_0 + \beta_1 UM_t + \varepsilon_t, \qquad t = 1,2,3,\ldots,T,$

is estimated, where ΔAP_t is a generic representation of the change in the price or interest rate of a given asset, ε is a white noise random error term and T is the number of money announcements.

Typically, Equation (1) is estimated over periods that are differentiated by the policy of objectives of the Federal Reserve. Three periods are considered; January 5, 1978 to October 4, 1979, October 8, 1979 to October 6, 1982 and October 8, 1982 to January 26, 1984.[5/] The first period begins shortly after the Money Market Services, Inc. first reported its survey and ends with the Fed's dramatic decision to place increased emphasis on the monetary aggregates, in particular, M1. The second is the critical money-stock-control period when the Fed was paying closer attention to its monetary aggregate targets. The third period begins with the Federal Reserve's switch to a borrowed reserves operating procedure, which is commonly interpreted to be a movement back toward interest rate targeting, and ends just prior to the Fed's re-instatement of contemporaneous reserve accounting.[6/] Partitioning the data in this way is important not only because the variability of the dependent variables of Equation (1) changes dramatically across the periods (so that it would be inappropriate to apply ordinary least squares (OLS) to the entire period) but also because, strictly speaking, the anticipated-liquidity-effect hypothesis is only

relevant if agents believe that the Fed is targeting the nominal money stock.

Estimates of Equation (1) for each asset and for each sub-period are presented in Table 1. Scatter plots of these data with the regression lines drawn in are presented in Charts 1-9. The regression results indicate that there is a significant, positive correlation between ΔTBR and UM during each of the three sub-period. These results are consistent with those of a number of researchers. The scatter plot in Chart 1, however, is flat and elongated, indicating a different story. The flatness reflects the fact that, with the exception of the three circled observations, there is no particular positive or negative relationship between ΔTBR and UM during this period. The elongation reflects this and the fact that the variance of UM is large relative to that of ΔTBR. In contrast, the scatter plots in Charts 2 and 3 show a definite positive slope: Chart 2 reflects clearly the greater variability in both ΔTBR and UM during the important money-stock-control period (the scales on the three Charts are identical to facilitate comparisons).[7/] Consequently, the scatter plots reveal a change in the money market's response to unanticipated changes in the money stock after October 1979 that is more pronounced than the regression results in Table 1 suggest. While the coefficient on UM for the first period is smaller than that of either subsequent period, it is, nevertheless, statistically significant at the 5 percent level. The scatter plot in Chart 1 suggests, however, that the statistical significance of the coefficient is likely due solely to the influence of the three

circled observations. Indeed, when these observations are deleted, the relationship between TBR and UM prior to October 1979 is not statistically significant at the 10 percent level. Estimates of Equation (1) with the three observations deleted are presented in Table 2.[8/]

OLS estimates of Equation (1) with ΔTWEX as the dependent variable indicate that there is no statistically significant relationship between ΔTWEX and UM prior to October 1979, but that there is a positive, significant relationship between these variables in each of the subsequent periods. Again, the scatter plots, presented in Charts 4-6, reveal a different story. Chart 4 shows a pattern similar to that of ΔTBR for this period; flat and elongated. Charts 5 and 6 reveal a spherical pattern, again with markedly greater variability in both ΔTWEX and UM during the money-stock-control period. Unlike the scatter plots for ΔTBR, there is no sharply discernible positive slope, despite the positive slope of the regression lines. This suggests that the OLS results of Table 1 are due largely to the sensitivity of least squares to outliers. As reported in Table 2, when the four circled observations in Chart 5 and the three circled observations in Chart 6 are deleted, no statistically significant relationship between these variables is found for the remaining observations during either sub-period. This is consistent with a visual inspection of the scatter plots which suggests there was not a sharp break in the pattern of the response of ΔTWEX to money announcements across the three periods.

Estimates of Equation (1) using ΔSP500 as the dependent variable indicate that there is a significant negative relationship between these variables during each of the first two sub-periods and a marginally insignificant (at the 5 percent level) relationship during the last sub-period. Again, the scatter plots in Charts 7-9 suggest the relationship between unanticipated changes in the money stock and changes in stock price is not strong. Furthermore, there is no indication of a break in the relationship following the Fed's dramatic policy change in October 1979. As was the case with ΔTWEX, the scatter plots suggest that the significant regression coefficients result from a few extreme observations. This is especially true for the first and last sub-periods. Indeed, if the three circled observations of Chart 7 and the two circled observations of Charts 8 and 9 are deleted, no statistically significant relationship between these variables is observed; however, UM is only marginally insignificant (at the 5 percent level) during the important money-stock-control period.[9/]

The absence of a sharp break in the relationship between ΔTWEX and ΔSP500 and unanticipated changes in the money stock, like the one that exists between ΔTBR and UM, limits the usefulness of the correlations between UM and ΔTWEX and SP500 for differentiating among competing hypotheses. Furthermore, if there is no change in the response of the foreign exchange and stock markets to money announcements after October 1979 but the money market responds differently, the response of the former markets cannot provide collateral information about why the money market's response changed.

In total, the results presented here tend to suggest that using the correlations between UM and ΔTWEX and ΔSP500 to differentiate the anticipated-liquidity-effect hypothesis from the expected-inflation and real-activity hypotheses could result in conclusions that are spurious. Indeed, the reaction of the foreign exchange rate and stock prices to unanticipated changes in the money stock do not appear to provide an adequate basis for differentiating among competing hypotheses.

3. THE CONSISTENCY OF THE RESPONSE TO UNANTICIPATED CHANGES IN THE MONEY STOCK ACROSS MARKETS

While some may consider the above results convincing, others might not. They might argue, with some justification, that much econometric evidence may result from a few extreme, but undetected, observations. Furthermore, they might argue that even when these observations were removed, the coefficient estimates of Table 2 indicate a positive relation between UM and ΔTWEX and a negative relationship between UM and ΔSP500--even though the relationships are not statistically significant. Hence, some might contend that the sensitivity of the results to a few observations should not ipso facto deny the average results of Table 1. From this point of view, it is desirable to obtain some additional information on the strength of the evidence supporting the various hypotheses.

Asset prices and interest rates are generally thought of as being determined by market fundamentals. New information comes to the market each day in the form of news about events which may affect asset prices. If this news is random, then the asset price

can be represented by the typical random walk specification

(2) $\Delta AP_t = \varepsilon_t$

where ε denotes the new information and is iid$(0, \sigma_\varepsilon^2)$. Now assume that periodically, say every fifth market day, additional information comes into the market in the form of weekly money announcements, A. Assume that A is iid$(0, \sigma_A^2)$ and that $E(\varepsilon A) = 0$, i.e., the money announcement is orthogonal to the other information which the market receives daily. ε and A are different not only because they have different variances but because ε is observed on each market day while A is observed less frequently. If ΔAP is observed on days when there is no money announcement, its variance is σ_ε^2. In contrast, its variance is $\sigma_\varepsilon^2 + \sigma_A^2$ on days when there is a money announcement. That is, the variance of the change in the asset's price is larger on days when there is a money announcement.

