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MONEY SUPPLY ANNOUNCEMENTS AND STOCK PRICES: THE UK EVIDENCE

By

N. P. Tessaromatis
Postel Investment Management
and University of Warwick

P. E. Triantafillou
Sunderland Polytechnic
Business School

Abstract

The question of monetary policy and specifically of money supply changes on asset prices have been well researched on both sides of the Atlantic. Money supply announcements provide us with a unique opportunity to study the above by avoiding the problem of endogeneity. UK data are used to investigate the effects of money supply announcements on stock returns. It is found that unexpected changes in the money supply have a significant effect on asset prices. These results are in accordance with the results obtaines by using American data.

1. Introduction

The relation between the money supply and returns on different securities is a topic extensively researched in the literature. Current research on the relation between money and asset prices focuses on the reaction of asset prices to money supply announcements. The idea is to examine how asset prices react to the unexpected (unanticipated) componet of the money supply. The money supply announcement is treated as an exogenous variable which causes financial variables to change and not vice versav.

This study uses UK data to test the reaction of the UK stock market to money supply announcements. We find that stock prices are negatively related to the unexpected componet of the money supply. We also provide evidence on the informational efficiency of the UK Stock Exchange. In section 2 we discuss the available empirical evidence and provide a theoretical framework linking stock prices to the money supply. In section 3 we describe the data and the methodology used. This section also contains the empirical results. A summary and conclusions are given in section 4.

2. Stock Prices and Money Supply: Literature Review

Early research on the relation between money supply and equity prices has focused on the channels of effect of money on stock prices (see Hamburger and Kochin (1972 p. 331) and Homa and Jaffee (1971 p. 1045). Their findings suggested that knowledge o the past money supply could be used in a stock price forecasting model which was capable of generating abnormal stock returns, a conclusion inconsistent with the notion of market efficiency which holds that all relevant available information is instantaneously reflected in security prices. Later work by Pesando (1974 p. 909), Rogalski and Vinso (1977 p. 1017) and Sorensen (1982 p. 649) found that investors' expectations incorporated information about monetary policy in such a way that stock returns impounded future changes in the supply of money.

Research in the US using money supply announcements to test the reaction of stock returns, reported that stock prices responded negatively to the unanticipated component of M1. Berkman (1978 p. 32) found that an unanticipated increase in the money supply depressed share prices. Lynge (1981 p. 40) reported that positive money announcements lower stock prices but he did not distinguish between expected and unexpected money supply. Pearce and Roley (1983 p. 1323) found that stock price respond only to the unanticipated change in the money supply as predicted by the efficient market hypothesis. An unanticipated increase in the announced money supply depresses stock prices and vice versa.

Similar results are reported in Cornell (1983 p. 644) who also examined the simultaneous reaction of short and long-term nominal interest rates and exchange rates to money supply announcements. More recently Hardouvelis (1986 p. 225) and Hafer (1986 p. 5) using US data and Loderer, Lys and Schweizer (1986 p. 33) using Swiss data report results that confirm the conclusions reached by others, namely that stock prices are negatively related to unexpected money supply.

A number of competing hypotheses have been suggested in the literature as a possible explanation of the likely reaction of stock returns to money announcements. The "inflation premium hypothesis" suggests that an unanticipated jump in the money supply will lead to expectations of higher inflation. Implicit in this explanation is the belief that the monetary authorities lack credibility in the market, i.e. the market participants do not expect the monetary authorities to counteract a shock in the banking system that affects the money supply. Viewing the value of a firm as the present value of future cash flows

discounted at the company's cost of capital, in the absence of market imperfections like taxes, the overall effect of a change in inflation expectations could be argued to be neutral. That is an increase in inflationary expectations will lead to an increase in future corporate cash flows but at the same time will increase the cost of capital that these cash flows are discounted at. In fact, we have plenty of evidence which suggest that stock prices are negatively related to inflation expectations[1].

Whatever the explanation[2] negative association between stock prices and inflation, if a higher than expected money supply leads to higher expected inflation, the "inflation premium hypothesis" would predict that stock prices should fall following the announcement of an unexpected increase in the money stock.

The "policy anticipation hypothesis" maintains that an unexpected jump in the money supply affects nominal interest rates through its effect on the real interest rate component. Given the assumption that prices are sticky in the short-run the theory predicts that positive (negative) money supply surprises lead to higher (lower) short-term interest rates, because the market expects that the monetary authorities will in the future tighten (relax) the money supply. An increase in real interest rates would lead to lower stock prices as future cash flows are discounted at a higher cost of capital. Also if agents believes that high real interest rates will depress future economic activity that could lead to lower future corporate profits. Therefore, according to this hypothesis, positive (negative) money supply surprises should be associated with lower (higher) stock prices.

