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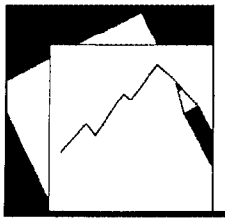

IMF Working Paper

Macroeconomic News and Stock Returns in the United States and Germany

Norbert Funke and Akimi Matsuda

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Macroeconomic News and Stock Returns in the United States and Germany

Prepared by Norbert Funke and Akimi Matsuda[1]

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Abstract

Using daily data for the January 1997 to June 2002 period, we analyze the impact of a broad set of macroeconomic news on stock prices in the United States and Germany. With GARCH specifications we test five hypotheses and find that news on real economic activity has a significant impact on stock prices. The effects vary between different types of stocks and depend on the state of the economy. In a boom period, bad economic news may be good news for stock prices. For German stock prices, international news is at least as important as domestic news. The analysis of bihourly data suggests that the main effect occurs within a short period of time.

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Authors' e-mail addresses: nfunke@imf.org; am736@nyu.edu

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I. INTRODUCTION

Daily comments in financial media suggest that stock prices are highly sensitive to macroeconomic news. Market analysts often explain stock market movements with surprise announcements from government or central bank releases of economic data. To the outside observer, arguments used in the financial press to explain the daily ups and downs of stock prices may sometimes appear puzzling. For example, on one occasion, market analysts report that stock prices are falling because of disappointing unemployment news. On another occasion, the public learns that stock prices are on the rise, because unemployment is higher than anticipated, thus leading to expectations that interest rates may soon decline. It is easy to identify numerous similar examples (see Table 1).

Both from a trader's and investor's perspective, and from the perspective of a policymaker, a good understanding of the reaction of stock prices to macroeconomic news is important. It helps traders to better gauge the likely impact of news and to reallocate their portfolio accordingly. It gives some guidance to policymakers, on how stock markets react, for example, to unexpected changes in official interest rates. This is an important consideration for policymakers, if asset price developments matter for their policymaking.

Theoretical considerations suggest that the link between macroeconomic news and stock prices is indeed complex. Most empirical studies in this area focus on the United States and broad market indices. In contrast to previous studies, we explicitly derive and test five hypotheses on the link between macroeconomic news and stock prices. The hypotheses relate to the fact that the impact may depend on the type of stock, the state of the economy, and the integration of the country into the world economy. Unlike most previous studies, we also look at one European market and linkages between the U.S. and the German stock market. In addition, the focus of the analysis is on the January 1997–June 2002 period.

Table 1: Selected Press Reports on Stock Movements

U.S. stocks rise after surprisingly strong GDP rise (Reuters, 28 February 2002)	*U.S. stocks rose Friday after a report showing the economy grew at a surprisingly slow rate this summer* (CNN Money, 27 October 2000)
A soft GDP number unnerve markets as dismal July comes to a close (CNN Money, 31 July 2002)	*...markets climbed to record levels Thursday in reaction to a government report that showed the U.S. economy moderating* (CNN Money, 3 July 1997)
Weak reports on manufacturing and labor knocked stocks lower (CNN Money, 1 August 2002,)	*...stocks fall on unexpected decline in March jobless rate* (Bloomberg, 8 April 1999).
Stocks surge after central bank cuts interest rates in surprise move (CNN Money, 15 October 1998)	*U.S. stocks surge along with rate hike* (CNN Money 16 May 2000)

This phase is of particular interest, as economic conditions and stock market developments varied importantly between the first half and the second half of this period. The stock market boom and economic expansion were common characteristics of the first half of the period, while economic slowdown and less favorable stock market developments characterized the latter period.

Section II gives a brief overview of theoretical considerations, presents five hypotheses on the link between macroeconomic news and stock prices, and reviews existing empirical investigations in light of these hypotheses. Section III describes the data set and analyzes the characteristics of the news. Section IV presents new empirical evidence for our five hypotheses. Section V draws some broad conclusions.

II. A Brief Review of the Literature

A. Theoretical Considerations: Five Hypotheses

The efficient market hypothesis suggests that security prices embed all available information. Prices respond only to true news. For example, if the authorities' announcement of the latest growth rate for quarterly GDP is identical to market expectations, stock prices should not respond to the announcement. Only the unexpected part of an announcement, that is, the surprise element, represents true news and is expected to have an impact on stock prices. In this paper, news relates to the surprise element of the announcement.

Macroeconomic news has an impact on stock prices if the news has an impact on the determinants of stock prices. According to standard theoretical models, stock prices (P_t) reflect the present discounted value of expected future earnings/dividends (d) given information available at the time t (Ω_t):

$$P_t = E\left(\sum_{\tau=1}^{\infty} \frac{d_{t+\tau}}{1+_t r_{t+\tau}} \,|\Omega_t\right),$$

with the discount rate (r_t) consisting of two components—the risk-free rate and the risk premium (see e.g., Duffie, 2001). Therefore, conceptually "three primitive factors" (Boyd, Jagannathan, Hu, 2001) have an important influence on stock prices—the risk-free rate of interest, growth expectations, that is, the expected growth rate of corporate earnings/dividends, and the equity risk premium. Macroeconomic news that conveys information on one or more of these "three primitive factors" may thus be expected to have an impact on stock prices, for example, higher-than-expected GDP growth may lead to a revision of growth expectations and thus lead to an upward pressure on stock prices. In contrast, higher-than-expected interest rates may result in an increase of the discount factor and thus lead to downward pressure on prices. The effects are difficult to predict if news affects more than one of the three factors. This intuitive explanation allows us to derive five hypotheses:

1. *The effects depend on the type of news*. Economic news that conveys direct information on one or more of the three factors may be expected to have a more significant impact on stock prices than news that is only vaguely linked to one or more of these factors. For example, interest rate news may play an important role, as unexpected interest rate changes have a direct, first-order impact on the discount factor. News that conveys clear information on growth expectations (e.g., GDP news) may also be expected to have a strong impact on stock prices. On the other hand, current-account news may be more difficult to characterize, thus the impact may be less clear.

2. *The impact of news varies with the type of stock*. For example, news related to GDP growth expectations may have a stronger impact on cyclical stocks (i.e., stocks where earnings are particularly sensitive to fluctuations in macroeconomic growth) than noncyclical stocks. Likewise, the impact may differ between old economy and new economy stocks.

3. *The impact of news depends on the state of the economy* (see also Veronesi, 1999). News may convey conflicting information on more than one of the three primitive factors in different states of the economy. For example, rising unemployment is generally a bad signal for economic growth and thus most likely also for investors' growth expectations. However, rising unemployment may also have an impact on interest rate expectations, which in turn may depend on the state of the economy. The impact on interest rates may be negligible in contractions, in particular if interest rates are already very low. Thus, in this case, rising unemployment may be bad news for stock prices. However, during expansions, higher-than-expected unemployment may lead to a downward revision of future interest rates. Therefore, the net impact of lower growth expectations and lower future interest rates is a priori indeterminate and may even be positive.

4. *Just like domestic news, foreign news is expected to have an impact on stock prices*. In an increasingly integrated world economy, changes in the macroeconomic environment of a large country may have an impact on growth expectations in neighbor countries or in countries that are closely linked through trade and capital flows. For example, economic news related to the U.S. economy may be expected to have an impact on developments in other markets.

5. *The impact of news occurs within a short period of time*. Theory suggests that an adjustment to news is almost instantaneous. Market prices reflect the new set of available information rapidly, or as fast as the institutional environment will allow. Also, macroeconomic news is only one specific type of news and market participants will constantly adjust their views in light of other incoming information, be it of an economic, political, or company-specific nature.

B. Empirical Studies

Most empirical studies focus on the United States and use daily data.[2] The almost unanimous finding of early empirical analyses in the late 1970s and 1980s is that unexpected high money growth, unexpected increases in interest rates, and higher-than-expected inflation tend to lower stock prices. Most early analyses find only a weaker effect of nonmonetary news (e.g., Hardouvelis, 1986; Jain, 1988). Floros and Tsetsekos (1996), Farber and Hallock (1999 a, b), and Rapach (2001) show that surprise announcements of selected real economic news, such as surprise announcements of GDP growth rates, unemployment, and consumer and business confidence measures also have a significant impact on stock prices.