An analysis of the variability of the three asset prices is presented in Table 3. The standard deviations for money announcement days and days when there is no money announcement are presented for each of the three sub-periods. The third column contains the F-statistic for a test of the equality of the variances on days when there is and is not a money announcement against the alternative that the variance is larger on money announcement days. None of the reported F-statistics are statistically significant at the 5 percent level for the pre-October 1979 period, however, all are significant for the two subsequent sub-periods. These results support the proposition that all three markets were reacting to money announcements after October 1979 but not before, and should

provide comfort to those who would argue that the general results of Table 1 can be used effectively to differentiate among alternative hypotheses.[10/] These tests too, however, are sensitive to the observations deleted previously. The F-statistic in the far right-hand column is for the test repeated with the same observations deleted as in table 2. In each instance the F-statistics decline and none are statistically significant during the post-October 1982 period.

These results suggest that changes in market prices on announcement days are larger than on days when there is no money announcement, at least during the important money-stock-control period. If the same money announcement is driving all three asset markets, money announcements that produce unusually large changes in the Treasury bill rate should be the same as those that produce unusually large movements in the exchange value of the dollar and stock prices. That is, the anticipated-liquidity-effect hypothesis suggests that an unexpected rise in the money stock gives rise to expectations that the Fed will tighten. Because the market anticipates this, the real rate rises immediately with the money announcement. Simultaneously, the foreign exchange value of the dollar rises and stock prices fall.

One efficient way to identify days when there are unusually large movements in asset prices is to estimate the equation,

(3) $\Delta AP_t = X_t\beta + \varepsilon_t, \qquad t=1, 2, \ldots, N,$

where X_t is a 1x(T+1) vector of observations,

$X_t = (1, 0, 0, \ldots, 0, UM_t, 0, \ldots, 0)$, β is a (T+1)x1 vector of parameters, $\beta = (\beta_0, \beta_1, \beta_2, \ldots, \beta_T)$, N denotes

the number of market days, less one, in a given calendar period and, as before, T denotes the number of days out of N when there is a money announcement. That is, ΔAP_t is regressed on each unanticipated change in the money stock individually. Since the days when there is a money announcement are "fit" without error, the standard error of Equation (3) is the standard error of ΔAP on days when there is no money announcement.[11/] Consequently, the t-ratio for each UM indicates the number of standard deviations [for non-announcement days] by which the asset price changed on each money announcement day. This procedure can be used to partition changes in asset prices into "large" and "small" [relative to movements on days when there is no money announcement] simply by the appropriate choice of the critical value of the t-ratio. Instead of arbitrarily choosing a relatively small critical t-ratio, Equation (3) is estimated and the UMs are partitioned into those that are significant at a 5 percent significance level, denoted UM-A, and those that are not, denoted UM-B. Then the equation

$$(4) \quad \Delta AP_t = \alpha_0 + \alpha_1 UM\text{-}A + \mu UM\text{-}B + \varepsilon_t$$

is estimated and the hypothesis that $\mu = 0$ is tested. If the hypothesis is rejected, the elements of UM-B are again tested individually. Those that are significant at the 10 percent level are then included in the A category, and Equation (4) is re-estimated with the new partition of the UMs. This process is repeated [each time with the significance level for being included in the A category being increased by 5 percentage points] until the hypothesis that $\mu = 0$ cannot be rejected.

This procedure was applied to ΔTBR, ΔTWEX, and ΔSP500 for each sub-period. Because individual coefficients were both positively and negatively related to the dependent variables, the A category is partitioned into those with positive coefficients, UM-A, and those with negative coefficients, UM-AN. Final estimates of Equation (4) are presented in Table 4. The final "significance level" for being included in the A category, α, is noted at the bottom of the table.

The frequency of the response both within and across markets is presented in Table 5. The results indicate that there were only three observations for ΔTBR and ΔSP500 that were identified by this procedure during the first period. Indeed, these are the circled observations in Charts 1 and 7. The procedure identified only one observation for ΔTWEX during this period. Not surprising, the results support the previous finding that none of these markets were reacting to unanticipated changes in the money stock prior to October 1979.

The results for the critical money-stock-control period indicate that of the 149 unanticipated changes in the money stock, there were 39, 16, and 2 in the UM-A partition for ΔTBR, ΔTWEX, and ΔSP500, respectively, and 12, 10 and 9, respectively, in the UM-AN partition. The procedure chose a significantly larger set of observations for ΔTWEX and ΔSP500 than the few circled observations of the previous analysis because it identifies days when there were large movements in asset prices, regardless of whether they are associated with a large change in unanticipated money. Because of this characteristic, the procedure likely biases

the results toward finding important simultaneous observations in all three markets. Nevertheless, of the 39 observations in the UM-A partition for ΔTBR, 8 were in the UM-A partition for ΔTWEX and 6 were in the UM-AN partition for ΔSP500. More importantly, only one of these observations is in both the UM-A partition for ΔTWEX and the UM-AN partition for ΔSP500. That is, there was only one observation that could differentiate the anticipated-liquidity-effect hypothesis from both the expected-inflation and the real-activity hypotheses. Consequently, the evidence favoring the anticipated-liquidity-effect hypothesis appears to be quite weak during the money-stock-control period, a period when it should be the strongest.

The results for the post-1982 period are similar. Proportionately, the frequency of response in the UM-A partition for both ΔTBR and ΔTWEX is about the same as in the previous period and the frequency of the response in the UM-AN partition for ΔSP500 is somewhat larger. There were two instances when unanticipated changes in the money stock were in the UM-A group for ΔTWEX and the UM-AN partition for ΔSP500. On only one of these occasions, however, was the unanticipated change in the money stock also in the UM-A partition for ΔTBR. Consequently, again there was only one observation that would differentiate the anticipated-liquidity-effect hypothesis from the others.

4. CONCLUSIONS

This paper investigates the strength and consistency of the evidence which is commonly used to differentiate among competing

hypotheses of why the money market responds as it does to unanticipated changes in the money stock. A number of interesting findings emerge. First, unlike the results of other studies, there appears to be a sharp break in the response of the money market to unanticipated changes in the money stock following the Fed's October 1979 change in operating procedure: the statistically significant positive response of interest rates prior to October 1979 is due solely to three observations.

Second, there does not appear to be a break in the response of stock prices and exchange rates to money announcements after October 1979, despite the increase in the variability of changes in stock prices and exchange rates on days when there is a money announcement. Indeed, the commonly reported statistically significant positive correlation between unanticipated increases in the money stock and changes in the trade-weighted exchange rate and the statistically significant negative correlation between unanticipated changes in the money stock and stock prices is due to a few extreme observations.[12/] Consequently, the evidence usually used to support the anticipated-liquidity-effect hypothesis is weak.

Third, a comparison of the consistency of the response of the money, foreign exchange, and stock markets to unanticipated changes in the money stock indicates that those money announcements that are associated with the largest changes in domestic interest rates are generally not those that are associated with the largest changes in either the trade-weighted exchange rate or stock prices. Indeed, out of the 215 money announcements during the post-October 1979 period, there were only two occasions when all three markets

simultaneously showed large movements in the direction that would differentiate the anticipated-liquidity-effect hypothesis from the others. This, too, points to the weakness of the evidence which is used to differentiate among these competing hypotheses.