A third hypothesis surveyed in Cornell (1983 p. 644) is based on the information that monetary surprises convey on future money demand. An unexpected increase in the money stock tells agents that aggregate money demand is greater than they forecast. If money demand depends on expected future output [see Fama (1982 p. 201) for empirical evidence supporting this proposition] the money surprise leads agents to expect higher future output. That increases future real interest rates which increase the demand for money in the present which in turn leads to increases in present interest rates. Assuming that the increase in real interest rates is more than offset by the increase in future cash flows brought about by the increase in future output, the "real activity hypothesis" predicts that positive (negative) money surprises will lead to higher (lower) stock prices.

3. Empirical Evidence

The reaction of stock prices to money supply announcements can be tested by regressing stock returns on the unexpected part of the money supply revealed on the day of the announcement. The predictions of each hypothesis can be tested by looking at the coefficient b of the following regression:

$$R_t = a + bUM_t + e_t \tag{1}$$

Where

R_t = Holding period return of the stock index, on the day of the announcement

UM_t = Unexpected money supply (Actual minus expected) revealed when the announcement is made at t.

In an informationally efficient capital market, the market uses available information when prices are set. In such a market, money announcements should influence stock returns only to the extent that the announcement deviates from the market's expectations. In other words, only the unexpected component of the money supply should be related to returns. If the market is efficient, movements in stock prices should be unrelated to the expected component of the money supply, when the announcement is made.

The hypothesis of market efficiency can be tested by including in eg. (1) expected money supply as an independent variable. The modified equation is:

$$R_{it} = a + b_1UM_t + b_2EM_t + e_t \tag{2}$$

Where: EM_t = Expected money supply.

If stock returns react only to the unanticipated component of money, then $b_2 = 0$.

Data

Stock returns were calculated as the daily percentage changes of the Financial Times All-Share Index (FTA). The FTA Index is a market capitalisation weighted index consisting of about 750 common stocks. Returns were calculated over two different intervals: the announcement day and the day after the announcement. This was done in order to determine the time taken for the

market to react to the money supply announcements. Data are collected for the 4/1982 - 10/1986 period.

The announcement of £M3 seasonally adjusted takes place at about 2.30 p.m. the first Tuseday of each month. The money supply series consists of monthly observations of the change of the seasonally adjusted £M3 series obtained from the relevant Bank of England provisional press releases.

Money supply expectations are provided by Money Market (MMS). MMS (UK) conducts a telephone survey of about 20 IK market participants on the Monday before the Tuesday sterling M3 announcement. The data consists on monthly observations of the survey median (forecasts were not available for April and October 1982).

The rationality of the money supply forecasts by Money Market services (UK) is tested by subjecting the survey data to two standard tests of rationality. Unbiasedness is tested by regressing the actual monthly change in £M3, AM, on the forecasts change EM as follows:

$$AM_t = a + bEM_t + u_t \qquad (3)$$

Where u_t is a zero-mean finite variance white noise error term. If the forecasts are unbiased then a= 0 and b= 1 and u_t should follow a random walk[3]. The estimated version of eq. (3) over the March 1982 - August 1986 period is as follows:

$$AM_t = 0.177 + 1.067\ EM_t \quad R^2 = 0.38 \quad B\text{-}P = 10.771 \quad DW = 1.967$$
$$(-0.871)\ (5.295) \qquad F_{2,45} = 1.315$$

(t-statistics in parentheses)

The F statistic tests the joint hypothesis a=0 and b=1. Since F=1.315 (critical value F = 3.20) the joint hypothesis cannot be rejected as the 95 per cent level of significance. The hypothesis that the error term follows a random walk is tested by comparing the value of the Box-Pierce (BP) statistic to its critical value. The BP statistic is approximately chi-square distributed with p-n degrees of freedom, where p is the number of lags and n is the number of independent variables. As the critical value of the B-P statistic for 12 lags is 21.19 the hypothesis of overall randomness cannot be rejected at the 95 per cent level of significance.