Limited evidence exists on the second hypothesis regarding whether macroeconomic news has a different impact on various types of stocks. Hardouvelis (1986) presents evidence that stocks of financial institutions are particularly sensitive to financial news. Li and Hu (1998) show that small cap stocks are less sensitive to macroeconomic news than large cap stocks. Looking at the impact of U.S. trade deficit news on individual automakers in the United States and Japan, Sun and Tong (2000) show that the news has a negative effect on Japanese automobile American Depository Receipts (ADRs) and no significant effect on the U.S. counterparts.

In line with our third hypothesis, the impact of nonmonetary news becomes stronger when the state of the economy is taken into account. McQueen and Roley (1993) find a stronger relationship between macroeconomic news and stock prices when taking into account the situation of the economy in the business cycle. Similar news can have asymmetric effects on stock prices depending on the phase of the business cycle. Boyd, Jagannathan, and Hu (2001) present evidence that the impact of unemployment news is asymmetric. During contractions, stock prices respond negatively to news of rising unemployment. During expansions stock prices respond positively to an increase in unemployment. In the latter case, according to their argument, the effect on stock prices of a downward revision of interest rates is stronger than the effect of a downward revision of growth expectations.

Limited evidence exists on international spillovers of news, in particular for stocks. Bailey (1989) shows that M1 releases in the United States are important for Canada's financial markets. The magnitude of the effect is smaller than the corresponding effect in the United States. Tandom and Urich (1987) show that positive U.S. money-supply surprises, or unanticipated increases in producer prices, have a positive significant effect on Eurocurrency interest rates, and a negative impact on spot exchange rates (implying a dollar appreciation).

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[2] A number of comparable studies analyze the impact of news on other financial variables, such as interest rates and exchange rates. See, for example, Hand, Holthausen and Leftwich (1992); Ederington and Lee (1993); Krueger (1996); and Fleming and Remolona (1999 a, b).

Using high-frequency data, Fleming and Remolona (1999b) show that the response of U.S. treasury yields to different types of macroeconomic news occurs within a short period of time. The major market reaction occurs within two minutes after the announcement. Trading volume remains significantly higher for about 90 minutes.

III. Daily Stock Returns and Macroeconomic News

A. The Sample and Data

The following analysis looks at the reaction of stock returns to a large set of macroeconomic variables in the United States and Germany. The sample period is January 1997–June 2002. The starting dates coincide with the systematic availability of market survey data in Bloomberg.

Stock market data are from Datastream. During most of the analysis, stock market data refers to the daily percentage change in the closing values of a number of different stock market indices (total return indices). Changes are calculated as logarithmic differences multiplied by 100. In the last part of the analysis, we use bihourly data for the German Dax index.

We consider 27 different types of macroeconomic news for the United States and 12 different kinds of news for Germany (Table 2, Appendixes 1 and 2). The news relate to three different areas: (i) news about the actual development of the real sector (e.g., capacity utilization, GDP growth); (ii) news that serves as leading indicators (e.g., consumer and business confidence measures); and (iii) news on interest rates and prices. Macroeconomic news is derived from information provided by Bloomberg, and in the case of the federal funds rate, it derives from data provided by Money Market Services International.[3] Macroeconomic news is obtained by comparing macroeconomic announcements of key economic indicators to market expectations prior to the announcement. Typically, macroeconomic indicators are released at precisely identifiable times. In most cases, the precise dates and times are known well in advance. Therefore, the market anticipates these announcements and forms its expectations. Most of the data is announced as a percent change from the previous month (MoM, percent) or as an index number, as in the case of confidence measures. In this case, we define news as the percentage point difference between actual data and median survey data. If data are announced in levels, as for example, in the case of construction, we convert the announcement into percentage change from the actual level of the previous month.

[3] We thank Louis Radovich from Money Market Service International for providing us with the historic time series of market expectations of federal funds rates.

Table 2: United States and Germany: Survey Data of Selected Macroeconomic News

United States			Germany
Business inventory	GDP final	Personal spending	Consumer prices
Capacity utilization	GDP preliminary	Producer prices	GDP growth
Chicago purchasing manager's index	Housing starts	Retail sales	IFO business climate survey
Construction spending	Industrial production	Trade balance	Industrial production
Consumer confidence	Leading indicator	Unemployment rate	Import price index
Consumer credit	National survey of purchasing managers	Wholesale prices	Interest rates (main refinancing rate, ECB)
Consumer prices	New single family home sales		Manufactoring orders
Durable goods orders	Nonfarm payroll change		Producer prices
Employment costs	Personal income		Retail sales
Fed funds target	Fed. Res. Bank of Philadelphia Index		Trade balance
GDP advance			Unemployment
			Wholesale prices

This table lists the macroeconomic indicators for which survey data are published regularly and which we use in our analysis.

Source: Bloomberg

Most of the data is made public on a monthly basis; in some cases, announcements take place at a lower frequency. For example, the Federal Open Market Committee (FOMC) meets eight times per year on dates announced in advance to the public. Occasionally, however, changes are also made between preannounced meetings. In this case, the change in the interest rates is also considered as news.

B. Are Market Expectations Unbiased?

Under the efficient market hypothesis, only truly new information has an impact on stock prices. To this end, it is also important to establish that news is unbiased. Table 3 reports some basic characteristics of the news. The first three columns show the maximum, the minimum, and the mean of the news. The fourth and fifth columns report results for a test of the null hypothesis where the mean of the news is equal to zero against the two-sided alternative that the mean is not equal to zero. We present t-statistics and the marginal significance level (p-value). If this p-value is less than 0.05, we reject the null hypothesis.

In almost all cases, the hypothesis that the surprise component (i.e., the difference or the percentage difference between actual data and median survey data) is expected to be zero cannot be rejected at conventional levels, thus indicating that news is unbiased. We also do not find evidence for autocorrelation in the news. We will treat the survey data as rational expectations of future announcements.

C. Motivation

To get a first impression on the link between macroeconomic news and stock prices, we look at the stock market's reaction to big surprise announcements of key economic indicators. Figure 1 compares, for the United States and Germany, the average daily returns of the five largest surprise announcements of selected economic indicators, with the average daily stock returns of announcement days.

