JARI JÄRVINEN

Industry Portfolios and Macroeconomic News: A Traditional Approach*

ABSTRACT

This paper examines monthly stock market reactions to macroeconomic news (residuals from a VEC model) using Finnish disaggregated data for the period of January 1987 to September 1996. Responses during different exchange rate regimes are also studied. The results give support to the efficient market view and suggest further that stock returns respond primarily to news about industrial production, real money supply, and interest rates. For example, a positive surprise in real money supply and interest rates decreases stock returns while the similar surprise in industrial production leads to an increase in stock returns. Furthermore, an exchange rate regime also seems to have an impact on the results. For a fixed (floating) rates, a weaker than expected real exchange rate is bad (good) news for the stock market.

Key words: *Industry portfolios, Macroeconomic news, VAR model, VEC model*

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JARI JÄRVINEN, D.Sc. (Econ)

Tapiola Asset Management Ltd • e-mail: jari.järvinen@tapiola.fi

1. INTRODUCTION

Financial theory attributes changes in asset prices to changes in fundamental values. An even stronger claim is based on the *Efficient Market Hypothesis*, which states that stock prices accurately reflect all publicly available information immediately and completely. Therefore, changes in stock prices can only be due to unanticipated changes or ″news″ about – for example, taxation or general macroeconomic conditions that plausibly affects fundamentals (i.e., expected future dividends or discount rates). If market participants are careful users of all available information, past or expected information should then have no effects since this information is already reflected in current market prices.

This paper concentrates on the relationship between macroeconomy and the stock market in Finland by asking the following question: What role does the macroeconomic news play in explaining the movements in stock prices? This question is important for both practitioners and academic economists. Practitioners are perhaps interested in using the information about macroeconomic fundamentals in pricing assets or alternatively making decisions about future real investments. On the other hand, academic economists may be interested in this question because answering it will help to identify some sources of systematic risks, and to consider whether these risks are priced (as they should) on the stock market.

There is a branch of econometric studies testing the relevance of macroeconomic news for stock price movements. The empirical evidence (e.g., see Pearce & Roley 1985; Hardouvelis 1987; Wasserfallen 1989; Aggarwal & Shirm 1992; Sadeghi 1992; McQueen & Roley 1993; Siklos & Anusiewicz 1998; and Ewing 1998) suggests that stock returns respond to news. However, these results show that news can explain only a small fraction of observed variations in equity returns (Roll 1988 and Cutler, Poterba & Summers 1989), even if some of the influences are significant at conventional levels. In the Finnish stock market data, the explanatory power of economic news seems to be even lower (see Junttila, Larkomaa & Perttunen 1997 and references therein). In general, these results indicate that stock returns primarily respond to monetary news while non-monetary news seems to have only weaker effects (Hardouvelis 1987). The empirical evidence also seems to be sample-specific and unstable over time (Orphanides 1992).

The purpose of this paper is to investigate whether macroeconomic news can explain a significant fraction of the stock returns for various industries in the Helsinki Stock Exchange. The major contribution is to document empirical evidence of the cross-sectional relation between industry portfolios and macroeconomic news. Moreover, special emphasis is placed on investigating the responses during different exchange rate regimes. The two-stage ordinary least squares (OLS) estimation methodology used previously by Cutler et al. (1989), Lahti and

Pylkkönen (1989), Orphanides (1992), and Viskari (1992), among others, is followed. The methodology is as follows: First, a vector autoregression (VAR) model is used to identify the unexpected components (i.e., residuals) of each macroeconomic indicator; and second, to consider these unanticipated news components in explaining the changes in industry stock returns.

This paper extends previous studies in several ways. First, industry portfolios are used as dependent variables since there may be distinct effects across industries. This is especially important in the Helsinki Stock Exchange, where Nokia Corporation (a large telecommunications firm) dominates the aggregate stock market. This could bias the results by masking some important dependencies. Industry level analysis can also provide further insight about how different industries respond to news and whether these responses are significantly different from the stock market on average (i.e., whether common response applies to all industries). Furthermore, the Finnish stock market is traditionally dominated by export-oriented, cyclical industries like forest industries, but it would be interesting to investigate how also non-cyclical industries such as other services respond to macroeconomic news.

Second, the stability of the parameter estimates is investigated by dividing the sample period into two non-overlapping sub-samples and testing whether the response coefficients in the pricing model are the same during different phases of exchange rate regimes. Third, publication lags in economic statistics are considered as well as the recent time series data available is used to update the findings of earlier studies. Finally, from a methodological point of view, using vector error correction (VEC) models to generate market expectations and thus news extends the existing literature. The advantage of the VEC model is that it captures both short-term dynamics (market expectations) as well as long-run equilibrium relations (revisions in market expectations) at one pass.

The results suggest that a systematic relationship between stock returns and macroeconomic news is evident, although the explanatory power of news seems to be rather low. Across industries, news jointly explains from 2.4 to 15.5 (11.4) percent of the variance in (market) returns, and mainly news about monetary policy affects stock returns (i.e., real money supply and interest rates). In addition, during the fixed (floating) exchange rate regime, a weaker than expected real exchange rate is bad (good) news for the stock market. In the whole sample, the estimation results do favor a common response, but during sub-periods, some industries respond significantly differently from the market suggesting distinct intrinsic industry-specific characteristics.

The remainder of this paper is organized as follows: Section 2 outlines a simple theoretical model that relates stock prices to new information. In the following section, the data and statistical methods are described. Section 4 presents the empirical results, and in the last section, conclusions are drawn.

2. THEORETICAL FRAMEWORK

A common model that relates a stock price to news posits that stock price equals the present value of future dividends discounted by a risk-adjusted discount rate. Theoretically, stock prices are determined by ex ante variables (i.e., expected cash flows and expected discount rates at which those future cash flows are capitalized) that are not directly observable. Therefore, it is the impact of new information on agents' expectations that determine the ultimate response of stock prices to news. The rational valuation formula (see Cuthbertson 1996, 77–78) for stock price can be written as:

$$(1) \qquad p_t = E[\sum_{i=1}^{\infty} \delta^i D_{t+i} | \Omega_t],$$

where p_t is the stock price at time t, $E[\bullet|\Omega_t]$ is mathematical expectation conditional on the market's period-t information set Ω_t, D_{t+i} is the dividend paid at time $t + i$, and $\delta = 1/(1 + r)$ is the discount factor for cash flows that occur at time $t + i$, determined in the market based on information known at time t.