The forecast is efficient if all available information are incorporated in the forecast measure. A weak form test of efficiency is to test whether the survey median incorporates information embedded in past values of the actual money

supply. A standard test is to examine whether the forecast error (AM-EM) is related to the past values of the actual money supply. The efficiency test involves estimating the following equation.

$$(AM_t - EM_t) = a + b_1AM_{t-1} + \beta_2AM_{t-2} + b_3AM_{t-3} + b_4AM_{t-4} + u_t \qquad (4)$$

The estimated version of eq. (4) is as follows:

$$(AM_t - EM_t) = \underset{(1.751)}{0.461} - \underset{(0.310)}{0.036AM_{t-1}} + \underset{(0.631)}{0.072AM_{t-2}} + \underset{(0.475)}{0.054AM_{t-3}} - \underset{(-2,636)}{0.300AM_{t-4}}$$

$\bar{R}^2 = 0.07$, DW = 1,759, $F_{5,45} = 2.413$, B.P. = 6.703

On the basis of the F-statistic the null hypothesis that the expectations are efficient cannot be rejected[4] at the 5 per cent level of significance (critical $F_{5,45}$ = 2.43).

3.1. Empirical Results

Table 2 presents the results of the estimation of equation 2. Dependent variable is the rate of return on the Financial Times All Share Index measured over the following time periods: the announcement day and the day following announcement. Returns over one day following the announcement is calculated to test whether the effect of unanticipated money on stock Prices persists beyond the day of the announcement. Since the market has approximately one hour to react from the time the money supply is announced (normally at 2.30 p.m.) to the closing time of the Stock Exchange (3.30 p.m.) b, will reveal how quickly the market incoprorated the new information revealed by the announcement.

Looking at the coefficients of the unexpected money supply our regression results indicate a significant (at the 90 per cent level) negative reaction of the stock market index on the day the money supply is announcement. The coefficient of unexpected money growth is still negative and significant at the 95 per cent level. When the announcement reveals that the money supply is 10 per cent higher than expected stock prices fall in the same day by 2.8 per cent and a further 3.2 per cent the following day. Similar coefficient estimates (3.9 per cent) are reported in Pearce and Roley (1983 page 1329).

The delayed reaction of stock prices to available information is inconsistent

with an informationally efficient capital market. However, this is not the only explanation. The Financial Times All Share Index includes, apart from large well traded companies, small companies that are thinly traded. It is therefore possible that the delay in reaction is a consequence of thin trading on a subset of the index rather than evidence of market inefficiency. To test this hypothesis we re-estimated eq. 2 using the Financial Times Ordinary Index (FTO). The Financial Times Ordinary Index is an equally weighted index including the 30 largest

TABLE 1

Regression of the FTA Index on expected and unexpected money supply (£ME)

$R_t = a + b_1UM_t + b_2EM_t + u_t$

Period	Coefficients			$\bar{R}^2$
4/82-10/86	a	b_1	b_2	
Announcement	0.284	-0.293	-0.297	0.05
Day	(1.245)	(-1.742)	(-1.742)	
Day After the	0.201	-0.324	-0.133	0.06
Announcement	(0.995)	(-2.175)	(-0.658)	

t - statistic in parentheses

$\bar{R}^2$ is the adjusted R^2 statistic

stocks traded in the London Stock Exchange. Thin trading effects will therefore be minimal.

The results from the estimation of eq. 2 using the (FTO) Index as dependent variable, indicates that the delay in reaction observed when the Financial Times All Share Index is used to study reaction to monetary announcements is due to thinly traded stocks included in the index rather then the market inefficiencies.

For the announcement day the coefficient of unexpected money supply is negative and significantly different from zero at the 95 per cent level of significance. While b, is still negative at the day following the announcement it is not different from zero at the 95 per cent level.

In an informationally efficient capital market asset prices should incorporate all available information. In such a market, expected money supply should

have no effect on stock prices when the announcement is made. Our evidence presented in tables 1 and 2 show that for both measurement periods the coefficient of the expected component of money is negative but not statistically different from zero at the 95 per cent level of significance[5].

TABLE 2

Regression of the FTO Index on expected and unexpected money supply (£M3)

$R_t = a + b_1UM_t + b_2EM_t + u_t$

Period	Coefficients			$\bar{R}^2$
4/82 - 10/86	a	b_1	b_2	
Announcement	0.323	-0.541	-0.451	0.11
Day	(1.146)	(-2.414)	(-1.574)	
Day After the	0.163	-0.236	-0.148	0.00
Announcement	(0.623)	(-1.224)	(-0.566)	

t - statistic in parentheses

$\bar{R}^2$ is the adjusted R^2 statistic

3.2. Differences in the Announcement Effect

The results reported in Tables 1 and 2 were interpreted assuming that the reaction of stock prices was symmetric with respect to unanticipated increases or decreases in money. It is however possible that, given the government's concern about inflation the response of stock prices to money supply announcements is higher for positive surprises than for negative ones. This hypothesis has been tested by Urich and Wachtel (1981 p. 1063) with regard to the reaction of interest rates to money announcements. For 1974 they find that positive unanticipated changes have a coefficient of 0.16 and negative unanticipated changes have a zero coefficient. This result is reversed for the reaction of 1974-75. Hafer (1986 p. 5) also tested the hypothesis that the reaction of U.S. stock returns is symmetrical with respect to the sign of the monetary surprise and found that only positive values of the unanticipated changes in money supply appear to have a significant impact on stock prices.