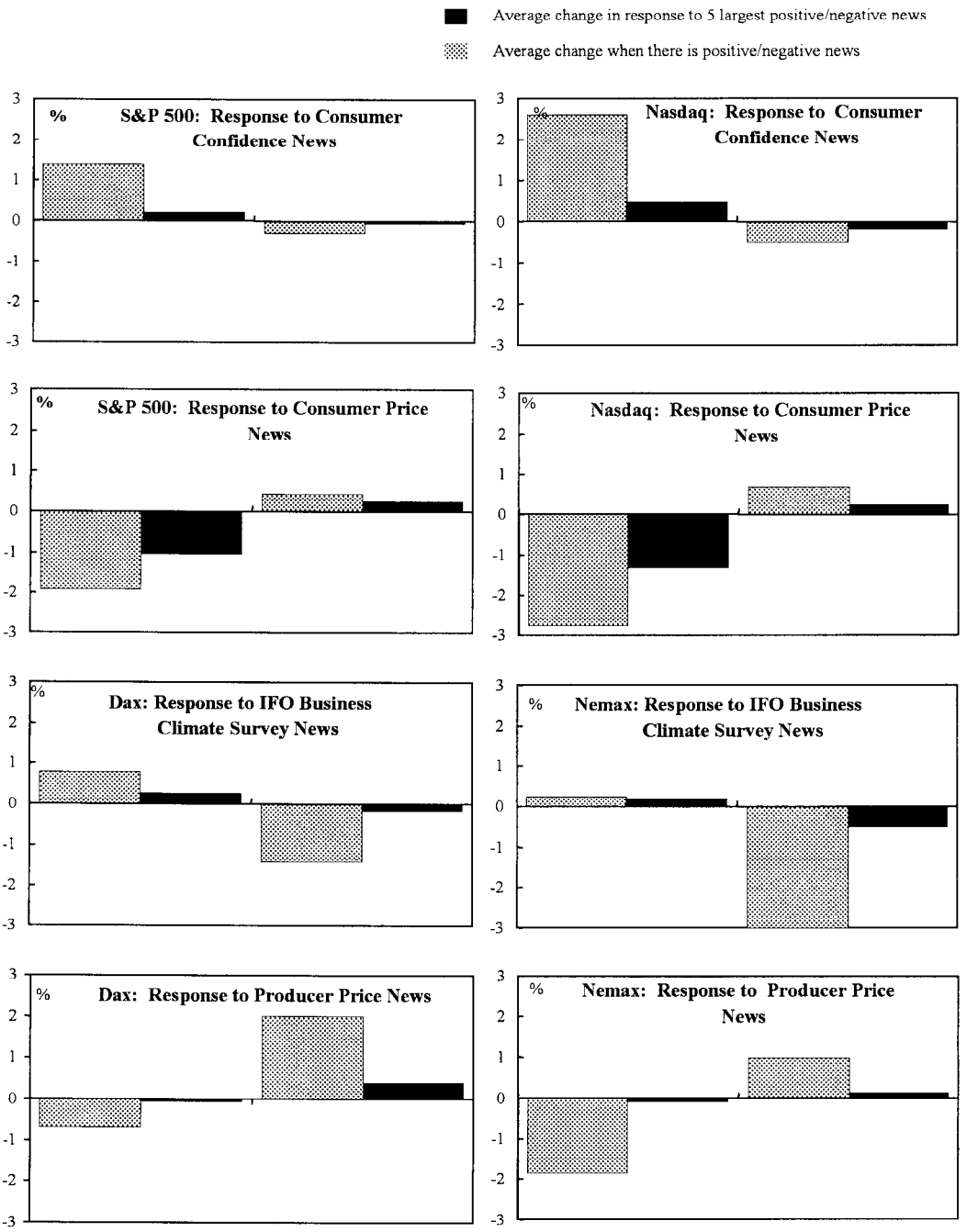
The graphs give a first indication that stock returns respond positively to positive news on business consumer confidence and negatively to higher-than-expected inflation rates. In turn, returns respond negatively to lower-than-expected confidence measures and positively to lower-than-expected inflation. For example, the five largest positive news with respect to consumer confidence in the United States were on average accompanied by a more than 1 percent increase of the S&P 500, and a more than 2 percent increase of the Nasdaq composite index. The five largest negative surprises with respect to the IFO business climate index were accompanied by a 1.5 percent decrease of the Dax and a 3 percent decline of the Nemax.

Table 3: Characteristics of Macroeconomic News

Variables	Unit	Max	Min	Mean	Test Results 2/ t-statistics	p-value 3/
			United States			
Business inventory	MoM, %	0.60	-0.80	0.02	0.94	0.35**
Capacity utilization	%	0.70	-0.60	0.002	1.17	0.24**
Chicago purchasing manager's index	Index	7.81	-8.51	0.003	0.15	0.88**
Construction spending	MoM, %	2.50	-2.70	0.20	1.39	0.17**
Consumer confidence	Index	12.20	-10.60	0.03	1.11	0.27**
Consumer credit	Billion of $	15.10	-12.20	0.05	1.60	0.11**
Consumer prices	MoM, %	0.30	-0.30	-0.02	-1.20	0.24**
Durable goods orders	MoM, %	10.80	-7.20	0.23	0.62	0.54**
Employment cost index	QoQ,%	0.40	-0.40	-0.02	-0.43	0.67**
Federal funds rate	%	0.25	-0.50	-0.29	1.99	0.09**
GDP advance	QoQ,%	1.40	-1.10	0.52	3.21	0.01
GDP final	QoQ,%	0.50	-1.60	-0.04	-0.46	0.65**
GDP preliminary	QoQ,%	1.80	-0.40	0.14	1.41	0.17**
Housing starts	in Thousand	849	-171	1.84	2.08	0.04**
Industrial production	MoM, %	0.70	-0.50	0.02	0.59	0.56**
Unemployment rate	%	0.30	-0.30	0.001	-1.81	0.07**
Leading indicators	MoM, %	0.40	-0.08	0.01	0.15	0.88**
NAPM survey	Index	3.90	-4.70	0.001	-0.01	0.99**
New single-family home sales	in thousand	120	-139	0.41	1.35	0.18**
Nonfarm payroll	in thousand	188	-269	-0.72	-1.18	0.24**
Personal income	MoM, %	0.70	-0.40	0.06	2.61	0.01
Philadelphia index	Index	19.80	-30.70	-0.31	-0.25	0.81**
Producer prices	MoM, %	0.80	-1.20	-0.07	-1.62	0.11**
Personal spending	MoM, %	0.60	-0.80	0.03	1.24	0.22**
Retail sales	MoM, %	4.60	-1.60	0.03	0.30	0.77**
Trade balance	Billion of $	6.10	-3.90	-0.12	-0.48	0.64**
Wholesale prices	MoM, %	1.60	-1.00	0.07	1.17	0.25**
			Germany			
Consumer prices	MoM, %	0.40	-0.20	0.19	1.19	0.23**
GDP	QoQ, %	0.30	-0.40	-0.02	-0.56	0.56**
IFO survey	Index	2.10	-3.40	0.01	-1.28	0.20**
Industrial production	MoM, %	3.00	-3.60	-0.32	-2.01	0.04
Imported prices	MoM, %	1.30	-1.60	0.07	1.24	0.22**
Interest rate	%	0.25	-0.50	0.02	1.07	0.29**
Manufacturing order	MoM, %	5.40	-4.10	0.29	1.31	0.19**
Producer prices	MoM, %	0.90	-0.60	0.00	0.04	0.96**
Retail sales	MoM, %	7.80	-7.20	-0.02	-1.90	0.06**
Trade balance	Bn of DM	6.70	-8.70	0.03	1.82	0.07**
Unemployment rate	MoM, %	2.24	-2.83	-0.05	-0.51	0.61**
Wholesales prices	MoM, %	1.40	-1.20	0.05	0.73	0.46**

1/ News is defined as the difference between the announced value of an indicator and the median of market expectations.
2/ The null hypothesis is that the sample mean is equal to 0.
3/ ** The null hypothesis cannot be rejected at the 5 percent significance level.

Figure 1. United States and Germany: Macroeconomic News and Stock Prices



Sources: Bloomberg, Datastream, and authors' calculations.

IV. The Impact of News

A. Basic Estimation—News and Different Types of Stocks

The empirical analyses center around five hypotheses. Most earlier analyses used standard OLS regression techniques. However, an appropriate estimation procedure has to take account of two potential characteristics of the stock market return data: volatility clustering and the possibility of asymmetries in stock market data. Volatility clustering implies that large changes in returns are followed by further large changes. Asymmetries refer to the fact that negative innovations to stock returns tend to increase volatility more than positive innovations of the same magnitude. Various specifications of generalized autoregressive conditional heteroskedasticity (GARCH) models take these features into account. In a standard GARCH(1,1) model the mean equation is a function of exogenous variables (X) with an error term u_t:

$$y_t = X_t' b + u \cdot$$

The specification of the conditional variance is consistent with a forecast of this period's variance (σ^2_t) on the basis of a long-term average (the mean, ω), the forecast of the variance from the last period (the GARCH term, σ^2_{t-1}), and information about volatility in the previous period (the ARCH term, u^2_{t-1}) :

$$\sigma_t^2 = \omega + \alpha\sigma_{t-1}^2 + \beta u_{t-1}^2 \cdot$$

This standard model is symmetric in that negative and positive shocks have the same effect on volatility. In contrast to linear GARCH models, nonlinear models allow for an asymmetric reaction of volatility to good and bad innovations. One of the most popular models in this class is the exponential GARCH (EGARCH) model, first proposed by Nelson (1991). The specification for the conditional variance can be represented as:

$$\log\sigma_t^2 = \omega + \alpha\log\sigma_{t-1}^2 + \beta\left|\frac{u_{t-1}}{\sigma_{t-1}}\right| + \gamma\frac{u_{t-1}}{\sigma_{t-1}} \cdot$$

This model assumes that the leverage effect is exponential as the left hand side is the logarithm of the conditional variance. The impact is asymmetric if $\gamma \neq 0$.