Since stocks are priced according to rational valuation formula (1), any useful new information that may well affect future discount rates or future dividends, or both, should be of interest. Expected dividends are a function of macroeconomic fundamentals (e.g., exchange rates or industrial production) that affect the future profits of the firms. Expected discount rate, instead, is a function of the risk-free rate (r). In addition, expected discount rate also depends on risk premium, which, nevertheless, is assumed to be constant in this study.

3. DATA, MODELS, AND ESTIMATION METHODS

3.1. Macroeconomic and stock price data

The data set consists of 117 monthly observations from January 1987 to September 1996. Some of these observations are lost due to publication lags in economic statistics as well as lags in the VAR model. The specific variables are as follows:

Stock return data:

1) Stock returns (R_{it}) are expressed in differences in logs (end-of-month values) of the stock price indices measured by the HEX industry indices[1] deflated by the consumer

1 See Hernesniemi (1990) for further details about the HEX price indices for various industries. Of course, it would be theoretically preferable to use dividend adjusted monthly stock returns, but these HEX yield indices (including dividends) are not available before 1991. Therefore, stock returns are calculated without dividends, which has practically no impact on the results at the aggregate stock market level as will be shown later (see footnote 11). Furthermore, the movements of price and yield indices in real terms are strongly correlated (correprice index. The industry portfolios are as follows: 1) banks and finance, 2) insurance and investment, 3) other services, 4) metal and engineering, 5) forest industries, 6) multi-business industry, and 7) other industries. In order to compare the industry-level results to the whole market, the aggregate stock market responses are estimated by using HEX all share price index, which serves as a proxy for the benchmark model. (Source: The Helsinki Stock Exchange).

Without a precise economic theory that explains the link between macroeconomy and the stock market, the decision about which fundamental economic variables are to be included in analysis is somewhat arbitrary. In reality, several factors may have an impact on stock prices. Therefore, some simplifying assumptions about investors' relevant information set as a proxy for the true information set, which is unobservable, are required. Since this paper deals with a small open economy, the following macroeconomic indicators are included to describe both real and financial conditions of the domestic economy:

2) Logarithm of the industrial production (*ip*) measured by the volume index of the industrial production. (Source: Statistics Finland).
3) The logarithm of the real money supply (*m*1) measured by the nominal narrow money supply (M1 monetary aggregate) deflated by the consumer price index. (Sources: the Bank of Finland and Statistics Finland).
4) The nominal short-term interest rate (*H*3) measured by the three-month Helibor rate. (Source: the Bank of Finland).
5) Logarithm of the inflation rate (π) measured by the annual difference of the consumer price index. (Source: Statistics Finland).
6) The logarithm of the real exchange rate (*s*). Real exchange rate ($s = ep^f/p^d$) is measured as a nominal trade-weighted exchange (*e*) rate deflated by the price levels ratio between foreign (p^f) and domestic (p^d) price levels, respectively. (Source: the Bank of Finland).

All time series are seasonally <u>un</u>adjusted. A real exchange rate is the relative price of the foreign good in terms of the domestic good. It determines the price competitive positions of the domestic firms compared to their foreign competitors. It is measured as the number of domestic currency needed to buy one unit of the foreign currency. Defined in this way, an increase (decrease) in real exchange rate denotes depreciation (appreciation); that is, improvement of price competitive position of the domestic economy.

lation is 0.985) during the period September 1987 to September 1996. Therefore, the HEX price indices are good proxies for the HEX yield indices.

3.2. A VAR model for describing market expectations

The theoretical background discussed in the last chapter implies that unanticipated changes in macroeconomic fundamentals are the relevant variables to be included in the empirical work. Therefore, the analyses conducted in this paper also require proxies for expected and unexpected values for fundamentals. One fundamental obstacle in testing asset-pricing theories is our inability to measure ″news″ accurately. Studies conducted for the US data benefit from the vast amount of available data to overcome obvious measurement problems. Specifically, regularly published survey data can be taken to measure market expectations, so that direct measures of news can be constructed.

Such information does generally not exist in Finland (at least as wide information set as is considered in this paper). Therefore, a statistical procedure must be chosen to extract news from the observed time series. Previous studies have solved this problem by using time series models like ARIMA or VAR models as a proxy for investors' expectations, and thus news-generating process. Some researchers (e.g., Graham 1996 and Martikainen & Yli-Olli 1991) prefer to use simply first difference of the variable as a proxy for news. This choice is based on the assumption that if macroeconomic variables are random walk processes, the first differences are equivalent to unexpected values, which are the unanticipated innovations in the economic variables (see Cheng 1995).

In this paper, unanticipated values were generated via the estimation of a VAR model[2]. However, this statistical procedure may be problematic due to measurement problems concerning how exactly the different variables are measured, and how well news can be isolated from the expected changes. In order to avoid the errors-in-variables problem, it is assumed that investors respond to the measured rather than the true news, implying that the original estimating equation should be specified in measured rather than true news.

Furthermore, efficient market theory assumes that all lagged values of $\mathbf{x}_t$ are known at the end of the period $t-1$. Unfortunately, most macroeconomic time series are not available until subsequent periods due to publication lags in economic statistics. In addition, they may be subject to revisions for months or, even years after their initial release have occurred. Therefore, to account for publication lags, a two-month lag in the industrial production and a one-month lag in the real money supply, the consumer price index, and the real exchange rate is assumed[3, 4].

2 Pearce and Roley (1985) show that survey data is more efficient (i.e., smaller root mean-squared error) than time-series models in generating expectations. McQueen and Roley (1993) concluded that despite the use of empirical expectation proxies, the estimated news coefficients using VARs seem to be consistent with the survey data.

3 Lagged values are used to ensure that the data is publicly known at the beginning of the period over which the stock returns are measured. Ignoring publication lags creates potential problem in such a way that the informa-

It is common in financial literature to describe movements in some variables via lagged values (see Chen 1991). However, this approach restricts the information set to include only the values of that particular variable. In reality, the investors' information set is, of course, larger. Therefore, expectations are modeled as a function of the lagged values of the variable itself, and the lagged values of other relevant variables. To coincide with this structure, expectations are expected to follow a finite order VAR process

(2) $$\mathbf{x}_t = \mathbf{A}_1\mathbf{x}_{t-1} + \dots + \mathbf{A}_k\mathbf{x}_{t-k} + \Phi\mathbf{D}_t + \mathbf{e}_t,$$

where $\mathbf{x}_t$ is a (5×1) vector of variables $\mathbf{x}_t = (ip_{t-2}, m1_{t-1}, H3_t, \pi_{t-1}, s_{t-1})'$, $\mathbf{A}$ is a (5×5) matrix, and $\mathbf{e}_t$ is a (5×1) vector of time t error terms $\mathbf{e}_t = (e_t^{ip}, e_t^{m1}, e_t^{H3}, e_t^{\pi}, e_t^{s})'$ which are assumed to be independently and identically distributed with zero mean and positive definite covariance matrix Σ. Each equation also includes vector of deterministic terms $\mathbf{D}_t$ that may contain constant, seasonal dummies, and possibly, some other intervention dummies to be specified later. The one-step-ahead forecast errors $\hat{\mathbf{e}}_t$ are treated as news, and used as explanatory variables for the stock return equations.