The acceptance of the anticipated-liquidity-effect hypothesis as the conventional wisdom for explaining the money market's reaction to unanticipated changes in the money stock appears to be premature. No single paradigm appears adequate in explaining the money market's reaction to unanticipated changes in the money stock.

FOOTNOTES

1/ See Cornell (1983b) for a discussion of these and other hypotheses.

2/ See Pearce and Roley (1985, p. 52) and Cornell (1983b, p. 647) for a discussion of the real-activity hypotheses.

3/ Two of the most significant of these are the facts that both long-and short-term interest rates respond to money announcements and that the money market responds to money announcements before and after the period during which the Fed was pursuing objectives for the money stock. The second of these is resolved by this paper.

4/ Pearce and Roley (1985, p. 52) note that because the bond market remains open after the money announcement, the market knows that interest rates will be "higher (after a positive money surprise) when the stock market opens on the next business day." Thus, all markets should respond simultaneously to the same money shock.

5/ These dates correspond to daily observations over these periods. Because money announcements are made once a week, the first and last announcement, in general, do not correspond to the first and last observation for the daily data. The convention of denoting the beginning and ending dates with those for the daily observations is used throughout the paper even though all daily observations are not used until section 3.

6/ The periods used here conform roughly to those employed by others. The major difference is that some begin the first period a little sooner and end the last period a little later. The Fed moved

from contemporaneous to lagged reserve accounting in 1968 and moved back to a modified form of contemporaneous reserve accounting in February 1984. Also, see Thornton (1988) for an analysis of the borrowed-reserves operating procedure.

7/ The means of ΔTBR, ΔTWEX, ΔSP500 and UM are not significantly different from zero during any of the three periods, so the reference lines are drawn at zero.

8/ Recently, there has been an increased emphasis on more careful analysis of data in econometric work, in particular, the effect of extreme observations, e.g., Beggs (1987) and Belsley, Kuh and Welsch (1980). This paper is very much in this spirit.

The deleted observations are as follows: For ΔTBR for the pre-money-stock-control period, 11/9/78, 4/26/79 and 6/14/79. For ΔTWER for the money-stock-control period, 5/9/80, 5/1/81, 6/12/81 and 1/22/82 and for the post-October 1982 period, 10/8/82, 1/21/83 and 3/18/83. For ΔSP500 for the pre-money-stock-control period, 4/13/78, 11/30/78 and 12/21/78, for the money-stock control period, 8/15/80 and 9/26/80 and for the post-October 1982 period, 10/22/82 and 1/21/83.

9/ One's first inclination is to look at the dates listed in footnote 8 to see if there is any news or event that could account for the behavior of these asset prices on those dates. Consequently, I sent my research analyst to the library with these dates and asked her to look for important information that might have effected the money, stock or foreign exchange markets on those dates. To my initial surprise and pleasure, she returned with a list of announcements of economic data, statements made by Fed and

other public officials, etc. on each of the dates. All of these newsworthy events were different and while they could have moved these market, it seems equally likely a priori that they did not. What seems more plausible is that one could go to the newspapers on any particular day and find newsworthy events that could be (by some logic) attributed to producing an observed change in assets prices. Indeed, it would appear that this is exactly what financial market analysts do, for which economist often chide them. Hence, one will have to be content with noting the importance of these outliers without having a good explanation for them.

10/ Because nearly all of the announcements made during the pre-money-stock-control period were made on Thursdays while 125 of the 149 money announcements made during the money-stock-control period were made on Friday, it could be that the increased variability is due to the so-called "weekend effect". A detailed analysis of the variability of these asset prices does not provide definitive evidence of a weekend effect. The variances of ΔTBR, ΔTWEX and ΔSP500 on the 24 money announcement that occurred on Thursdays during the money-stock-control period are not significantly different from the variances on days when there was no money announcement. There was no evidence of increased variability on Fridays before the money-stock-control period, however. If there was a "weekend effect", it should have been present during the period prior to October 1979 as well as after that time. The details of the analysis will be provided upon request.

11/ This assumes, of course, that the linear specification of Equation 3 is correct. In practice, the residuals are very small,

with the first significant digit coming at the sixteenth decimal place.

12/ One possibility is that the presence of extreme observations could result from the fact, noted some time ago with respect to stock prices by Fama (1965), that the distribution of changes in asset prices tends to be "thick tailed" combined with the sensitivity of least squares to outliers.

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Table 1
OLS Estimates of Equation (1)

Dependent Variable	T	Constant	UM	$\bar{R}^2$	SEE
		January 5, 1978 - October 4, 1979			
ΔTBR	88	.040* (3.80)	.022* (3.34)	.105	.097
ΔTWEX	--	.008 (0.21)	-.022 (0.94)	-.001	.340
ΔSP500	--	.070 (1.01)	-.094* (2.15)	.040	.642
		October 8, 1979 - October 6, 1982			
ΔTBR	149	.044 (1.52)	.072* (5.93)	.188	.349
ΔTWEX	--	.084 (1.46)	.056* (2.32)	.029	.693
ΔSP500	--	-.168 (1.59)	-.112* (2.54)	.036	1.273
		October 8, 1982 - January 26, 1984			
ΔTBR	66	-.002 (0.13)	.034* (5.44)	.305	.098
ΔTWEX	--	.072 (0.87)	.107* (2.53)	.091	.659
ΔSP500	--	.036 (0.16)	-.224 (1.98)	.043	1.760

Absolute value of t-statistic in parenthesis.
* Indicates statistical significance at the 5 percent level.

Table 2
Estimates of Equation (1) with Extreme Observations Deleted

Dependent Variable	Observations Deleted	Constant	UM	$\bar{R}^2$	SEE
		January 5, 1978 - October 4, 1979			
ΔTBR	3	.032*	.009	.018	.097
		(3.78)	(1.61)		
ΔSP500	3	.026	-.063	.017	.585
		(0.41)	(1.56)		
		October 8, 1979 - October 6, 1982			
ΔTWEX	4	.097	.031	.004	.669
		(1.73)	(1.25)		
ΔSP500	2	-.149	-.089	.019	1.262
		(1.42)	(1.96)		
		October 8, 1982 - January 26, 1984			
ΔTWEX	3	.082	.065	.020	.620
		(1.05)	(1.50)		
ΔSP500	2	.128	-.089	-.006	1.618
		(0.63)	(0.80)		

1/ Indicates the number of observations deleted.
Absolute value of t-statistic in parenthesis.
* Indicates statistical significance at the 5 percent level.