Based on initial tests we found evidence for asymmetries in U.S. and German stock market data. Based on the Akaike information criterion and the Schwartz criterion, we finally choose an EGARCH (1,1) specification. The benchmark model is:

$$dP_t = \alpha + X_t^e b + u_t,$$

where dP_t represents the change in the logarithm of the stock price index from the market close of business day, to the market close of previous business day, multiplied by 100. The variable X_t^e is the vector of news, that is, the unanticipated component of each announcement.[4] For news occurring before or whilst the stock market is open, the daily change of "today's closing price" versus "yesterday's closing price" is used. For news occurring after the stock market is closed, we analyze the changes of the next day. We also include a dummy for the events of September 11, 2001, which is set to 1 during the two following weeks.

Tables 4 and 5 report results, for the United States and Germany, for five different indices. In each case, we analyze a total market index, and two well publicized national indices—one that focuses on traditional stocks and one that focuses on high-growth and new economy stocks. For the United States, the two indices are the S&P 500 and the Nasdaq composite index. For Germany, we choose the Dax 30 and the Nemax 50 index. In addition, we use two level-three total return indices from Datastream that track cyclical and noncyclical stocks. Cyclical stocks are expected to be more closely linked to real economic developments than noncyclical stocks. Cyclical goods mainly include stocks from the automobile sector and households goods. Cyclical services comprise, for example, the transportation sector, retailers and leisure, entertainment and hotels. Noncyclical consumer goods include the food and beverage sector, health care, personal care products, and tobacco. We present Bollerslev-Wooldridge robust standard errors.

In line with our first hypothesis and previous findings for the United States, results suggest that only a subset of real sector news has a statistically significant impact on stock returns. For broad market indices only news related to inflation has a significant impact on stock prices. In the United States and Germany, higher-than-expected inflation rates tend to reduce stock prices. One explanation is that higher-than-expected inflation may lead to the expectation of more restrictive future monetary policies and thus to a fall in equity prices.

The second hypothesis states that macroeconomic news may have different effects on different types of stocks. The last three columns of Tables 4 and 5 show results for high-growth and new economy stocks and for cyclical and noncyclical stocks. Compared to broad market indices, the estimates for Nasdaq and Nemax stocks reveal only small differences. However, in line with theoretical predictions, macroeconomic news plays a more

[4] An analysis of the pairwise correlations of news showed that in almost all cases correlations are close to zero.

Table 4: Macroeconomic News and Daily Stock Returns in the United States

	Total Market	S&P 500	Nasdaq	Cyclical Stocks (Services)	Noncyclical Stocks (Goods)
Constant	0.0089	-0.0008	0.0442	0.0200	-0.0125
	(0.0283)	(0.0285)	(0.0418)	(0.0301)	(0.0292)
Consumer prices	-3.6579**	-3.8173**	-3.5849	-3.5530**	-3.454**
	(1.6521)	(1.6499)	(2.2285)	(1.6579)	(1.4499)
GDP preliminary	0.3456	0.4133	0.3146	1.0303**	0.8070
	(0.6356)	(0.6129)	(0.7350)	(0.4966)	(0.5811)
Retail sales	0.0544	0.0395	0.2874	0.3165**	-0.0988
	(0.0088)	(0.0825)	(0.2285)	(0.1339)	(0.0964)
Wholesale prices	-0.5275***	-0.5437***	-0.5714**	-0.5912***	-0.5605**
	(0.1723)	(0.1774)	(0.2300)	(0.1902)	(0.2203)
Dummy 9/11	-1.0355**	-1.0044**	-2.0807**	-2.9757	-0.3307
	(0.4264)	(0.4356)	(1.3027)	(2.1731)	(0.3490)
Dependent variable (-1)	-	-	-	0.0487**	0.0579**
				(0.0278)	(0.0284)
Number of observations	1433	1433	1433	1433	1433
Adj. R2	0.007	0.007	0.004	0.019	0.003
Durbin Watson (D.W.)	1.99	2.03	2.00	1.86	1.94
Q-Stat (5)	4.60	3.41	1.09	6.65	8.97
Arch (1), F-statistic	0.30	0.01	0.43	0.68	2.70
Arch (5), F-statistic	0.72	1.33	1.08	1.38	2.10*

Note: The dependent variable is the daily change of the corresponding stock price index. The sample period is January 1, 1997 – June 30, 2002. Regressions include all 27 types of U.S. news. Except for the constant, explanatory variables are only reported in the table if they are significant at conventional levels for at least one index. Bollerslev-Wooldrige robust standard errors are in parenthesis.
*** Significant at the 1% significance level.
** Significant at the 5% significance level.
* Significant at the 10% significance level.

Table 5. Macroeconomic News and Daily Stock Returns in Germany

	Total Market	DAX	Nemax	Cyclical Stocks (Goods)	Noncyclical Stocks (goods)
Constant	0.0493	0.0395	-0.0627	0.0487	0.0476*
	(0.0272)	(0.0341)	(0.0698)	(0.0380)	(0.0250)
Producer prices	-1.3114**	-1.4007**	-2.1936**	-1.4016**	-0.5618
	(0.5530)	(0.6826)	(1.0589)	(0.5552)	(0.3418)
Interest rate	-3.6271***	-4.8315***	-4.0122	-2.8465	-0.1707
	(1.1722)	(1.3647)	(2.8482)	(1.7595)	(0.7724)
Dummy 9/11	-2.0826*	-2.6495*	-2.4975*	-3.5978**	-0.7647
	(1.0892)	(1.4393)	(1.2604)	(1.5659)	(0.6047)
ΔS&P 500 (-1) or ΔNasdaq (-1)	0.4061***	0.4326***	0.4266***	0.3222***	0.1840***
	(0.0282)	(0.0341)	0.0355	(0.0360)	(0.0241)
Dependent variable (-1)	-0.1022***	-0.1346***	-	-	-
	(0.0274)	(0.0281)			
Number of observations	1,433	1,433	1,173	1,433	1,433
Adj. R^2	0.15	0.12	0.10	0.10	0.07
Durbin Watson (D.W.)	1.99	2.00	2.05	1.92	1.97
Q-Stat (5)	3.27	2.86	9.40*	6.54	5.74
Arch (1), F-statistic	0.97	0.78	0.02	6.46**	3.20*
Arch (5), F-statistic	0.54	0.46	0.87	1.77	3.37***

Note: The dependent variable is the daily change of the corresponding stock price index. The sample period is January 1, 1997–June 30, 2002, except for the Nemax, where the sample starts on December 31, 1997. Regressions include all 12 types of German news. Explanatory variables are only reported if they are significant at conventional levels for at least one index.
*** Significant at the 1% significance level.
** Significant at the 5% significance level.
* Significant at the 10% significance level.

significant role in the case of cyclical stocks than in the case of noncyclical stocks. For cyclical stocks in the United States news on GDP growth and on retail sales appears to increase the agent's expectations of future growth and thus has a positive impact on stock prices. In the case of noncyclical stocks in Germany, none of the explanatory variables turn out to be significant at conventional levels, suggesting that stock returns are not affected by macroeconomic news in any significant manner.

The September 11 dummy is also significant. The larger coefficient in the case of Germany appears to reflect that U.S. exchanges were closed in the aftermath of the event. As

a result, an immediate negative price reaction occurred only in Germany. Also, the impact was larger on growth stocks and cyclical stocks than on old economy stocks.

In line with existing results for the United States, the explanatory power of the macroeconomic news is very low. However, so far the analysis assumes that the response of investors to news is identical across states of the economy. As a result, the estimated response coefficients may be biased towards zero or insignificance.

B. The State of the Economy

Hypothesis three suggests that the stock market reaction may depend on the state of the economy. Different variables can be used to distinguish between these periods, including official business cycle turning points or other splits derived from economic indicators, such as the unemployment rate, industrial production, a leading indicator, and stock prices.

We tried a number of different methods to identify various states of the economy. The most promising results were obtained when the states of the economy were linked to GDP developments, that is, economic expansions and periods of economic slowdown. For the United States, we first used official information on the turning points of business cycles from the National Bureau of Economic Research. On November 26, 2001, the business cycle committee announced that the peak of the business cycle occurred in March 2001. As a result, we split the sample into two periods and chose as breakpoints March 2001 and the date of the announcement. During the recession period, positive real sector news becomes more relevant. At the same time, positive news on producer prices tended to have a positive impact on stock prices. This may be seen as one indication that in an economic recession higher-than-expected prices ensure good news as they imply that economic developments are stronger than previously thought. Unfortunately, no comparable official business cycle definitions exist for Germany. In addition, real economic developments were somewhat less pronounced in Germany during that period. However, when analyzing the sluggish growth period between the second quarter of 2001 and the second quarter of 2002, news on the IFO business climate index also turned out to be significant, thus mirroring findings for the United States.