This VAR model relates the current value of each series to the lagged values of the series itself and to those of the others. Since the information set used in forecasting cannot be available at the time the forecast is made, only lagged values of the variables are permitted in the model. Estimations can be carried out equation-by-equation by using OLS, because all explanatory variables in every equation are the same. Finally, after fitting the VAR model to the data, it is important to check that the assumptions underlying the model are satisfied. Otherwise, the procedure derived may not be valid, and thus residuals would be improper estimates of news.

VAR estimation assumes that variables included in the system are stationary. The standard Phillips and Perron (1988) unit root tests are used to test for the order of integration of the different series. If variables are nonstationary then a sufficient amount of differences should be used to achieve a stationary VAR model. Nevertheless, it should be noted that mechanical differencing is not recommended, since it is possible that the levels of the variables are cointegrated. If cointegration is present, then a VAR-model in differences would be misspecified be-

tion set implied by a typical VAR contains information that is not actually available to market participants. Therefore, if some of the variables on the right-hand side of the VAR model are not observable at time $t-1$, the residuals will be improperly estimated.

4 Accounting for publication lags in real exchange rate is problematic. Nominal exchange rate is known contemporaneously, but price levels only with a one-month lag. Of course, nominal exchange rate could be used, but this may not be suitable because the FIM was fixed during the period 87–92. Therefore, instead of using nominal exchange rate, the real exchange rate with one-month lag is used.

cause it omits the long-run information that is contained in levels of the variables (Hamilton 1994, 651–653).

Therefore, these possible cointegration relations between variables also need to be tested. The Johansen (1988, 1991) maximum likelihood technique is used to test for long-run cointegration. If cointegration is present, then the estimations should be conducted by using the VEC model

$$\Delta \mathbf{x}_t = \Pi \mathbf{x}_{t-k} + \Gamma_1 \Delta \mathbf{x}_{t-1} + \ldots + \Gamma_{k-1} \Delta x_{t-k+1} + \Phi \mathbf{D}_t + \mathbf{e}_t, \tag{3}$$

where Γ and Π matrices provide both the short-run dynamics and the long-run information contained in the data, respectively. When $0 < \text{rank}(\Pi) = r < 5$, matrix Π can be written as $\Pi = \alpha\beta'$, where β can be interpreted as a $(5 \times r)$ matrix of cointegration vectors, and α as $(5 \times r)$ matrix of error correction parameters. Again, $\hat{\mathbf{e}}_t$ is a vector of estimated residuals to be considered as news. The economic interpretation of the VEC-model is as follows: the error correction term is considered as the "error" from the long-run equilibrium relation (i.e., revisions in market expectations) while the difference terms give the short-run dynamics (i.e., market expectations).

3.3. The empirical model for stock returns and macroeconomic news

To analyze the systematic relationship between macroeconomic news and stock returns, it is necessary to make a functional form assumption of the relationship between dependent and independent variables. The commonly used relationship is linear, and the constant-mean-return model used to test the effects of news on industry returns is as follows:

$$R_{it} = \alpha_i + \beta_{1i}\hat{e}_t^{ip} + \beta_{2i}\hat{e}_t^{m1} + \beta_{3i}\hat{e}_t^{H3} + \beta_{4i}\hat{e}_t^{\pi} + \beta_{5i}\hat{e}_t^{s} + u_{it} \tag{4}$$

where R_{it} ($i = 1, \ldots, 7$) is the realized ex-post return of the industry i at month t, α_i is industry-specific constant, $\beta_{1i},\ldots,\beta_{5i}$ are the unknown regression coefficients (elasticities), which measure the impact of economic news on industry returns, and u_{it} is a stochastic disturbance term, which is assumed to be $u_i \sim \text{i.i.d}(0,\sigma^2)$. The regression error term u_{it} describes all other news (e.g., industry-specific, world economy, etc.) plus noise that is not directly related to pre-specified macroeconomic variables. Specifications similar to regression Equation (4) have been used in numerous studies (e.g., see Siklos & Anusiewicz 1998).

The coefficient of determination R^2C (adjusted for degrees of freedom) measures the fraction of the return variation that can be explained by news. However, the R^2C measure may be misleading because of the large macroeconomic fluctuation that occurred in the Finnish economy at the beginning of the 1990s. It makes identification of a linear relationship between macroeconomic changes and stock price changes easier and possibly overestimates the importance of news. In other words, given a true underlying constant linear relationship, the R^2C increases when there is a larger dispersion in the explanatory variables. Therefore, conclusions concerning the strength of the relationship between news and stock returns should not be made based on the R^2C-coefficients, but rather on the estimated industry-specific elasticities (β_i).

Another potential problem is the structural break(s) that may have occurred in the sample. The chosen period may not be homogenous, because there have occurred several major changes (e.g., in exchange rate regime or foreign ownership in Finnish companies) that might have had an impact on the stability of the estimated models. If the sample included structural breaks that represent changed market perceptions regarding the impact of news on stock market, the whole sample regression results would be misleading since they would show the neutralized effects of different market reactions over the whole sample. Therefore, structural stability of estimated models should be tested, and when necessary, separate models for different periods should be estimated.

One obvious candidate for structural break would be September 1992 when the Bank of Finland switched from a fixed to a floating exchange rate regime. Therefore, the sample is divided into two parts – pre-September 1992, representing the period of fixed rates; and post-September 1992, representing the period of floating rates. It is important to consider regime changes for at least two reasons. First, news may have different effects on firms' expected cash flows or expected discount rates, and thus on stock prices depending on chosen exchange rate regime. Second, ignoring structural breaks may mask the significant response coefficients.