Table 3
Standard Deviations on Money and Non-Money Announcement Days

Variable	Money Announcement Days	Non-Money Announcement Days	F-value	F-value with Observations deleted
		January 5, 1978 - October 4, 1979		
ΔTBR	.102	.101	1.02	.52
ΔTWEX	.340	.414	.68	N.A.
ΔSP500	.655	.725	.82	.66
		October 8, 1979 - October 6, 1982		
ΔTBR	.387	.254	2.32*	N.A.
ΔTWEX	.701	.557	1.59*	1.44*
ΔSP500	1.292	1.116	1.34*	1.29*
		October 8, 1982 - January 26, 1984		
ΔTBR	.118	.075	2.47*	N.A.
ΔTWEX	.686	.522	1.73*	1.44
ΔSP500	1.799	1.376	1.72*	1.37

* Indicates statistical significance at the 5 percent level.

Table 4
Estimates of the Final Partition of Equation (4)

Dependent Variable	Constant	UM-A	UM-AN	UM-B	$\bar{R}^2$	SEE
			January 5, 1978 - October 4, 1979			
ΔTBR[1/]	.012*	.112*	--	.005	.103	.096
	(2.47)	(5.79)		(0.74)		
ΔTWEX[1/]	-.031	--	-.934	-.017	.024	.396
	(1.63)		(3.53)	(0.64)		
ΔSP500[1/]	.023	--	-.924*	-.067	.051	.693
	(0.70)		(3.98)	(1.41)		
			October 8, 1979 - October 6, 1982			
ΔTBR[3/]	-.014	.182*	-.374*	.020	.204	.257
	(1.51)	(12.11)	(5.22)	(1.84)		
ΔTWEX[2/]	.041*	.400*	-.649*	.039	.116	.554
	(2.02)	(7.41)	(6.53)	(1.86)		
ΔSP500[1/]	.056	1.944*	-.657*	-.076	.068	1.119
	(1.35)	(3.65)	(5.41)	(1.86)		
			October 8, 1982 - January 26, 1984			
ΔTBR[2/]	-.001	.066*	--	.009	.208	.076
	(0.27)	(8.86)		(1.42)		
ΔTWEX[1/]	.025	.419*	-.802*	.065	.104	.529
	(0.84)	(5.21)	(3.23)	(1.73)		
ΔSP500[1/]	.109	1.800*	-1.222*	-.097	.117	1.384
	(1.41)	(3.53)	(5.71)	(0.99)		

1/ α = 5 percent.
2/ α = 10 percent.
3/ α = 20 percent.
Absolute value of the t-statistic is in parenthesis.
* Indicates statistical significance at the 5 percent level.

Table 5
Summary of the Results for all Three Markets

Dependent Variable	Classification	ΔTB		ΔTWEX		ΔSP500	
		UM-A	UM-AN	UM-A	UM-AN	UM-A	UM-AN
		January 5, 1978 - October 4, 1979					
ΔTBR	UM-A	3	-	0	0	0	0
	UM-AN	-	0	0	0	0	0
ΔTWEX	UM-A			0	-	0	0
	UM-AN			-	1	0	0
ΔSP500	UM-A					0	-
	UM-AN					-	3
		October 8, 1979 - October 6, 1982					
ΔTBR	UM-A	39	-	8	1	1	6
	UM-AN	-	12	1	2	1	0
ΔTWEX	UM-A			16	-	0	1
	UM-AN			-	10	1	0
ΔSP500	UM-A					2	-
	UM-AN					-	9
		October 8, 1982 - January 26, 1984					
ΔTBR	UM-A	18	-	1	0	0	3
	UM-AN	-	0	0	0	0	0
ΔTWEX	UM-A			7	-	0	2
	UM-AN			-	2	0	0
ΔSP500	UM-A					2	-
	UM-AN					-	7