To test whether there is a difference in the reaction of stock prices depending whether a positive or negative money surprise is revealed with the announcement our estimate of unanticipated money supply was split into two

variables: one that includes only positive values and zero otherwise (UM_t^+) and one that includes only negative values and zero otherwise (UM_t^-). As the following regression shows for the day of the announcement, negative unexpected changes in the money supply had no statistically significant effect on stock prices. On the contrary the coefficient of the positive money surprise was negative and statistically different from zero.

Financial Times All Share Index (Announcement Day)

$$R_t = 0.177 - 0.512\ UM_t^+ + 0.068\ UM_t^- \qquad \bar{R}^2 = 0.05$$
$$(0.989)\ (-2.009) \qquad (0.184)$$

Financial Times Ordinary Index (Announcement Day)

$$R_t = 0.206 - 0.969\ UM_t^+ + 0.092\ UM_t^- \qquad \bar{R}^2 = 0.11$$
$$(0.224)\ (-2.665) \qquad (0.204)$$

The finding that only positive money surprises is statistically related to stock returns raises an issue of market efficiency. If there is equal probability for either a positive or negative error then a possible strategy is to sell just before the announcement because while a positive surprise will reduce prices a negative one will leave prices unaffected (see also Hafer (1986) p. 11). A possible trading rule based on the models estimated above is for the investor to sell short the day before the announcement and cover his position after the money supply is announced. Utilisation of this simple trading rule for the sample period would have produced a mean daily return of 0.04 per cent (standard error 0.121) for the Financial Times All Share Index and 0.11 per cent (standard error 0.148) for the Financial Times Ordinary Index both of which are not statistically different from zero.

4. Conclusions

The results of this study confirm the findings of similar research using American data. We find that unanticipated changes in money have a statistically significant effect on stock prices. Our empirical results suggest that when the money supply is higher than expected, stock prices tend to decrease.

We also test whether stock prices react symmetrically to the sign of money supply changes. We find that stock returns are related only to a positive change in unanticipated money supply. A simple trading rule based on the above finding produced returns that were not statistically different from zero.

Footnotes

1. Fama and Schwert (1977 p. 115) present a comprehensive study of the effect of expected and unexpected inflation on stock as well as bond prices. For international evidence see Solnik (1983 p. 35) or Gultekin (1983 p. 469).

2. Feldstein (1980 p. 839) suggests taxes as a possible explanation of this phenomenon. Inflation is thought to raise the effective tax rate faced by corporations because of the tax treatment of depreciation charges and inventory changes. In an inflationary environment the replacement cost of equipment rises with the general price level. Since depreciation charges are based on historical cost of assets, in periods of inflation, nominal profits rise and overstate the true pre-tax profits of companies. As corporations pay taxes on the amount of nominal profits, the tax burden is increased and after-tax profits are reduced. A similar argument holds for inventory changes. Gonedes (1981 p. 227) examines the descriptive validity of the tax effects hypothesis using a variety of macroeconomic data for the period 1929-1974. His main empirical results appear to be substantially inconsistent with the tax-effects hypotheses. Modigliani and Cohn (1979 p. 24) suggest that the negative relation between stock returns and inflation is due to two continuing valuation errors committed by the market. Firstly by failing to realise that part of interest expenses is not truly an expense but rather a repayment of real principal. Secondly investors mistakenly capitalise equity earnings at the nominal rather the economically correct real rate. Their empirical work as well as that of Cohn and Lessard (1981 p. 277) provide support for this hypotheses. A major criticism of this theory is its reliance on market irrationality and the implicit assumption that such irrationality persists over a long time period. It is also puzzling as to why investors should be confused by inflation only in the stock market since available empirical evidence suggest that bondholders and households demand (and get) compensation for inflation (see Fama and Schwert (1977) p. 133). Fama 1981 (1981 p. 545) argues that the negative relation is spurious and that it proxies for other, more fundamental relationships between stock returns, real activity and money. Fama contends that stock returns are positively associated with expected real activity, while inflation is negatively related to expected real activity. This produces the negative contemporaneous correlation between stock returns and inflation. Tests of Fama's Hypotheses by Fama (1981 p. 565), Fama and Gibbons (1982 p. 297) and Mandelker and Tandom (1985 p. 267) provide evidence consistent with Fama's explanation.