3.4. Expected signs of the news coefficients and testable hypothesis

Many studies (e.g., see Lintner 1975, Fama & Schwert 1977, Fama 1981, 1982, Geske & Roll 1983, Chatrath, Ramchander & Song 1997 and Groenewold, O'Rourke & Thomas 1997) find a significant negative relationship between expected and unexpected inflation and stock returns. This is surprising since according to the Fisherian hypothesis, shares should provide a hedge against expected and unexpected inflation. One possible channel by which inflation news may have a negative impact on stock prices is that higher-than-expected inflation increases inflation expectations, which in turn leads to a monetary tightening. This implies higher short-term nominal interest rates, which reduces the present value of future cash flows, and thus current stock prices.

A negative relationship between higher-than-expected interest rates and stock returns is also expected (e.g., see Pearce & Roley 1985 and Thorbecke 1997). Higher-than-expected interest rates decrease firms' future profits through increased interest payments on debt and reduced aggregate demand. Unexpectedly high interest rates also increase the discount factors at which those future profits are capitalized. Therefore, higher interest rates are bad news for the stock market. Thus, when interest rates increase, the market values of equity prices decline. Furthermore, previous studies (e.g., see Hardouvelis 1987) find that stocks for financial companies (e.g., banks and finance and insurance and investments) are interest rate sensitive. This hypothesis is also tested here.

Depreciation in real exchange rate stimulates export of the domestic firms by making their products cheaper in foreign markets. However, if depreciation is higher than expected, monetary authority typically tries to reduce depreciation by increasing short-term interest rates[5]. Therefore, unanticipated depreciation is bad news for the stock market, in general. Furthermore, export-oriented industries (i.e., metal and engineering, forest industries, and multi-business industry) may even gain (if positive cash flow effect dominates negative discount rate effect) from unanticipated depreciation, since a cheaper FIM makes them more competitive on the foreign market. Hence, a positive association between real exchange rate news and stocks of export-oriented industries is expected.

However, stock price responses to unanticipated changes in real exchange rate may depend on monetary policy regime. During the fixed rates (exchange rate targeting), central bank ″leans against the wind″ after higher than expected depreciation, trying to keep the exchange rate within some fixed, pre-specified interval. During the floating rates (inflation targeting), the same surprise does not necessarily lead to monetary tightening, if, for example, general macroeconomic conditions are weak, or inflation expectations are at low level. Both of these conditions held in the Finnish economy at the beginning of the 1990s. Therefore, it is assumed that during the fixed (floating) rates, higher-than-expected depreciation in real exchange rate is bad (good) news for the stock market.

Many recent studies (see Prag 1994 and Siklos & Anusiewicz 1998) have examined the impact of the money supply news on stock returns. The consensus finding is that unexpectedly high money growth is associated with lower stock prices. One interpretation of this result is that investors may believe that the monetary authority will respond to this piece of news by quickly moving to a more restrictive monetary policy due to increased inflation expectations. Alternatively, unexpectedly high money supply may signal increase in future expected real interest rates (Hardouvelis 1987). According to these explanations, higher-than-expected money supply is bad news for the stock market.

Finally, higher-than-expected economy activity may increase investors' expectations of future economic growth and expected future profits of the firms. Good news about real econo-

5 This policy is known as ″leaning against the wind″ (see Solnik 1987). Because stock returns systematically decline as interest rates increase, then the monetary authority's policy of ″leaning against the wind″ will expose also domestic-oriented industries to unanticipated changes in real exchange rates.

my should make stocks even more attractive and hence cause an upward leap in share prices. Several studies (see Pearce & Roley 1985 and Sadeghi 1992) have shown that stock returns respond positively to higher-than-expected economic activity. Therefore, the likely impact of real activity surprises on stock prices is positive. Furthermore, it is expected that stock prices of industrial sectors are more sensitive to news about real economy than the firms in the services sector.

Summarizing the priors, stock returns across industries can be written as a function of news about macroeconomic indicators known at period *t* as follows:

$$(5) \qquad R_{it} = f_i(\underset{+}{\hat{e}_t^{ip}}, \underset{-}{\hat{e}_t^{m1}}, \underset{-}{\hat{e}_t^{H3}}, \underset{-}{\hat{e}_t^{\pi}}, \underset{-/+}{\hat{e}_t^{s}})$$

where (+/–) denotes the expected sign of the response coefficient. These signs correspond to the stock return responses to a higher than expected values of the fundamentals.

The significance of individual response coefficients is examined by *t*-tests. Common response (i.e., statistical difference from the response of the overall market index) is also tested. In addition, the joint significance of monetary ($\hat{e}_t^{m1}$, $\hat{e}_t^{H3}$, and $\hat{e}_t^{\pi}$) and non-monetary ($\hat{e}_t^{ip}$ and $\hat{e}_t^{s}$) news is tested to explore whether monetary or non-monetary variables contain relevant information for the stock markets. Wald tests for coefficient restrictions are used for this purpose. Conventional significance levels of 1, 5, and 10 percent are used throughout the analysis. *F*-distribution is used because in small samples, it is more cautious in rejecting the null than the χ^2-distribution (e.g., see Theil 1971, 402).

4. ESTIMATION RESULTS

4.1. Producing news via the estimation of the VAR model

In the first stage, news variables were generated via the estimation of the VAR[6, 7]. The lag length was chosen using Schwarz multivariate information criteria and Likelihood Ratio tests

6 VAR estimation is based on i.i.d. errors. However, due to the nature of this application, error terms need not be homoscedastic or normally distributed. The only requirement for news is to be independent in time, since otherwise, they could not be treated as news. When taking a closer look at the residual diagnostics, serial correlation and non-normality are found, which are due to some outliers. Preliminary data analysis (not shown) reveals several outliers, which are modeled by using intervention dummies (see footnote 7). However, care should be taken when using intervention dummies, since relevant information may be lost from the stock market's viewpoint in the second stage estimations. Therefore, the VAR model is estimated with intervention dummies, but after estimating parameters, the dummies with their estimated coefficients are added back to the residual series. The advantage of this method is that it prevents outliers to disturb VAR estimation, and still includes this information in the second stage.

7 The following vector of intervention dummies is used: $\mathbf{D}_t$ = (*D*894, *BS*, *D*9101, *D*9102, *D*9107, *D*9108, *D*9112, *DSPEC*, *D*9210). These dummies have been included since they all have clear economic interpretation, and corrected for small samples suggested by Sims (1980). Information criteria suggest the optimal lag length of two. However, residual misspecification tests revealed that additional lag is required to capture the dynamics of the model. The LR-test statistic comparing the three-lag model to the two-lag model is highly significant at less than 1-percent level. After that, residual diagnostics give no hint of misspecification, except of non-normality at the 5 percent level. Therefore, the lag length of the VARs is chosen to be three in this study.