Chart 1: Scatter Plot of ΔTBR and UM, January 5, 1978 - October 4, 1979

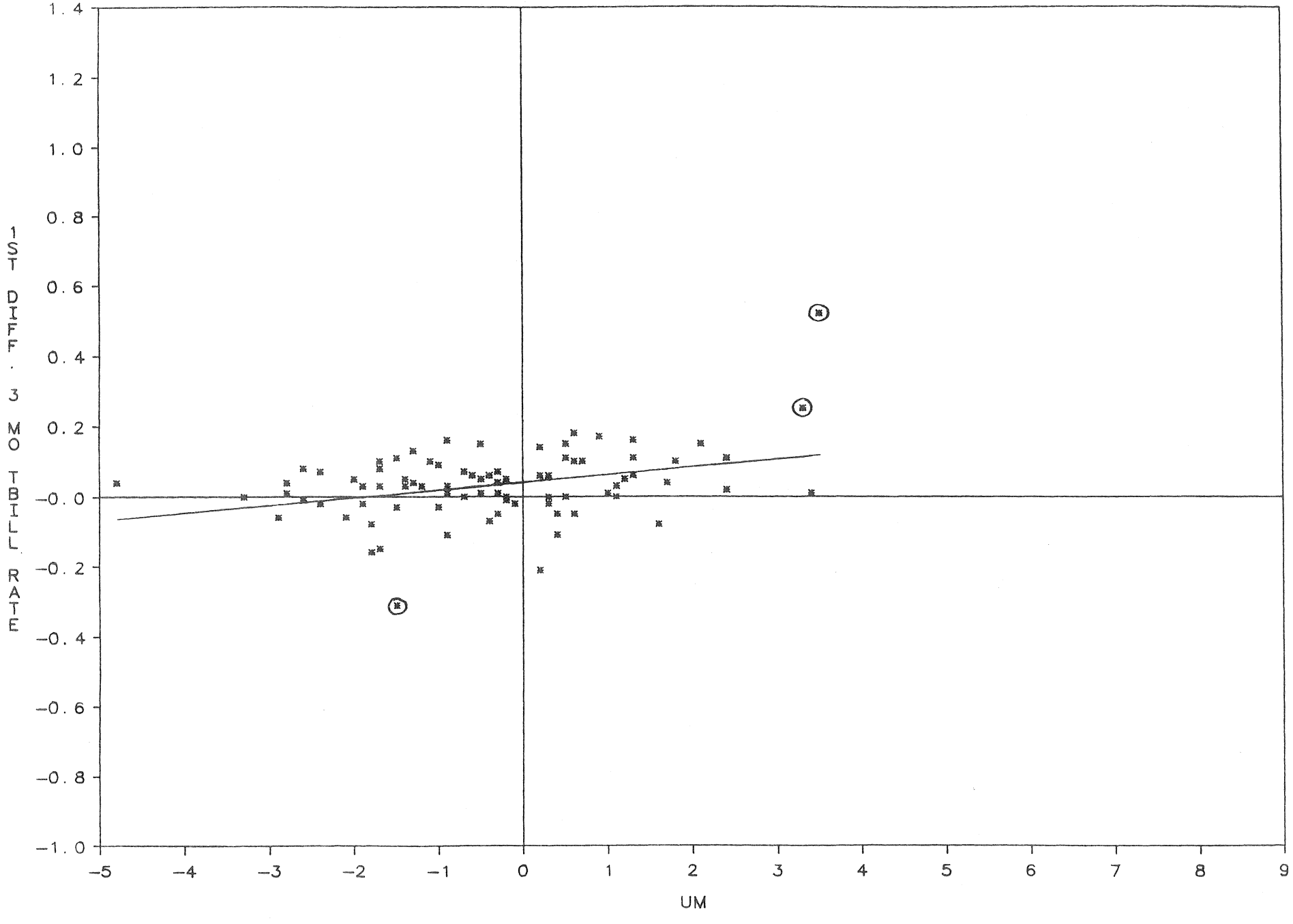

Chart 2: Scatter Plot of ΔTBR and UM, October 8, 1979 - October 6, 1982

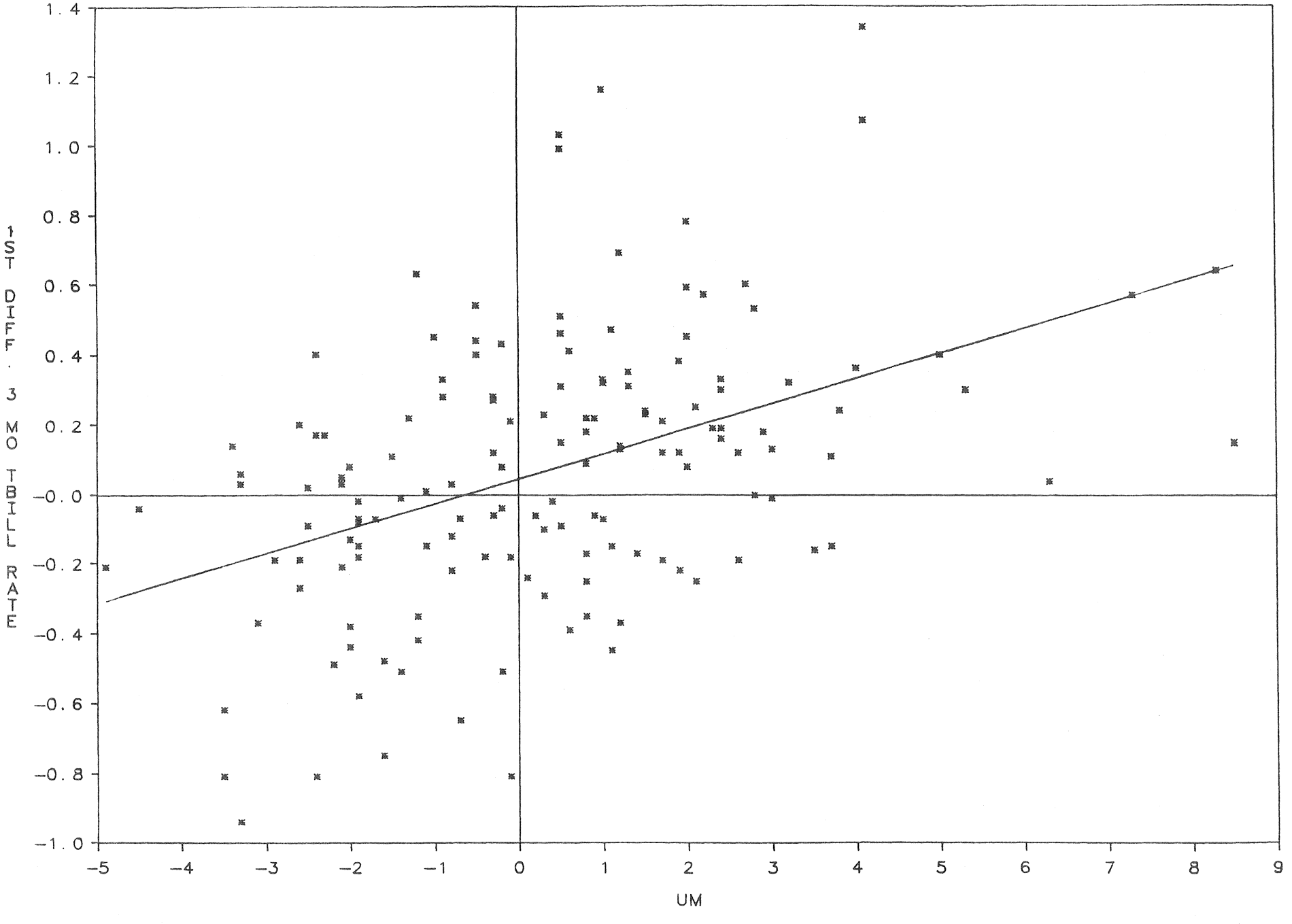