3. To avoid the problems caused by missing observations in testing the properties of the error term the test covers the period November 1982 - August 1986.

4. The marginal rejection of the alternative hypotheses (critical $F_{5,45} = 2.43$ against calculated $F_{5,45} = 2.413$) indicates that some information embedded in past prices is not fully incorporated in the median forecast. The coefficient of the fourth lag of the money supply series for example is negative and statistically different from zero.

5. For the announcement day although the coefficients of expected money supply for both indices and not significant at conventional levels of significance (90 or 95 per cent) there is some evidence that known information is not reflected in asset prices. Whether this finding is due to bias introduced by using the MMS survey median to proxy the market's expectations or is indicative of market inefficiency is a question requiring further research. A similar result is reported by Urich

and Watchtel (1981 p. 1063). Urich and Watchtel in their study on the impact of money supply announcements to interest rates found that, using survey data to proxy money expectations, the coefficient of expected money supply is significantly different from zero and similar in magnitude but of opposite sign to the coefficient of the "unexpected term". The authors dismiss the result as spurious.

References

Barro, R. (1977), Unanticipated Money Growth and Unemployment in the United States, American Economic Review.

Berkman, N. (1978), On the Significance of Weekly Changes in Ml, New England Economic Review.

Cohn, R and Lessard, D. (1981), The Effects of Inflation on Stock Prices: International Evidence, Journal of Finance.

Cornell, B. (1983), The Money Supply Puzzle: Review and Interpretation, American Economic Review.

Fama, E. (1981), Stock Returns, Real Activity, Inflation and Money, American Economic Review.

Fama, E. (1982), Inflation, Output and Money, Journal of Business.

Fama, E. and Gibbons, M. (1982), Inflation, Real Returns and Capital Investment, Journal of Monetary Economics.

Fama, E. and Schwert, W. (1977), Inflation and Asset Returns, Journal of Financial Economics.

Feldstein, M. (1980), Inflation and the Stock Market, American Economic Review.

Gonedes, N. (1981), Evidence on the "Tax-Effects" of Inflation Under Historical Cost Accounting Method, Journal of Business.

Gultekin, B. (1983), Stock Prices and Inflation: Evidence from other Countries, Journal of Finance.

Hafer, R. (1986), The Response of Stock Prices to Changes in Weekly Money and the Discount Rate, The Federal Reserve Bank of St. Louis Review.

Hamburger, M. and Kochin, L. (1972), Money and Stock Prices: The Channels of Influence, Journal of Finance.

Hardouvelis, G. (1984), Market Perceptions of Federal Reserve Policy and the Weekly Monetary Announcements, Journal of Monetary Economics.

Hardouvelis, G. (1986), Macroeconomic Information and Stock Prices, First Boston Working Paper Series.

Homa, K. and Jaffee, D. (1971), The Supply of Money and Common Stock Prices, Journal of Finance.

Loderer, C, Lys, T. and Schweizer, U. (1986), Daily Monetary Impulses and Security Prices, Journal of Monetary Economics.

Lynge, M. (1981), Money Supply Announcements and Stock Prices, Journal of Portfolio Management.

Makin, J. (1982), Effects of Inflation Control Programs on Expected Real Interest Rates, IMF Staff Papers.

Mandelker, G. and Tandom, K. (1985), Common Stock Returns, Real Activity, Money and Inflation: Some International Evidence, Journal of International Money and Finance.

Modigliani, F. and Cohn, R. (1970), Inflation, Rational Valuation and the Market, Financial Analysts Journal.

Pearce, D. and Roley, V. (1983), The Reaction of Stock Prices to Unanticipated Changes in Money: A Note, Journal of Finance.

Pesando, J. (1974), The Supply of Money and Common Stock Prices: Further Observations on the Econometric Evidence, Journal of Finance.

Rogalski, R. and Vinso, J. (1977), Stock Returns, Money Supply and the Direction of Causality, Journal of Finance.

Solnik, B. (1983), The Relation Between Stock Prices and Inflationary Expectations: The International Evidence, Journal of Finance.

Sorensen, E. (1982), Rational Expectations and the Impact of Money upon Stock Prices, Journal of Financial and Quantitative Analysis.

Urich, T. and Wachtel, P. (1981), Market Responses to Weekly Money Supply Announcements in the 1970s, Journal of Finance.