After defining a suitable lag order, time series properties (not shown) of the data are investigated. Phillips and Perron (1988) unit root tests suggest that all variables (including stock prices) are nonstationary with stationary differences (i.e., $\mathbf{x}_t \sim I(1)$ processes). In addition, Johansen's (1988, 1991) cointegration tests (with and without intervention dummies) for alternative lags suggest that there may be one or two independent cointegration vectors present in the data[8]. Therefore, the VAR(3) model with two cointegration vectors in VEC form is estimated, and its residuals are used as news proxies.

4.2. Whole sample results: stock market responses to news

Equation (4) is estimated separately for each industry by using OLS[9] and the Newey and West (1987) estimator[10] of the covariance matrix. These results are reported in Appendix 1. Several interesting results emerge from this appendix. First, news explains approximately 11.4 percent of the market return[11]. Across industries, the explanatory power varies between 2.4 percent

because error term diagnostics show that residuals are better behaved with them rather than without them. The dummies are as follows: *D*894, *D*9112, and *D*9210 account for revaluation in March 1989, devaluation in November 1991, and floating decision in September 1992, respectively. *BS* accounts for a bank workers' strike (takes the value 1 in January 1990 and –1 in March 1990). *D*9101 and *D*9102 account for withholding tax, and the end of the special tax-free account. In addition, the harbor workers strike in June 1991 and devaluation speculation *DSPEC* that takes the value 1 from April to November 1992, and zero otherwise are considered. Every equation in the VAR system also includes 11 seasonal dummies and a constant.

8 Several recent studies present evidence in favor of cointegration relationships among macroeconomic variables such as those investigated in this paper (e.g., see Fung & Kasumovich 1998).

9 Initially, the estimations were conducted with seasonal dummies and a dummy for the October 1987 crash, but this seems to have only minor effects of the results. Therefore, to avoid efficiency losses, these dummies are not included in the subsequent estimations.

10 The reported results are based on i.i.d. residuals. Several diagnostic tests (not shown) for the estimated models were run, and were largely acceptable, despite some problems. Residuals are normally distributed for most of the cases measured by Jarque-Bera -statistics. However, serial correlation seems to be a problem, although Durbin-Watson test gives no hint of serial correlation. Ljung-Boxin *Q*-tests calculated at 28 lags show that autocorrelation is present in every equation at least at the 10 percent level. Furthermore, the ARCH(1) effect is clearly observed only in banks and finance. Finally, RESET(1) tests for general misspecification reject the null of correctly specified model at the 5 percent level only in insurance and investment.

11 In order to check the potential bias that excluding dividends might cause; Equation (4) was re-estimated by using dividend adjusted monthly stock returns as a dependent variable. The dividends adjusted stock returns were calculated by combining the WI index (1987–1990) and the HEX yield index (1991–1996). For further details see Berglund, Wahlroos, and Grandell (1983) and Hernesniemi (1990). The estimation results were as follows:

(metal and engineering) and 15.5 percent (insurance and investment). As a group, the most news sensitive industries seem to be the financial sector (banks and finance and insurance and investments). In total, these results imply that news accounts for only a small, but still non-zero portion of stock return variation.

Second, according to *F*-tests, news jointly appears to be important determinants of stock returns: news jointly has significant effect on stock returns (H_1) for five industries out of seven at the 1-percent level. Comparing the role-played by monetary and non-monetary news as a group, monetary news (H_2) are more important than non-monetary news (H_3) in affecting stock returns. Across industries, forest industries and multi-business industry respond also to non-monetary information for less than the 1- percent level.

Third, individual response coefficients suggest significant aggregate market responses to news about industrial production, real money supply, and interest rates. Other news appears to have less significant effects on stock returns. Most of the significant coefficients affect stock returns with their predicted signs. For example, industrial production news parameter estimates range from 0.36 to 0.93 across industries compared to the aggregate market reaction of magnitude 0.57. Higher-than-expected money supply and interest rates are bad news for the stock market: one percent (percentage) unexpected increases in real money supply (interest rate) decreases market by 0.69 (2.9) percent.

Across industries, significant responses for more than half of the cases were found with respect to news about industrial production, real money supply, and interest rates. Overall, these estimates were very similar to those of the market on average. In fact, industry portfolios do not respond significantly differently from the market. Despite the common response, there are still some industry-specific differences worth mentioning. First, primarily export-oriented cyclical industrial industries respond to industrial production news. Second, cyclical industries do not respond to interest rate news. Third, domestic-oriented industries (other services and other industries) as well as financial sectors seem to be more sensitive to the domestic money market conditions. Finally, the financial sector is the most sensitive among all industries to interest rate news: responses are over twice stronger than the market on average.

However, news about inflation and real exchange rate produce mixed results. Five industries out of seven produce a positive inflation coefficient, which is contrary to the prior expec-

$$R_t = \underset{(0.659)}{0.004} + \underset{(2.913)}{0.577}\ \hat{e}_t^{ip} - \underset{(-2.574)}{0.679}\ \hat{e}_t^{m1} - \underset{(-2.394)}{0.031}\ \hat{e}_t^{H3} + \underset{(1.309)}{1.271}\ \hat{e}_t^{\pi} + \underset{(0.338)}{0.147}\ \hat{e}_t^{s} \qquad R^2C = 0.123\ \ DW = 1.841$$

As can be seen from these results (*t*-statistics in parenthesis) compared to those in Appendix 1 without dividends, the parameter estimates are very close. Industrial production, real money supply, and interest rate news has statistically significant effect on stock returns. Therefore, it can be argued that stock returns calculated simply through capital gains or losses are a good proxy for the total stock return, which consists of capital gains and dividend yield.

tations. The coefficient is even significant in multi-business industry. The positive responses seem not to depend on the way inflation is measured. If monthly consumer price inflation or consumer price index in levels is used as a proxy for inflation, these results still hold (these results are not reported). However, ignoring publication lags changed the inflation coefficient to negative. Furthermore, a higher-than-expected real exchange rate is bad news for most industries as expected, although these estimates failed to reach significance at conventional levels[12].