To get a more detailed characterization of the state of the economy, we follow McQueen and Roley (1993) and distinguish between three states of the economy—a boom period, a recession period, and a normal period. To obtain the three states, we regress the actual log of GDP on a constant and a trend. Then we add and subtract a constant from a trend to create upper and lower bounds. We denote the highest quartile as boom period and the lowest quartile as recession or very weak period. We call the remaining 50 percent "medium." To estimate the conditional response to economic news we use the following specification:

$$dP_t = \alpha + \sum_i D_i X_t^e b + u_t$$

where D_i is a dummy variable that describes the state of the economy. Table 6 reports the results.

Table 6 shows the result for the S&P 500 and the Nasdaq composite index. A larger number of macroeconomic variables appear to have a significant impact on stock prices but the impact differs across states of the economy. We find some evidence for asymmetric effects of macroeconomic news. The impact of news on GDP growth, unemployment, and the Fed target rate varies between boom and recession periods. In a boom period, good (bad) economic news may be bad (good) news for stock prices. In a recession period, good (bad) economic news is good (bad) news for stock prices. For example, when the economy is very weak or is in recession, higher-than-expected GDP growth rates lead on average to positive stock market reactions. However, if the economy is in a boom period, higher-than-expected GDP growth rates may dampen stock prices. One explanation is that in a boom period higher-than-expected GDP growth may result in fears that the economy is overheating and that interest rates may rise.

For the S&P 500, a higher-than-expected unemployment rate has a positive impact on stock prices during a boom period and a negative impact during a recession period. In a boom period, higher-than-expected unemployment may reduce expectations of higher future interest rates, and thus the overall effect on stock prices may be positive. In a recession period, higher than expected unemployment may have little effect on interest rates, in particular when interest rates are already low. Thus, in a recession, higher-than-expected unemployment only reduces growth expectations and thus leads to lower stock prices.

When economic developments are strong, a higher-than-expected federal funds rate tends to lower stock prices, whereas when the economy is in recession, a higher-than-expected federal funds rate tends to lead to a rise in stock prices. In the first case, higher interest rates may have a direct impact on stock prices by reducing the value of discounted future earnings, whereas in a recession period, higher-than-expected interest rates may imply a better assessment of the monetary authorities of the future outlook of the economy, and thus, may lead to higher growth expectations. The large coefficient of interest rate news on the Nasdaq index reflects, among other things, the remarkable reactions of Nasdaq stocks to the surprise decline in interest rates on January 3, 2001 and April 18, 2001, when the Nasdaq index climbed in one day by 13 percent and 8 percent, respectively.

One puzzle seems to be that similar results do not emerge for other real sector news, such as consumer confidence or capacity utilization news. However, in general, the reduction of the number of observations may limit the significance of some variables. Also, no asymmetry can be detected, as long as market expectations are closely in line with actual announcements.

Table 6. Macroeconomic News and Stock Returns During Different States of the Economy

	S&P 500			Nasdaq		
	Weak growth - recession	High growth - boom	Medium growth	Weak growth - recession	High growth - boom	Medium growth
Business inventory	0.5230 (0.5156)	1.6737* (0.8892)	-0.3922 (1.4305)	1.0342 (1.1970)	2.5300** (1.1393)	-0.0887 (2.3887)
Capacity utilization	0.9088 (0.8640)	3.5920*** (1.3170)	-0.4060 (0.6101)	-0.0961 (1.1376)	6.4688*** 1.8009	-0.0813 (0.7433)
Consumer confidence	0.0427** (0.0197)	0.0809 (0.012)	-0.0047 (0.0450)	0.0775** (0.0320)	0.1522 (0.2923)	0.0026 (0.0689)
Construction spending	0.5846*** (0.1243)	-0.3311 (0.2756)	-0.0168 (0.1118)	0.9707*** (0.1278)	-0.6697 (0.6644)	-0.0729 (0.1400)
Consumer prices	0.0641 (1.9178)	0.1414 (2.3997)	-6.3762*** (1.719)	0.2098 (3.1678)	3.9215 (4.8904)	-9.5379*** (2.8369)
Fed target rate	4.991** (2.494)	-3.1307 (2.7475)	-8.8141*** (1.5568)	4.9860** (4.2525)	-6.8033 (6.8316)	-17.9217*** (3.7417)
GDP advance	0.4560* (0.2469)	-1.3397*** (0.3494)	0.7282** (0.2871)	0.5524 (0.4106)	-2.9739*** (0..8160)	0.5401 (0.5691)
GDP preliminary	1.0371 (0.7772)	-2.2256*** (0.6719)	0.7817 (0.6988)	0.4156 (1.1980)	-2.2172 (2.0825)	-0.7825 (1.0850)
GDP final	1.5179 (1.3190)	-0.7225 (2.3342)	0.1487 (0.8413)	0.5218 (2.6176)	3.0181 (4.8309)	0.0130 (0.8559)
Housing start	-0.0096* (0.0040)	0.0810 (0.0927)	0.0211* (0.0112)	-0.1175** (0.0481)	-0.05605 (0.0794)	0.0213 (0.0223)
Unemployment	-0.1151* (0.0531)	0.2919** (0.1179)	-0.0234 (0.0594)	-0.1301 (0.1073)	0.3675 (0.3518)	-0.0992 (0.0.070)
Producer prices	0.5917 (0.3771)	2.3925* (1.4460)	-1.3536*** (0.4175)	1.0788** (0.4637)	0.2288 (2.2166)	-1.3265** (0.6027)
Retail sales	0.2217* (0.1343)	-0.0882 (0.9538)	-1.3121*** (0.4188)	0.4350* (0.2522)	1.5452 (2.5686)	-0.72073 (0.5263)
Wholesale prices	-0.3690 (0.3797)	-0.6270 (0.9466)	-0.6077*** (0.2101)	-0.5425 (0.3647)	-0.9744 (1.6539)	-0.5589** (0.2772)
Number of observations	323	326	783	323	326	783
Adj. R^2		0.03			0.03	
D.W.		2.03			1.99	
Q-Stat. (5)		2.70			2.74	
Arch (1), F-statistic		1.13			1.23	
Arch (5), F-statistic		1.40			1.35	

The dependent variable is the daily change of the corresponding stock price index. The sample period is January 1, 1999–June 30, 2002.

C. International Spillover of News

The fourth hypothesis argues that stock market developments are not only influenced by domestic news but also by international news. In particular, news from the United States may be expected to have an impact on stock market developments in Europe.

In the case of the United States, none of the German news had a significant impact on U.S. stock prices. However, U.S. news appears to have a significant impact on German stock prices. U.S. news that occurs early in the morning and before the close of European markets may be expected to have an impact on the same day in Germany. However, news that occurs after the close of the German stock market may have an impact on stock prices the following day. Taking into account the release time, we adjusted our data set and estimation accordingly.

Table 7 shows that much of U.S. news has an impact on stock prices in Germany. The direction of the effect is, in general, identical to the one in the United States. Positive real economic news has a positive impact on stock prices. Also, the direct impact of news on the federal funds target rate is highly significant. Regular FOMC meetings typically end when the German stock market is already closed or is about to close.[5] However, results indicate that the stock market reaction in Germany often occurs on the same day. This suggests that market participants continue to adjust their expectations ahead of a FOMC meeting and act accordingly. As consensus forecasts are typically collected around one week ahead of a FOMC meeting, estimates of the news component based on consensus forecasts may overestimate the "real" news of an announcement.

The second and fourth column of Table 7 also include the lagged return of the S&P 500 and the Nasdaq index, respectively. Lagged stock returns may be interpreted as an aggregate proxy that incorporates the effects of U.S. news of the previous day. The significance of the coefficient on lagged stock returns supports often-heard perceptions that stock price developments in the United States have an important impact on developments in Germany. Results indicate that a 1 percent increase in U.S. stock returns is on average associated with a 0.43 percent increase in stock prices in Germany. Even if lagged U.S. stock returns are included in the regressions, some U.S. news continues to have a separate impact on stock prices in Germany.