Chart 3: Scatter Plot of ΔTBR and UM, October 8, 1982 - January 26, 1984

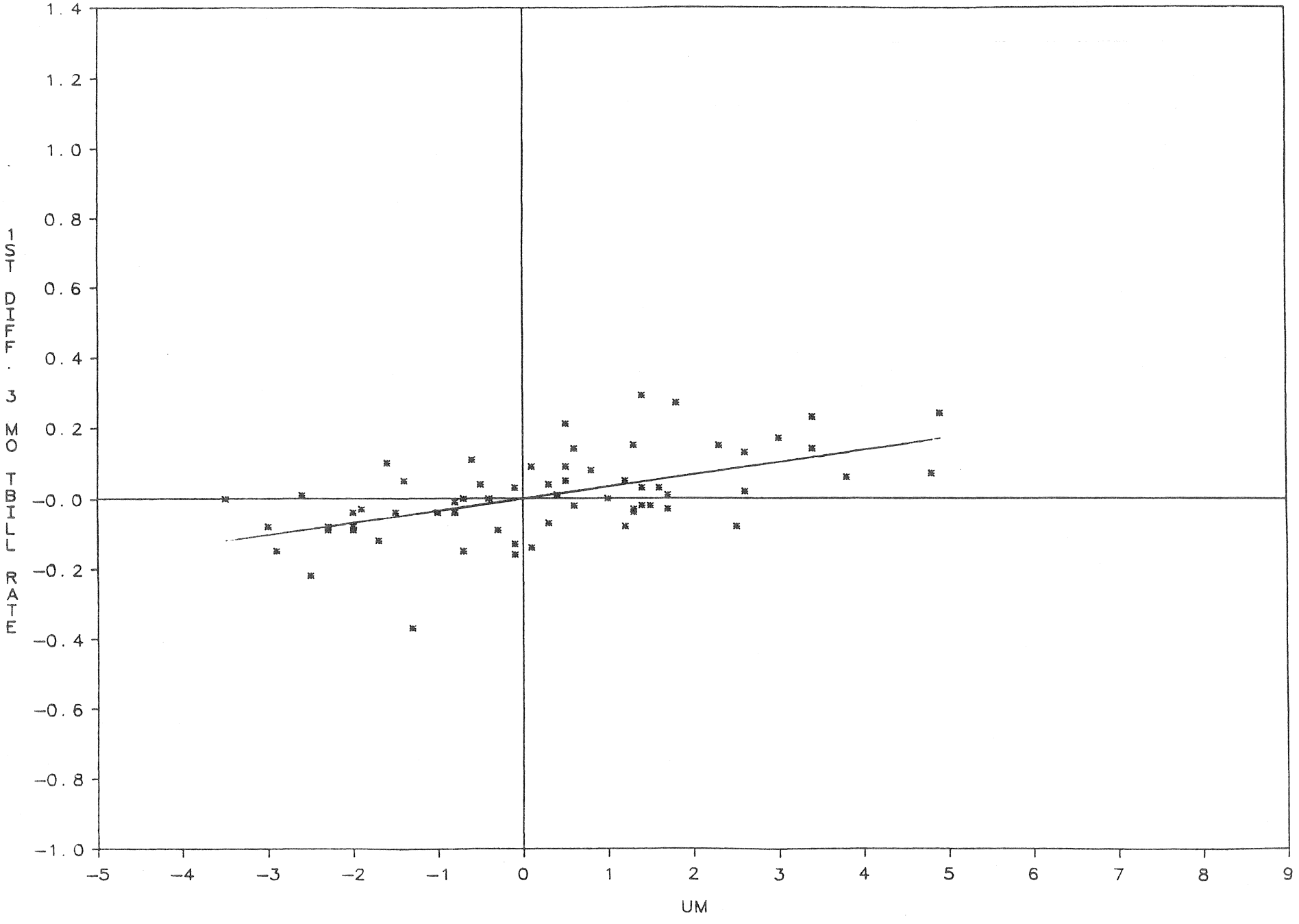

Chart 4: Scatter Plot of ΔTWEX and UM, January 5, 1979 - October 4, 1979

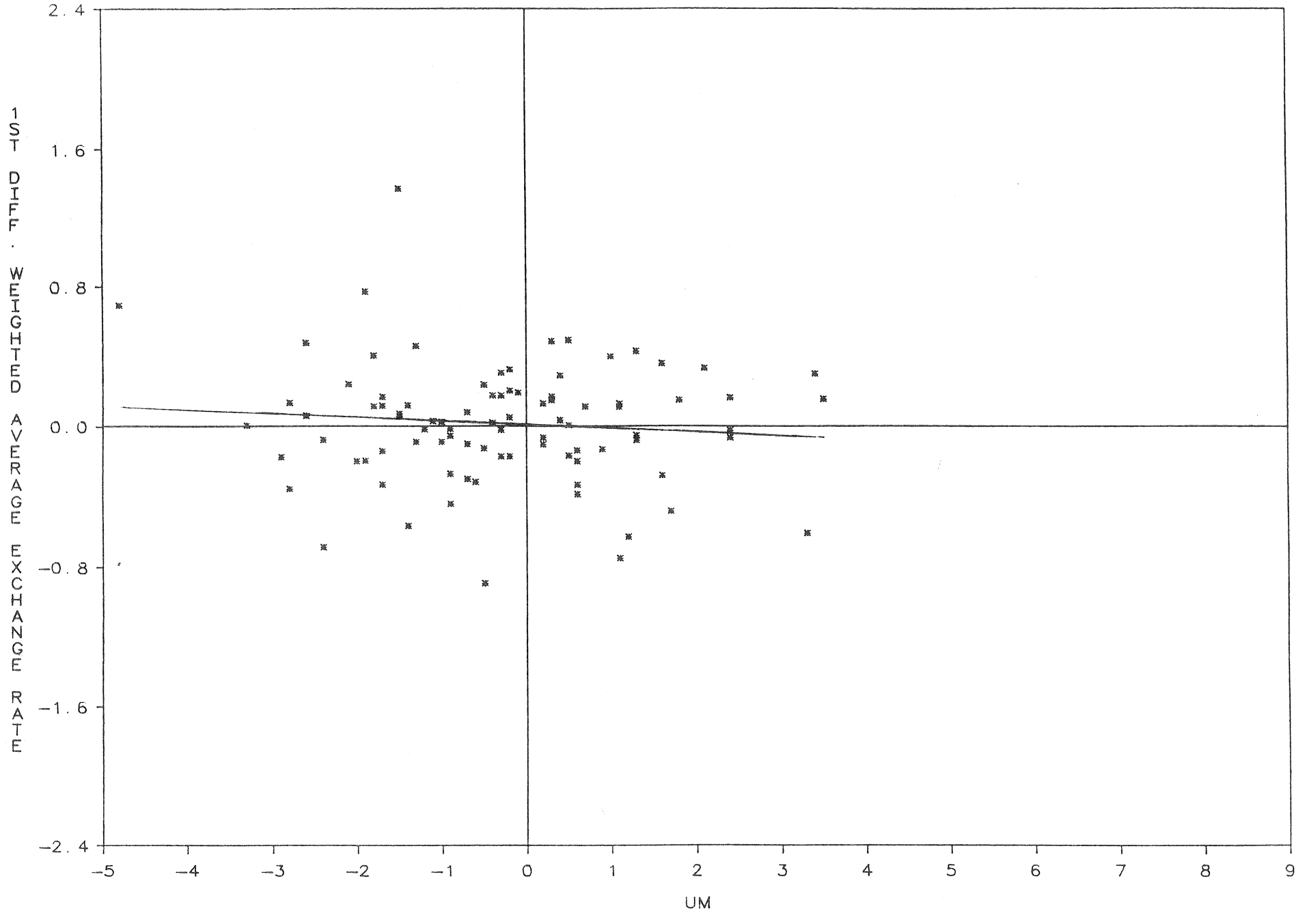

Chart 5: Scatter Plot of ΔTWEX and UM, October 8, 1979 - October 6, 1982