4.3. Sub-sample results: responses during different exchange rate regimes

As a preliminary step for detecting structural breaks, CUSUM tests and recursive residuals are used. Without exception, these tests show that at least one statistically significant break occurred in the Finnish stock market. This breakpoint is located at September 1992. The CHOW breakpoint (forecast) test confirmed that this break was significant in two (four) industries out of seven[13]. Therefore, the regression Equation (4) was re-estimated separately across various industries over these two different exchange rate regimes: 1987:07–1992:08 (fixed rates) and 1992:09–1996:09 (floating rates).

The sub-sample results are reported in Appendices 2 and 3. These results suggest that news jointly (H_1) has an effect on stock returns in both regimes. According to R^2C-measures, news account for about the same fraction of the market returns (some 6–7 percent) irrespective of the exchange rate regimes. Instead, across industries, the explanatory power of the regressions seems to depend on a sub-sample. Again, the signs of significant response coefficients match prior expectations for the most part. Yet, there are some differences in the magnitudes of the coefficients across industries and periods. For example, during the period 92–96, financial sectors (forest industry and multi-business industry) have their peak responses to interest rate (industrial production) news. Furthermore, banks and finance and multi-business industry show above average sensitivity to macroeconomic news during both monetary policy regimes.

During the period 92–96, stock returns seem to be more sensitive to non-monetary (H_3) news. Interest rate news turned out to be significant for financial sectors: an unexpected one-

12 However, this conclusion turns out to be premature since real exchange rate parameters change over time in several industries (e.g., banks and finance, multi-business industry, other industries, and general price index). One of the results of fitting the model, which assumes constant parameters when they are in fact variable, is low *t*-statistics (see footnote 13).

13 Initially, the estimations with a full set of slope and intercept dummies are experimented with in order to test whether any response coefficients were affected by the change in exchange rate regime. These results (not reported) indicate that the dummies for the interest rate (insurance and investment) and real exchange rate (all share price index, banks and finance, multi-business industry, and other industries) news turn out to be significant. Furthermore, average stock returns also have changed in other services and market index. Due to these significant dummies, it seems that stock market responses to interest rate and real exchange rate news depend on monetary policy regime.

percentage increase in interest rate lowers these industries by 6.8–11.9 percent, which is 5–8 times more than the market on average. Other services also respond to interest rate news, but the response is smaller in magnitude. Furthermore, the real exchange rate now has a significant effect on banks and finance, multi-business industry, and market index: an unexpected one percent depreciation increases these industries by 1.0–1.5 percent. When testing for the common response, financial (insurance and other services) sectors differ from the average market response to interest rate (real exchange rate) news at the 10 percent level.

During the sub-period 87–92, there is no obvious pattern whether service or industrial industries are more sensitive to news. When looking at individual coefficients, stock returns now respond to a broader set of news. The coefficients of industrial production, real money supply, and interest rates are as expected. For example, an unexpected one percent increase in real money supply depresses stock returns for most of the industries by about 0.5–0.8 percent, while an unexpected one percent depreciation in real exchange rate lowers stock returns by 0.6–2.1 percent. The only exception is insurance and investment, whose negative response to industrial production news seems somewhat dubious. Again, financial sectors show the strongest reactions to interest rate news.

Some evidence that stock return responses to real exchange rate news depend on the exchange rate regime was also found. Response coefficients were negative for every industry during the fixed rates. However, this no longer holds during floating rates, and the signs turn out to be positive for five industries out of seven. Moreover, forest and multi-business industries respond positively to news about industrial production for both of the sub-periods, but during the period 92–96, the price responses are some 1.5–2 times stronger. Another interesting observation is that during the floating rates, real money supply news seems to have no significant impact on stock prices.

The most interesting part of these sub-sample results is the negative relation between stocks and real exchanges rate news, which is valid for every industry. These responses are actually statistically significant for more than half of the cases. For example, an unexpected 1 percent depreciation in real exchange rate is associated with a 1.4 (2.1) percent increase (decrease) in banks and finance during the floating (fixed) exchange rate regime. This evidence indicates that stock market responses to real exchange rate news depend on exchange rate regime.

5. CONCLUSIONS

The purpose of this paper was to investigate to what extent macroeconomic news drives monthly stock returns across industries during the sample period January 1987 to September 1996. The main results are as follows. First, a systematic relationship between news and stock returns was found. Second, this relationship with respect to real exchange rate news is not constant, but varies depending on the time period considered: during the fixed rates, the responses were negative while during the floating rates, the reverse held. Third, stock returns respond primarily to monetary news, although during the floating rates, non-monetary news seems to be more important. Nevertheless, differences in measurement accuracy may explain why monetary news seems to be more important.

The switch in exchange rate regime meant that market perception regarding the monetary policy and the likely effects of the real exchange rate news on stock returns may have changed. Therefore, the results concerning real exchange rate news for the whole sample are misleading. In fact, unanticipated changes in real exchange rates are important determinants for stock market movements during the both sub-samples. The sub-sample results with respect to industrial production, real money supply, and interest rates are fundamentally the same as the whole sample estimations, although there are some variations in the magnitude of the responses across industries.

Consistent with Hardouvelis (1987), the financial sector shows the strongest reactions to interest rate news among all industries. During the floating rate regime, the responses were even significantly stronger than the market, apparently because monetary developments directly affect the cash flows of financial companies. Overall, these results suggest a common response across industries in the whole sample period, but when the sample is splitted into sub-samples, the common response for some of the industries is rejected.

As also noted by Cutler et al. (1989), the use of estimated VAR residuals, as proxies for news, may be problematic for several reasons. First, if the VARs are misspecified, residuals do not accurately reflect the value of information to market participants. Second, in reality, the appropriate information set is much richer than the one implied in this paper. If investors operate with an information set larger than that considered here, residuals might overstate the importance of news. Third, VAR does not capture any news about future macroeconomic conditions, revealed in period *t*, which is not directly reflected in that period's variables.

The estimation results suggest the difficulty of explaining as much as 11.4 percent of the market return, which is somewhat higher than previously obtained from the Finnish data employing aggregate stock market index (e.g., Lahti & Pylkkönen 1989 and Viskari 1992). Across industries, the explanatory power varies on both sides, suggesting distinct intrinsic characteristics. However, the somewhat higher explanatory power may simply reflect the fact that the data covers a very short and exceptional sample period.

In addition, due to the exceptional sample period, also the expectation-generating mechanism may have changed. This problem can be reduced by recursive estimation of VARs (see Siklos & Anusiewicz 1998). However, due to the small number of observations, this approach is not followed in the present study. Publication lags also seem to have important effects on the results. Ignoring publication lags produces inverse signs to all, but interest rates variables. This may explain the positive stock market response to higher than expected real money supply in the Finnish data reported by Viskari (1992). Nevertheless, despite using lagged values to account for lags in publication; there are still some timing issues associated with the real exchange rate news and the reflection of that piece of news on the stock market.