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[5] No statistically significant impact of Fed interest rate changes is visible on next-day German stock prices.

Table 7. International Spillover of News

	Dax	Dax	Nemax	Nemax
German News:				
Producer prices	-1.8052***	-1.5010**	-1.7064	-2.2282*
	(0.6599)	(0.7030)	(1.1690)	(1.1588)
Interest rate	-4.5708***	-4.3149***	-1.4372	-1.1376
	(1.3943)	(1.4132)	(3.8775)	(3.5760)
U.S. News:				
Business inventory	0.8655	0.6077	3.968***	3.3002**
	(0.7229)	(0.7148)	(1.3406)	(1.3043)
Consumer credit	0.0032***	0.0028**	0.0005	0.0015
	(0.0012)	(0.0012)	(0.0022)	(0.0021)
Consumer prices	-3.6164**	-2.9480**	-2.9025	-1.5127
	(1.4379)	(1.5539)	(2.8048)	(2.8263)
Personal income	1.3923	1.4872	2.3447*	2.3748
	(1.0582)	(1.1117)	(1.3662)	(1.2841)
Retail Sales	0.2813	0.2257	0.7161**	0.7501**
	(0.2098)	(0.2364)	(0.3144)	(0.3496)
Fed target rate	-4.4014***	-4.0344***	-17.020***	-15.2467***
	(1.0584)	(1.2291)	(3.5075)	(3.5881)
Trade balance	0.2151**	0.1707*	0.3130*	0.2511*
	(0.0998)	(0.0885)	(0.1803)	(0.1582)
Δ S&P 500 (-1) or Δ Nasdaq (-1)	-	0.4245***	-	0.4265***
		(0.0349)		(0.0387)
Dummy 911	-2.8431**	-2.7537	-3.2214**	-2.883***
	(1.1544)	(1.3789)	(1.2995)	(1.3088)
Number of observations	1433	1432	1173	1173
Adj. R^2	0.02	0.13	0.03	0.11
D.W.	1.94	1.98	2.02	1.99
Q-Stat. (5)	4.12	3.96	2.71	4.56
Arch (1) F-statistic	0.58	0.63	0.24	0.14
Arch (5) F-statistic	2.15*	0.72	1.26	1.27

The dependent variable is the daily change of the corresponding stock price index. The sample period is January 1, 1999–June 30, 2002 and for the Nemax the sample start on December 31, 1997.

D. Evidence for Bihourly Data

Hypothesis 5 suggests that stock market reactions occur within a short period of time. To test this hypothesis, we use bihourly data for Germany. Datastream provides data that are recorded at 10:00 a.m., 12:00 a.m., 2:00 p.m., and 4:00 p.m. U.K. time. We reorganize the dataset and match the release time of the macroeconomic news with the corresponding time bracket. In the regressions, we account for time-of-day effects by including a dummy for the market opening session and the closing session. Also, we include the previous day's change of the S&P 500 and of the change of the U.S. dollar—deutsche mark exchange rate (as of midnight German time) as explanatory variable in the opening session. The exchange rate change can be interpreted as a proxy that captures other "late evening" or "overnight news."

The analysis of bihourly data in Table 8 indicates that not only monetary news but also real sector news has a significant impact on stock prices. Positive (negative) news on the IFO business climate index has a positive (negative) influence on German stock prices during the period immediately following the announcement. The impact becomes substantially larger when we look only at the period of weak economic development, here defined as June 2001–June 2002. A positive surprise announcement of the IFO business climate survey index by 1 percentage point, is on average accompanied by a stock price increase of 0.5 percent during the next hour.

Surprise interest rate changes of the European Central Bank also have a significant short-term impact on stock prices. However, compared to the analysis of daily data, the coefficient is somewhat smaller.[6] This reflects that a part of the stock price movement may already occur before the announcement, thus in anticipation of a rate change. This notion is confirmed when including lags and leads of interest rate news in the regression. Whereas interest rate news has no longer any significant impact on stock price changes two to six hours after the announcement, upcoming interest rate news has a significant impact during the two to six hours before the announcement. To see, more generally, whether the market reaction to news occurs only within a short period of time, we included up to four lags of each explanatory variable. Lagged explanatory variables were not significant, suggesting that the reaction of stock prices to macroeconomic news occurs very quickly indeed.

The last two columns of Table 8 provide further evidence that U.S. news has an important impact on German stock prices. Positive (negative) U.S. news regarding GDP growth, retail sales, construction spending, consumer confidence, and the leading indicator tend to lead to a positive (negative) stock market reaction in Germany. Additional analyses also showed that in the case of interest rate decisions during regular FOMC meetings, most of the market reaction occurs in the hours before the actual interest rate announcement.

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[6] Also, somewhat surprisingly news on producer prices, which are typically released at 8 a.m., did not appear to have a significant impact on stock prices in the early morning session.

Table 8. Bihourly Data of Macroeconomic News and Stock Prices in Germany

	Dax (January 1997–June 2002)	Dax (June 2001–June 2002)	Dax: international spill-over (January 1997–June 2002)	Dax: international spill-over (June 2001–June 2002)
German News				
IFO-index	0.1812**	0.5030***	0.1848**	0.4966***
	(0.0879)	(0.1367)	(0.0879)	(0.1317)
Interest rate	-2.8322***	-3.3728**	-2.7208***	-2.8753**
	(1.1388)	(1.6791)	(0.9738)	(1.3975)
S&P500	0.5031***	0.4995***	0.5015***	0.5128***
	(0.0302)	(0.0624)	(0.0298)	(0.0601)
Exchange rate	0.1933***	0.1348	0.1912***	0.08824
	(0.0503)	(0.1003)	(0.0498)	(0.1027)
U.S. news				
Employment cost index			-0.6727	-4.9282**
			(0.5015)	(2.2666)
Construction spending			0.1048*	-0.0192
			(0.0546)	(0.2630)
Consumer confidence			0.0154	0.0895***
			(0.0108)	(0.0172)
Leading indicator			0.5792***	-0.2467
			(0.2095)	(0.4913)
GDP advance			0.2624***	0.7062***
			(0.0810)	(0.2044)
Final GDP			0.6947**	1.0130
			(0.2780)	(0.9186)
Preliminary GDP			0.8507***	2.5735***
			(0.2829)	(0.6680)
Retail sales			0.2443***	0.3105***
			(0.0823)	(0.0972)
Number of observations	5732	1041	5732	1041
Adj. R^2	0.17	0.13	0.17	0.15
D.W.	2.02	1.93	2.02	1.91
Q-Stat. (5)	7.99	2.22	8.14	2.55
Arch (1) F-statistic	0.03	0.25	0.04	0.32
Arch (5) F-statistic	1.50	0.20	1.45	0.43

The dependent variable is the bihourly change of the Dax. Regressions include up to 4 lags of the explanatory variable.

V. Conclusion

This paper aims at better understanding the stock market reaction to macroeconomic news. We present evidence for five hypotheses derived from theoretical considerations. First, the effects of macroeconomic news on stock prices depend on the type of news. In general, domestic news has a more significant impact on stock prices in the United States than in Germany. This may reflect, in part, the fact that traditionally more macroeconomic indicators have been published and actively followed in the United States than in Germany. Out of the list of indicators, news on interest rates, inflation, and the IFO business climate index appear to contribute most to market movements in Germany. Second, the effects differ among various types of stocks. News related directly to real activity has a stronger impact on cyclical stocks than on noncyclical stocks. In the United States, interest rate news has a stronger impact on new economy stocks than on traditional stocks.

Third, the stock market implication of news is state-dependent. For the United States, we present evidence for asymmetric effects of news related to unemployment, GDP growth, and the federal funds target rate. Bad economic news, such as an unexpected increase in unemployment, may be good news for stocks during economic expansions but bad news during economic contractions. This, at least in part, is because economic news may affect more than one of the basic determinants of stock prices—the risk-free interest rate, growth expectations, and the risk premium—and in conflicting ways. The dominance of either effect may depend on the state of the economy. In general, real economic news tends to be more important during recessions than in normal times.

Fourth, international news may be as important or even more important than domestic news. In the case of Germany, U.S. news has an important impact on stock prices. However, German news does not have an important impact on U.S. equity prices. Finally, the analysis of bihourly data suggests that most of the market reaction occurs within a short period of time.