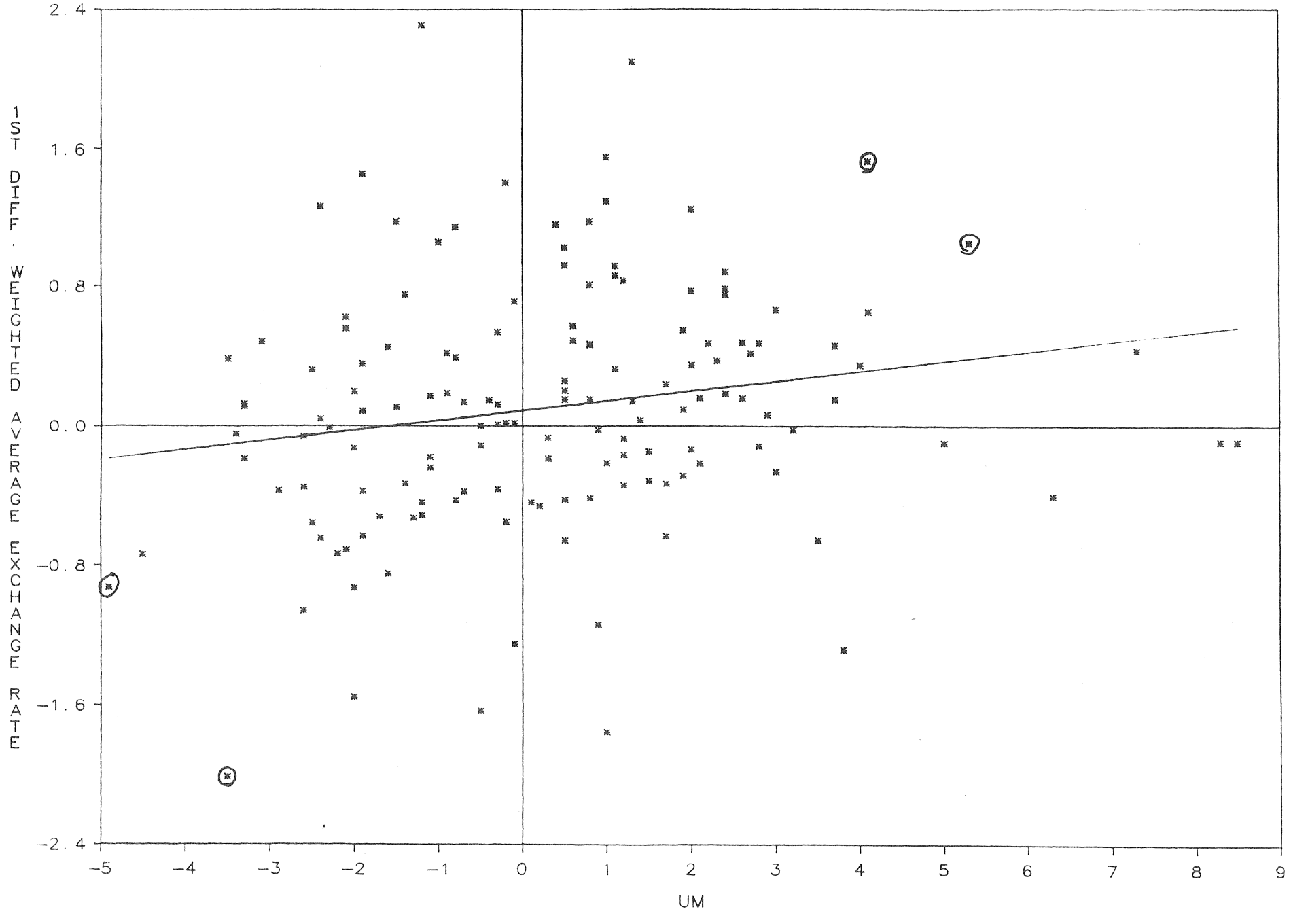

Chart 6: Scatter Plot of ΔTWEX and UM, October 8, 1982 - January 26, 1984

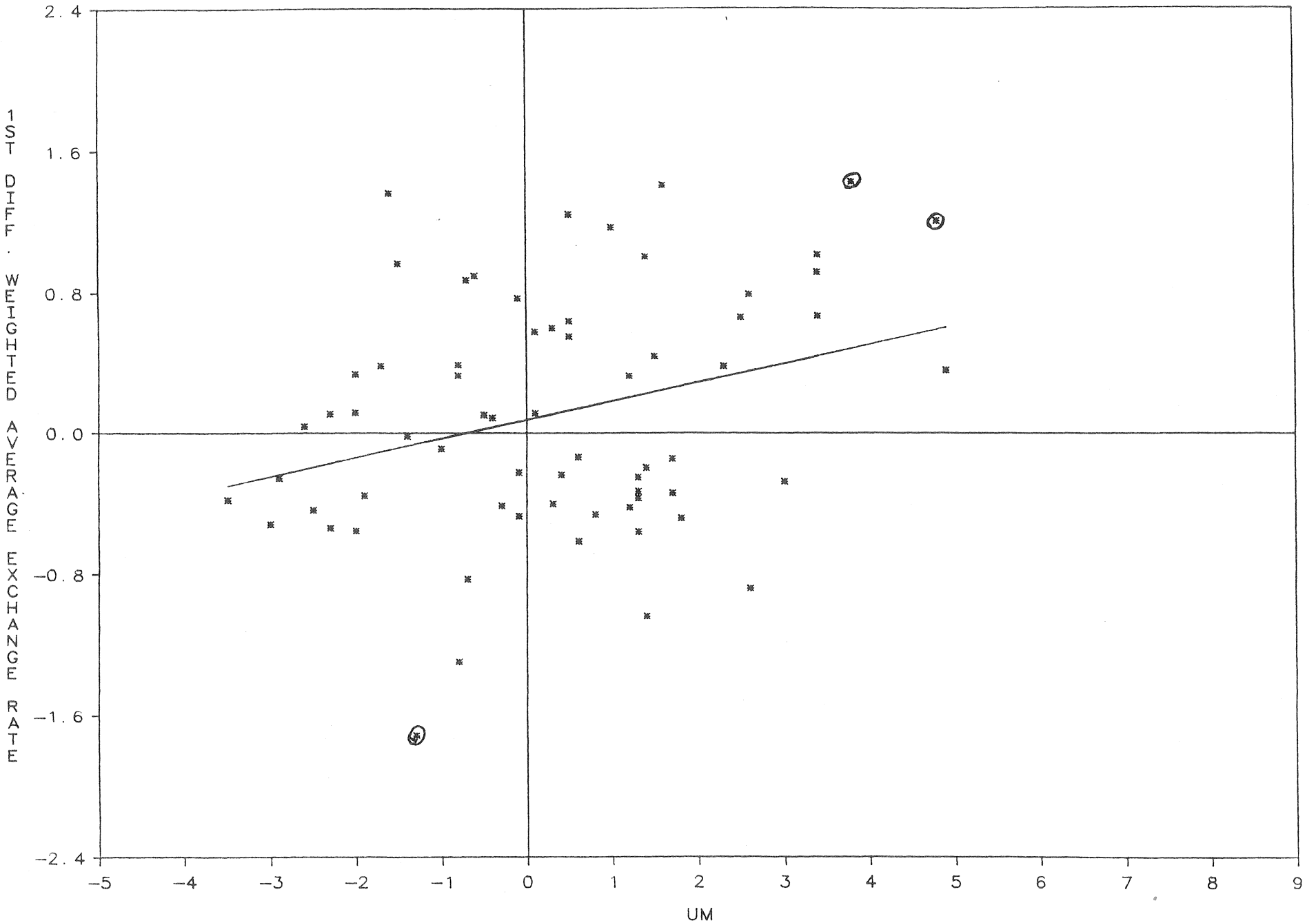

Chart 7: Scatter Plot of ΔSP500 and UM, January 5, 1978 - October 4, 1979