In this paper, several simplifying assumptions concerning the relationship between stock returns and news have been made. For example, the assumption that there is a straightforward linear relationship between news and stock returns, although widely used, can be criticized. In reality, this relationship could be, of course, a complicated non-linear form. Moreover, from the efficiency viewpoint, the results acquired in this paper do not necessarily mean either efficiency or inefficiency, since our tests are not direct tests of market efficiency. Instead, these statistical tests are joint tests of three things: the model of the relationship between macroeconomic variables and stock prices (including the sufficiency of the used information set), the measurement of all included variables, and market efficiency. The low explanatory power is probably due to all of them, and there is no way to determine their relative importance based on the results reported in this paper.

Likewise, the fact that stock returns do not respond systematically to inflation news does not necessarily mean that inflation shocks are an unimportant determinant of stock returns. It might simply be that the VAR at a monthly frequency is an inferior way to measure news. Monthly data involves much noise and other effects that may mask the impacts of news on stock returns. Therefore, an alternative way to measure news about macroeconomic indicators is to use survey data on expectations. So far, the problem is the lack of suitable data, but in the future, this would have the advantage of applying the higher frequency data.

Although news jointly seem to be an important determinant of stock returns, the fact that most of the variation in returns cannot be explained using economic information (e.g., see Cutler et al. 1989) remains. Therefore, the central question in interpreting this evidence is whether the unexplained return movements are due to omitted news about future cash flows and discount rates, or to other factors, that may not affect expectations of these variables.

Cutler et al. (1989) and Orphanides (1992) have documented approximately the same magnitude of explanatory power for monthly aggregate returns despite using a broader information set. Hence, adding more fundamentals into the analysis does not seem to be a fruitful path for the future research. Instead, extending the traditional approach into a more realistic modeling strategy by allowing, for example, asymmetric responses could give us some further insight about how Finnish stock prices are priced with respect to macroeconomic news. Finally, non-economic news like elections or international military and other conflicts may also have an impact on equity market risk premium and thus on the pricing of the Finnish stocks. ■

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APPENDIX 1. Stock market reactions to macroeconomic news (1987:09–1996:09, *n* = 117)

$$R_{it} = \alpha_i + \beta_{1i}\hat{e}_t^{ip} + \beta_{2i}\hat{e}_t^{m1} + \beta_{3i}\hat{e}_t^{H3} + \beta_{4i}\hat{e}_t^{\pi} + \beta_{5i}\hat{e}_t^{s} + u_{it}$$

Industry	β_{1i}	β_{2i}	β_{3i}	β_{4i}	β_{5i}	R^2C	DW	H_1:	H_2:	H_3:
Banks and finance	0.223	–0.436	–0.066***	1.919	0.359	0.128	2.085	4.320***	7.163***	0.470
	(0.880)	(–1.382)	(–2.806)	(1.265)	(0.432)			[0.001]	[0.000]	[0.626]
Insurance and investment	0.278	–0.647**	–0.073***	–0.239	–0.170	0.155	1.998	2.668**	4.281***	0.706
	(1.167)	(–2.023)	(–2.728)	(–0.188)	(–0.225)			[0.026]	[0.007]	[0.496]
Other services	0.392**	–0.483*	–0.037***	3.507	–0.400	0.104	1.816	4.225***	6.662***	2.923*
	(2.067)	(–1.815)	(–3.324)	(0.552)	(–1.140)			[0.002]	[0.000]	[0.058]
Metal and engineering	0.361*	–0.610**	–0.016	1.708	–0.144	0.024	2.004	1.689	2.512*	1.689
	(1.838)	(–2.057)	(–1.240)	(1.345)	(–0.315)			[0.144]	[0.063]	[0.189]
Forest industries	0.690***	–0.478	–0.009	2.516	0.287	0.060	1.825	3.762***	4.301***	6.139***
	(3.304)	(–1.331)	(–0.707)	(1.590)	(0.741)			[0.004]	[0.007]	[0.003]
Multi-business industry	0.928***	–0.947***	–0.026	2.490**	0.295	0.149	1.810	5.902***	9.474***	6.083***
	(3.473)	(–2.713)	(–1.519)	(2.041)	(0.574)			[0.000]	[0.000]	[0.003]
Other industries	0.284	–0.515	–0.039***	–0.343	–0.068	0.082	2.092	3.929***	5.032***	0.626
	(1.116)	(–1.609)	(–3.775)	(–0.298)	(–0.135)			[0.004]	[0.003]	[0.537]
HEX all share index	0.570***	–0.686**	–0.029**	1.208	0.166	0.114	1.812	4.161***	6.642***	4.035**
	(2.805)	(–2.542)	(–2.161)	(1.188)	(0.379)			[0.002]	[0.000]	[0.020]

Note: Independent variables are industrial production (ip^u), real money supply ($m1^u$), three-month helibor rate ($H3^u$), annual inflation rate (π^u), and real exchange rate (s^u). They are proxied by the VEC residuals. *t*-values (in parenthesis) and *F*-values [*p*-values in square brackets] are corrected for heteroscedasticity and autocorrelation by using the Newey-West (1987) procedure. Coefficients that are significantly differently from the market are shown in bold. R^2C is the coefficient of determination adjusted for degrees of freedom. DW is Durbin – Watson statistic. H_1 is the null hypothesis that all slope coefficients are jointly zero; H_2 and H_3 are similar for monetary ($m1^u$, $H3^u$, and π^u) and non-monetary (ip^u and s^u) coefficients, respectively. *, **, and *** denote significance at the 10 %, 5 %, and 1 % level, respectively.