Notwithstanding the importance of macroeconomic news for stock price developments, the overall explanatory power of daily and bihourly developments remains limited. Macroeconomic news represents only one type of news. Political news and company-specific news also have an important impact on stock prices. More recently, company-specific news relating to select high-tech companies appear to have gained greater relevance in overall market developments. A closer analysis of the impact of company-specific news, however, is beyond the scope of this paper.

Appendix 1. Key Economic Indicators for the United States [1/]

Variables	Code	Original Publication	Frequency Release time and date	Unit	Brief Description
Business inventory	U.S.BI	**BoC** http://www.censU.S..gov.svsd/mtistex.html.	**Monthly** 8:30 ET around 15th of each month (data for two months prior)	MoM, %	Includes sales and inventory statistics from all three stages of the manufacturing process (manufacturing, wholesale, and retail).
Capacity utilization	U.S.CU	**FRB** http://www.federalreserve.gov/releases/G17/Current	**Monthly** 9:15 ET around the 15th of each month (data for previous. month).	%	Capacity utilization is calculated for the manufacturing, mining and electric, and gas utilities industries. For given industries, the utilization rate is equal to the output index divided by a capacity index.
Chicago purchasing manager's index	U.S.CPM	**Chicago purchasing managers**	**Monthly** the last day of every month (for current month)	Index	A monthly index of regional (Midwestern) manufacturing activity. An index reading higher than 50 means manufacturing reporting improved business outnumbered those reporting deteriorating conditions.
Construction spending	U.S.CS	**BoC** http://www.censU.S..gov/prod/1/constr/c30/c30.html	**Monthly** 10:00 ET on the first business day of each month (data for two months prior).	Billion of $	Value of new construction put in place in the U.S. (both private and public construction).
Consumer confidence	U.S.CC	**CB** http://www.tcb-indicators.org/.	**Monthly** 10:00 ET on the last Tuesday of each month (data for current month).	Index	The Conference Board conducts a monthly survey of 5000 households to ascertain the level of consumer confidence. The index consists of two sub-indices - consumers' appraisal of current conditions and their expectations for the future. Expectations make up 60 percent of the total index, with current conditions accounting for the other 40 percent.
Consumer credit	U.S.CCr	**FRB** http://www.federalreserve.gov/releases/G19/Current/.	**Monthly** 15:00 ET on the fifth business day of the month (data for two months prior).	Billion of $	Consumer credit consists of three categories: auto, revolving (i.e., credit card), and other consumer credits.
Consumer price index	U.S.CP	**BLS** http://stats.bls.gov/news.release/cpi.toc.htm.	**Monthly** 8:30 ET, about the 18th of each month for the prior month.	MoM, %	The consumer price index is a measure of the price level of a fixed market basket of goods and services purchased by consumers.

[1/] We have mainly borrowed wording from EconEdLink (http://www.econedlink.org/lessons/index.cfm?lesson=EM225) and "Economic Calendar" section of Lycos Finance (http://finance.lycos.com/home/research/econ_calendar.asp) Websites. Abbreviations are:
BoC: Bureau of Census, Department of Commerce, FRB: Federal Reserve Board, CB: The Conference Board, BLS: Bureau of Labor Statistics, Department of Labor, BEA:Bureau of Economic Analysis, Department of Commerce

Variables	Code	Original Publication	Frequency Release time and date	Unit	Brief Description
Durable goods orders	U.S.DG	**BoC** http://www.censU.S..gov/ftp/pub/indicator/www/m3/index.htm.	**Monthly** 8:30 ET around the 26th of each month (data for month prior).	MoM, %	The durable orders release measures the dollar volume of orders, shipments, and unfilled orders of durable goods.
Employment cost index	U.S.EC	**BLS** http://stats.bls.gov/news.release/eci.toc.htm.	**Quarterly** 8:30 ET, near the end of the first month of the quarter for the previous. quarter.	QoQ,%	The ECI compensation series includes wages and salaries and employer costs for employee benefits. The sum of the change in these two components equals the change in total compensation.
Fed funds target rate	U.S.FED		**Pre-announced** Typically 8 times per year	Percent	Target interest rate for banks to lend to each other overnight.
GDP advance	U.S.GDPA	**BEA** http://www.bea.doc.gov/bea/dn1.htm.	**Quarterly** Third or fourth week of the month at 8:30 ET for the previous. quarter	Annual rate, %	Real GDP for each quarter is announced three times. The month following the end of the quarter is described as the advance GDP; the second announcement or revision is described as preliminary announcement; and the third month is the final. While labeled as final, even this figure may eventually be revised after the final data for the year are published.
GDP preliminary	U.S.GDPP		**Quarterly** Third or fourth week of the month at 8:30 ET for the prior quarter	Annual rate, %	
GDP final	U.S.GDPF		**Quarterly**	Annual rate, %	
Housing starts	U.S.HS	**BoC** http://www.censU.S..gov/ftp/pub/indicator/www/hoU.S.ing.html	**Monthly** 8:30 ET around the 16th of the month (data for one month prior).	Annual rate, %	Private residential real estate activities. The index is the new privately owned housing units started.
Industrial production	U.S.IP		**Monthly** 9:15 ET around 15th of each month (a month prior)	MoM, % change	The index of industrial production is a fixed-weight measure of the physical output of the nation's factories, mines, and utilities.

Variables	Code	Original Publication	Frequency Release time and date	Unit	Brief Description
Jobless rate (unemployment rate)	U.S.JR	**BLS** http://stats.bls.gov/news.release/empsit.toc.htm	**Monthly** First Friday of each month at 8:30 ET for the previous. month	%	Number of unemployed as a percentage of the labor force.
Leading indicator	U.S.LI	**CB** http://www.tcb-indicators.org/.	**Monthly** 8:30 ET around the third week of the month for the previous. month.	MoM, %	The index of leading indicators includes ten different economic statistics.
NAPM survey index	U.S.NAPM	**NAPM** [2/] http://www.napm.org.	**Monthly** 10:00 ET on the first business day of the month for the previous. month		The NAPM report is a national survey of purchasing managers which covers indicators such as new orders, production, employment, inventories, delivery times, prices, export orders, and import orders. Diffusion indices are produced for each of these categories, with a reading over 50% indicating expansion relative to the previous. month, and a sub-50% reading indicating contraction.
New single-family home sales	U.S.NSF	**BoC** http://www.censU.S..gov/const/c25_curr.txt.	**Monthly** 10:00 ET around the last business day of the month (data for month prior).	Annual rate, %	New one-family homes sold.
Nonfarm payroll change	U.S.NP	**BLS** http://stats.bls.gov/news.release/empsit.toc.htm.	**Monthly** First Friday of the month at 8:30 ET for the prior month		Monthly change on nonfarm payrolls individual total.

[2/] NAPM(ISM): Index provided by Institute for Supply Management (formerly The National Association of Purchasing Management)

Personal income	U.S.PI	**BEA** http://www.bea.doc.gov/bea/rels.htm	**Monthly** 8:30 ET around the first business day of the month (data for two months prior).	MoM, %	Personal income is the income received by persons from all sources, that is, from participation in production, from both government and business transfer payments and from government interest.
Federal Reserve of Philadelphia Index	U.S.Phil	**The Philadelphia Federal Reserve Bank**	**Monthly** Third Thursday of the month at 10 ET for the current month.		Business outlook survey diffusion. Diffusion indexes present the percentage of respondents indicating an increase minus the percentage indicating a decrease.