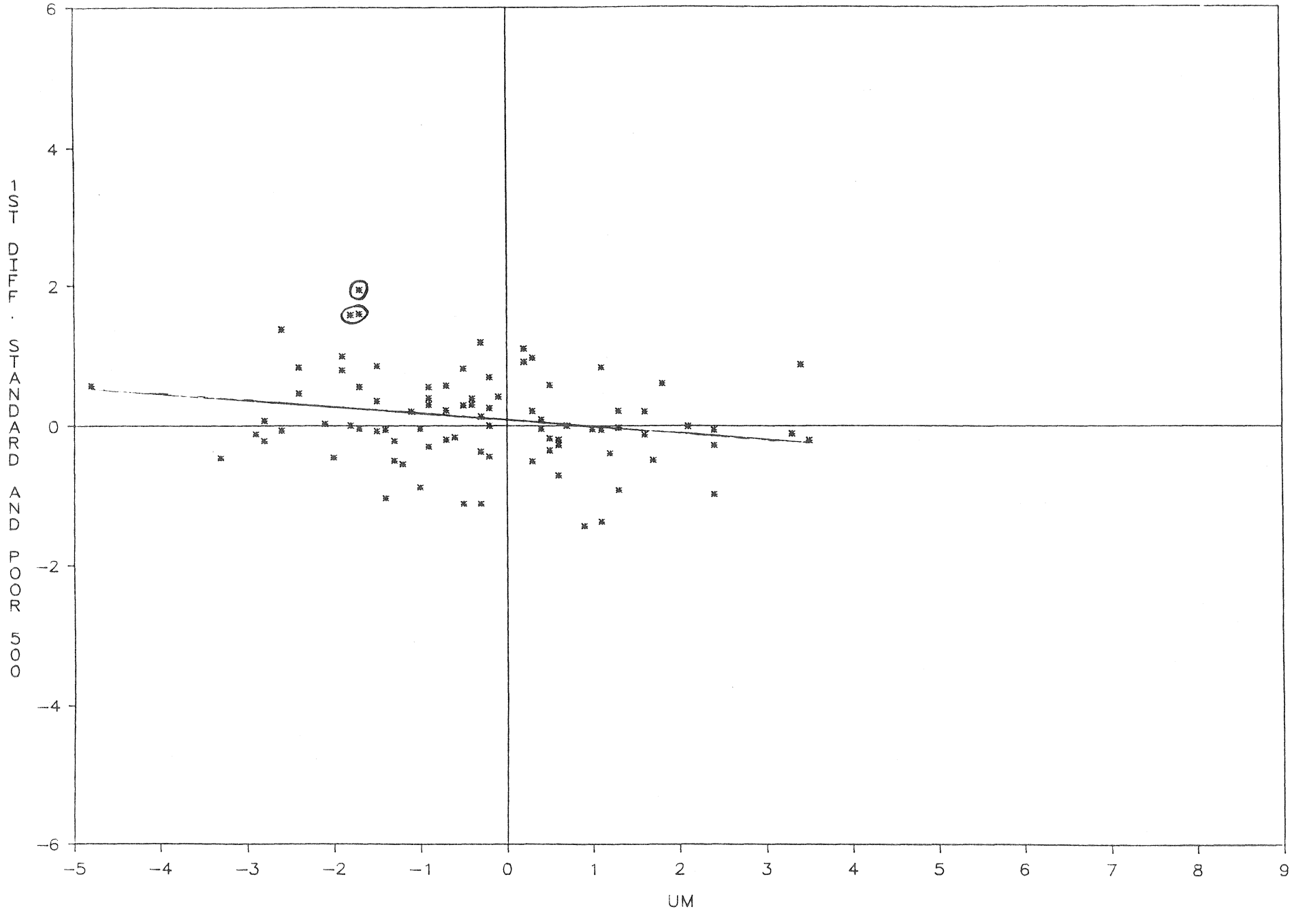

Chart 8: Scatter Plot of ΔSP500 and UM, October 8, 1979 - October 6, 1982

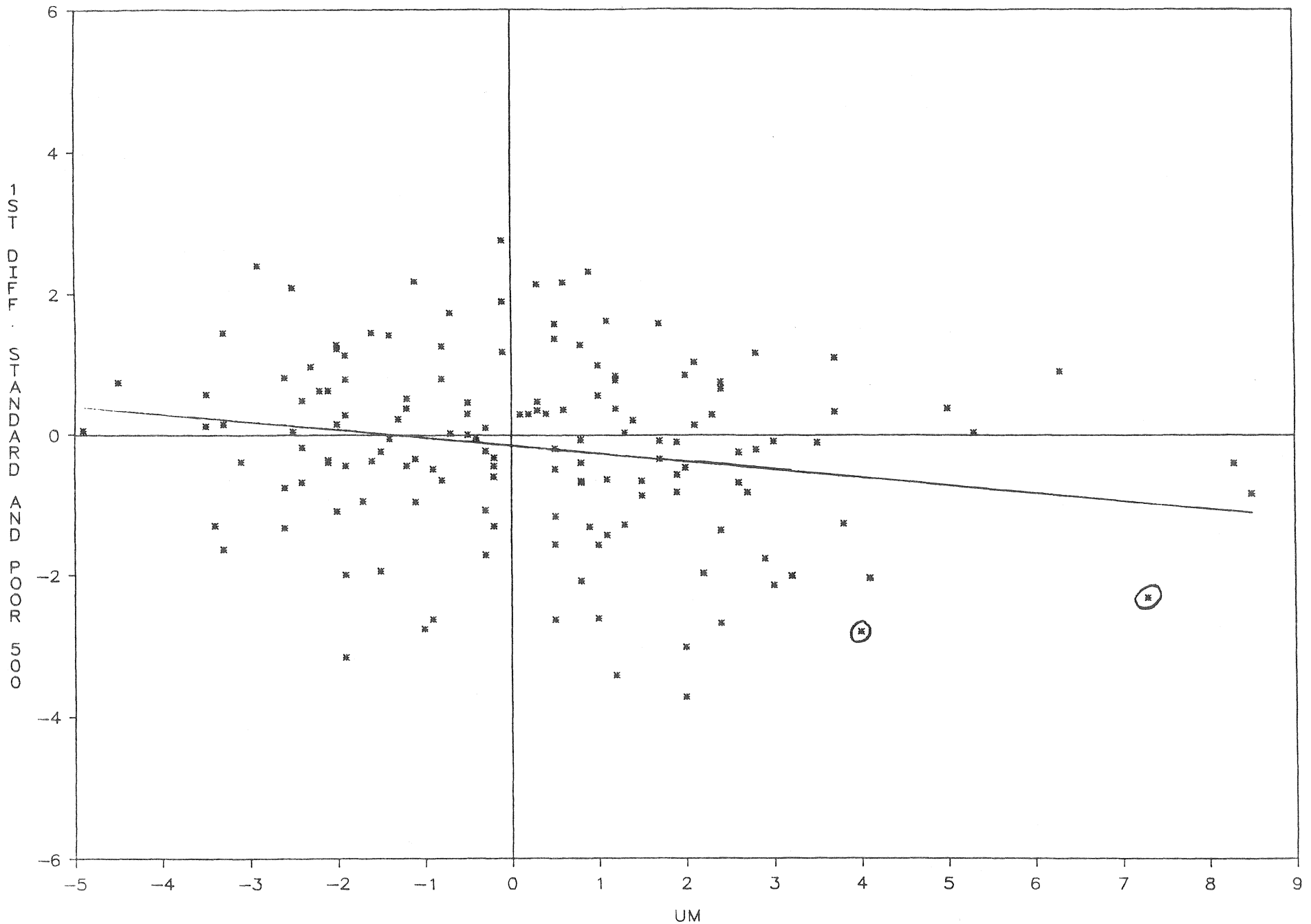

Chart 9: Scatter Plot of ΔSP500 and UM, October 8, 1982 - January 26, 1984