APPENDIX 2. Stock market reactions to macroeconomic news during fixed rates (1987:07–1992:08, *n* = 62)

$$R_{it} = \alpha_i + \beta_{1i}\hat{e}_t^{ip} + \beta_{2i}\hat{e}_t^{m1} + \beta_{3i}\hat{e}_t^{H3} + \beta_{4i}\hat{e}_t^{\pi} + \beta_{5i}\hat{e}_t^{s} + u_{it}$$

Industry	β_{1i}	β_{2i}	β_{3i}	β_{4i}	β_{5i}	R^2C	DW	H_1:	H_2:	H_3:
Banks and finance	0.085	–0.462	–0.043*	0.743	**–2.132******	0.167	1.333	11.340***	9.114***	10.448***
	(0.327)	(–1.653)	(–1.811)	(0.699)	(–3.909)			[0.000]	[0.000]	[0.626]
Insurance and investments	**–0.169**	–0.494*	–0.035	**–1.310**	–1.661**	0.032	1.482	1.887	1.087	2.317
	(–0.616)	(–1.700)	(–1.217)	(–1.064)	(–2.126)			[0.111]	[0.362]	[0.108]
Other services	0.218	–0.564**	–0.026**	0.196	–0.615*	0.041	1.668	3.394**	4.814***	3.065*
	(1.014)	(–2.124)	(–2.166)	(0.185)	(–1.892)			[0.010]	[0.005]	[0.055]
Metal and engineering	0.353	–0.554**	–0.003	2.662**	–0.498	0.065	1.719	3.601***	4.944***	1.819
	(1.500)	(–2.220)	(–0.194)	(2.561)	(–0.991)			[0.007]	[0.004]	[0.172]
Forest industries	0.453*	–0.568	–0.007	1.457	**–0.159**	0.000	1.522	1.807	2.221*	2.103
	(1.954)	(–1.672)	(–0.362)	(0.959)	(–0.389)			[0.126]	[0.096]	[0.132]
Multi-business industry	0.622**	–0.775**	–0.022	2.712*	–0.871	0.080	1.683	5.819***	6.814***	3.856**
	(2.120)	(–2.026)	(–0.959)	(1.929)	(–1.567)			[0.000]	[0.001]	[0.027]
Other industries	0.194	–0.430	–0.036**	–0.439	–1.374***	0.105	2.063	3.257**	2.077	5.144***
	(0.695)	(–1.151)	(–2.382)	(–0.313)	(–3.073)			[0.012]	[0.114]	[0.009]
HEX all share index	0.371*	–0.594**	–0.021	1.205	–0.957**	0.062	1.587	4.235***	4.321***	4.719**
	(1.685)	(–2.032)	(–1.129)	(1.129)	(–2.251)			[0.002]	[0.008]	[0.013]

Note: Independent variables are industrial production (ip^u), real money supply ($m1^u$), three-month helibor rate ($H3^u$), annual inflation rate (π^u), and real exchange rate (s^u). They are proxied by the VEC residuals. *t*-values (in parenthesis) and *F*-values [*p*-values in square brackets] are corrected for heteroscedasticity and autocorrelation by using the Newey-West (1987) procedure. Coefficients that are significantly differently from the market are shown in bold. R^2C is the coefficient of determination adjusted for degrees of freedom. DW is Durbin – Watson statistic. H_1 is the null hypothesis that all slope coefficients are jointly zero; H_2 and H_3 are similar for monetary ($m1^u$, $H3^u$, and π^u) and non-monetary (ip^u and s^u) coefficients, respectively. *, **, and *** denote significance at the 10 %, 5 %, and 1 % level, respectively.

APPENDIX 3. Stock market reactions to macroeconomic news during floating rates (1992:09–1996:09, *n* = 49)

$$R_{it}=\alpha_i+\beta_{1i}\hat{e}_t^{ip}+\beta_{2i}\hat{e}_t^{m1}+\beta_{3i}\hat{e}_t^{H3}+\beta_{4i}\hat{e}_t^{\pi}+\beta_{5i}\hat{e}_t^{s}+u_{it}$$

Industry	β_{1i}	β_{2i}	β_{3i}	β_{4i}	β_{5i}	R^2C	DW	H_1:	H_2:	H_3:
Banks and finance	0.030	–0.679	**–0.068*****	1.976	1.396*	0.099	2.335	7.143***	4.345***	2.016
	(0.051)	(–0.685)	(–2.953)	(0.535)	(1.867)			[0.000]	[0.009]	[0.146]
Insurance and investments	1.046**	–1.498	**–0.119*****	–1.659	**–0.524**	0.278	2.274	24.251***	19.131***	2.583*
	(2.270)	(–1.273)	(–5.747)	(–0.479)	(–0.767)			[0.000]	[0.000]	[0.087]
Other services	0.454	0.206	–0.039**	–0.010	**–0.363**	0.018	2.163	3.981***	1.919	1.267
	(1.499)	(0.307)	(–2.253)	(–0.004)	(–0.642)			[0.005]	[0.141]	[0.291]
Metal and engineering	0.190	–0.206	–0.024	–2.465	0.112	0.000	2.208	1.827	0.652	0.147
	(0.415)	(–0.217)	(–1.018)	(–0.662)	(0.132)			[0.127]	[0.586]	[0.864]
Forest industries	0.849*	–0.117	0.006	**4.767**	0.579	0.045	2.065	2.606**	1.604	3.288**
	(1.759)	(–0.124)	(0.252)	(1.613)	(0.816)			[0.038]	[0.204]	[0.047]
Multi-business industry	0.981***	–1.035	0.009	0.7781	1.522***	0.163	1.946	5.528***	0.809	7.276***
	(2.210)	(–1.488)	(0.657)	(0.301)	(2.880)			[0.001]	[0.495]	[0.002]
Other industries	0.264	–0.835	–0.023	–1.659	0.827	0.001	2.012	8.175***	0.990	1.145
	(0.488)	(–0.900)	(–1.107)	(–0.660)	(1.077)			[0.000]	[0.406]	[0.327]
HEX all share index	0.598	–0.731	–0.014	–0.414	0.985*	0.066	1.946	7.299***	0.693	4.945**
	(1.423)	(–0.949)	(–1.103)	(–0.158)	(1.883)			[0.000]	[0.561]	[0.012]

Note: Independent variables are industrial production (ip^u), real money supply ($m1^u$), three-month helibor rate ($H3^u$), annual inflation rate (π^u), the real exchange rate (s^u). They are proxied by the VEC residuals. *t*-values (in parenthesis) and *F*-values [*p*-values in square brackets] are corrected for heteroscedasticity and autocorrelation by using the Newey-West (1987) procedure. Coefficients that are significantly differently from the market are shown in bold. R^2C is the coefficient of determination adjusted for degrees of freedom. DW is Durbin – Watson statistic. H_1 is the null hypothesis that all slope coefficients are jointly zero; H_2 and H_3 are similar for monetary ($m1^u$, $H3^u$, and π^u) and non-monetary (ip^u and s^u) coefficients, respectively. *, **, and *** denote significance at the 10 %, 5 %, and 1 % level, respectively.