Variables	Code	Original Publication	Frequency Release time and date	Unit	Brief Description
Producer price index	U.S.PP	**BLS** http://stats.bls.gov/news.release/ppi.toc.htm.	**Monthly** Around the 11th of each month at 8:30 ET for the previous. month.	MoM, %	The producer price index measures prices of goods at the wholesale level. There are three broad subcategories within PPI: crude, intermediate, and finished.
Personal spending	U.S.PS	**BEA** http://www.bea.doc.gov/bea/rels.htm	**Monthly** 8:30 ET around the first business day of each month (data for two months prior)	MoM % (annual rate)	Goods and services purchased by persons in the U.S. Also known as PCE (Personal Consumption Expenditure). PCE is comprised of three categories: durables, nondurable, and services. It also includes purchase of Used goods and purchase of goods and services abroad.
Retail sales	U.S.RS	**BoC** http://www.censU.S..gov/svsd/www/advtable.html.	**Monthly** 8:30 ET around the 13th of the month (data for one month prior).	MoM, % change	Monthly retail and food service sales by kind of business.
Trade balance	U.S.TB	**BEA** http://www.censU.S..gov/foreign-trade/www/press.html	**Monthly** 8:30 ET around the 20th of the month (data for two months prior).	Billion of $	Total Trade Balance = Goods + Services
Wholesale price index	U.S.WSI	**BoC** http://www.censU.S..gov/svsd/www/mwts.html.	**Monthly** 10:00 ET around the fifth business day of each month (data for two months prior).	MoM, % change	The wholesale trade report includes sales and inventory statistics from the second stage of the manufacturing process.

Appendix 2. Key Economic Indicators for Germany

Variables	Code	Original Publication	Frequency/Release date [1/]	Unit	Brief Description [2/]
Consumer price	GECP	Statistisches Bundesamt (Federal Statistic Office, FSO)	**Monthly** Around the middle of each month, 8:00 a.m.	MoM,%	Known as cost-of-living index and is Used to gauge Pan-German inflation by establishing the price increase in a fixed basket of goods and services purchased by an average individual. Base year=1995
GDP	GEGDP	Deutsche Bundesbank	**Quarterly** Around the 24th, 8:00 a.m.	QoQ, %	Base year =1995
IFO survey (Business Climate)	GEIFO	Institut fuer Wirtschaftsforschung (IFO Institute)	**Monthly** Around the 25th of the month (current month), 10:00 a.m.		General business climate index. The survey is conducted monthly by asking approximately 10,000 companies throughout Germany two questions concerning firstly how business is performing in the current period, and secondly, about how they expect it to perform in the near future.
Industrial production	GEIP	Deutsche Bundesbank	**Monthly** Earlier in the month, 11:30 a.m.	MoM, %	
Import price index	GEIPr	Statistisches Bundesamt	**Monthly** Around the 27th of each month, 8:00 a.m.	MoM, %	Base year =1995
Unemployment	GEJR	Deutsche Bundesbank Federal labor Office	**Monthly** Around the 7th of each month, 9:50 a.m.	%	Unemployment rate, as a percentage of total labor force, including both West and East Germany.
Interest rates	ECBINT	European Central Bank	**Council meetings** Around 2:45 p.m.	%	For the purpose of signalling the monetary policy stance, the minimum bid rate plays the role previously performed by the rate in fixed rate tenders.
Manufacturing orders	GEMO	Deutsche Bundesbank	**Monthly** 11:00-12:00 a.m. or 4:00 p.m. (Two month prior)	MoM, %	Pan German total manufacturing orders, received by the manufacturing sector, by main group (basic & producer goods, capital goods and consumer goods) in Germany. Base year+1995.
Producer price index	GEPP	Statistisches Bundesamt	**Monthly** Around the 25th of each month, 8:00 a.m.	MoM, %	
Retail sales	GERS	Statistisches Bundesamt	**Monthly** Around the middle of each month, 8:00 a.m. (Two months prior)	MoM, %	New survey pool consists of 20,000 companies chosen from the 390,000 retailers and restaurants that were registered in 1993. The index levels are adjusted for inflation, seasonal & calendar variations, according to the "Berlin" method.
Trade balance	GETB	Statistisches Bundesamt	**Monthly** Around the 10th, 8:00 a.m. (Two months prior)	Billion of DM	
Wholesale price index	GEWP	Statistisches Bundesamt	**Monthly** Around the middle of each month, 8:00	MoM%	Index measures price changes in goods sold wholesale.

[1/] Release time indicates usual release time. For some variables, release time may be different from what is stated in the column for some period.
[2/] We mainly borrowed wording from the data description section of Bloomberg.

REFERENCES

Bailey, Warren, 1989, "The Effect of U.S. Money Supply Announcements on Canadian Stock, Bond, and Currency Prices," *Canadian Journal of Economics,* Vol. 22, No. 3, pp. 607–18.

Boyd, John, H., Ravi Jagnnathan, and Jian Hu, 2001, "The Stock Market's Reaction to Unemployment News: Why Bad News is Usually Good for Stocks?" NBER Working Paper No. 8092 (Cambridge, Massachusetts: National Bureau of Economic Research).

Cutler, David M., James M. Poterba, and Lawrence H. Summers, 1988 "What Moves Stock Prices?" NBER Working Paper No. 2538 (Cambridge, Massachusetts: National Bureau of Economic Research).

Duffie, Darrell, 2001, *Dynamic Asset Pricing Theory* (Princeton, New Jersey: Princeton University Press, 3rd ed.).

Ederington, Louis H., and Jae Ha Lee, 1993, "How Markets Process Information: News Releases and Volatility," *Journal of Finance,* Vol. 48, No. 4, pp. 1161–91.

Farber, Henry S., and Kevin F. Hallock, 1999a, "Changing Stock Market Response to Announcements of Job Loss: Evidence from 1970 to 1997," Princeton University Industrial Relations Section Working Paper No. 414 (Princeton, New Jersey: Princeton University).

_____, 1999b, "Has Employment Reductions Become Good News for Shareholders? The Effect of Job Loss Announcements on Stock Prices, 1970–1997," Princeton University Industrial Relations Section Working Paper No. 417 (Princeton, New Jersey: Princeton University).

Fleming, Michael J., and Eli M. Remolona, 1999a, "The Term Structure of Announcement Effects," BIS Working Papers No. 71 (Basel: Bank for International Settlements).

_____, 1999b, "Price Formation and Liquidity in the U.S. Treasury Market: The Response to Public Information,"*Journal of Finance,* Vol. 54, No. 5, pp. 1901–15.

Floros, Nikos I., and George P. Tsetsekos, 1996, "The Impact of Credit Line Announcements on Stock Prices: Analysis of Stated Reasons and Financial Risk," *International Review of Economics and Finance*, Vol. 5, No. 3, pp. 307–20.

Hand, John R. M., Robert W. Holthausen, and Richard W. Leftwich, 1992, "The Effect of Bond Rating Agency on Announcements on Bond and Stock," *Journal of Finance,* Vol. 47, No. 2, pp. 733–52.

Hardouvelis, Gikas A., 1986, "Macroeconomic Information and Stock Prices," First Boston Working Paper Series FB-86–13, (New York: Columbia University).

Jain, Prem C., 1988, "Response to Hourly Stock Prices and Trading Volume to Economic News," *Journal of Business*, Vol. 61, No. 2, pp. 219–31.

Krueger, Alan B., 1996, "Do Markets Respond More to More Reliable Labor Market Data? A Test of Market Rationality," NBER Working Paper No. 5769 (Cambridge, Massachusetts: National Bureau of Economic Research).

Li, Li, and Zuliu F. Hu, 1998, "Responses of the Stock Market to Macroeconomic Announcements Across Economic States," IMF Working Paper 98/79 (Washington: International Monetary Fund).

McQueen, Grant, and V. Vance Roley, 1993, "Stock Prices, News and Business Conditions," *Review of Financial Studies,* Vol. 6, No. 3, pp. 683–707.

Nelson, D., 1991, "Conditional Heteroskedasticity in Asset Returns: A New Approach," *Econometrica*, Vol. 59, No. 52, pp. 347–70.

Rapach, David E., 2001, "Macro Shocks and Real Stock Prices," *Journal of Economics and Business,* Vol. 53, pp. 5–26.

Sun, Qian, and Wilson H.S. Tong, 2000, "The Effect of United States Trade Deficit Announcements on the Stock Prices of United States and Japanese Automakers," *Journal of Financial Research,* Vol. 23, No. 1, pp. 15–43.

Tandon, Kishore, and Thomas Ulrich, 1987, "International Market Response to Announcements of United States Macroeconomic Data," *Journal of International Money and Finance*, Vol. 6, No. 1, pp. 71–83.

Veronesi, Pietro, 1999, "Stock Market Overreaction to Bad News in Good Times: A Rational Expectations Equilibrium Model," *Review of Financial Studies*, Vol. 12, No. 5, pp. 975–1007.