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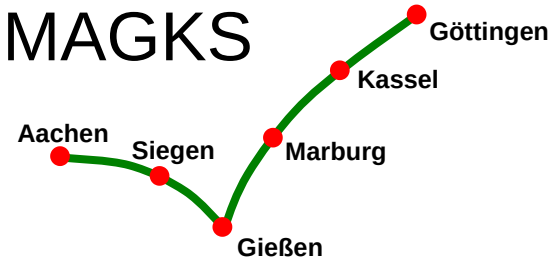

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FOMC Communication and Emerging Equity Markets

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FOMC Communication and Emerging Equity Markets

Abstract

Using a GARCH model, we study the effects of Federal Funds target rate changes and FOMC communication on emerging equity market returns and volatility over the period 1998–2006. First, both types of news have a significant impact on market returns. Second, target rate changes are more important than informal communication. Third, the occurrence of monetary policy reports lowers price volatility. Finally, American emerging markets react more to U.S. news than non-American markets.

JEL: E52, G14, G15

Keywords: Central Bank Communication, Emerging Markets, Federal Reserve Bank, U.S. Monetary Policy

1. Introduction

According to the International Monetary Funds' (IMF) Coordinated Portfolio Investment Survey, the United States (U.S.) is the world's largest investor. U.S. investors held about 30 percent of the world's reported portfolio investment assets throughout 2001–2006, while the share of total portfolio investments in the U.S. was about 17%. With about a 65 percent share in 2006, the U.S. dollar is still the most important reserve currency in the world and it dominates the payment flows of private international transactions. Given this importance of the U.S. in international capital flows, it is likely that news about U.S. monetary policy influences stock markets all over the world.

Reflecting these considerations, the impact of U.S. monetary policy actions on foreign equity indexes has been studied in the literature. However, the focus has been on the impact of formal policy announcements. Generally speaking, we expect financial markets not only adjust to formal monetary policy announcements but also to informal channels such as speeches and testimonies of Federal Open Market Committee (FOMC) members. Consequently, one would expect agents in foreign equity markets to watch not only formal U.S. monetary policy news but also pay attention to informal news. In this paper, we study the impact of U.S. monetary policy news on emerging financial markets. Our contribution to the literature lies in the utilization of a new data set that captures less formalized channels of U.S. monetary policy, in addition to formal channels, and the empirical investigation into their relative impact on emerging equity markets. Although they make up a substantive part of central bank communication,[1] less formalized channels of communication like the delivery of speeches and Congressional hearings (testimonies) have not been subject to many studies, especially in the context of emerging financial markets.

Our analysis focuses on emerging stock markets because they tend to be exposed to foreign news and in particular U.S. news for several reasons. Emerging economies rely on foreign investments to finance their catching-up process and are also influenced via international trade linkages. An upswing in the world's largest economy is bound to improve the domestic economic outlook via increased exports. As mostly small open economies, emerging countries import inflation tendencies from their main trading partners via exchange rate pass-through as well. Finally, emerging markets are characterized by the liberalization and internationalization of the banking sector, as well as increasing global financial market

[1] The Federal Reserve (Fed) has sharply increased the number of "informal" speeches delivered since the late 1990s. For example, during our sample period, while FOMC members delivered 114 speeches in 1998, they spoke about 70% more in 2006 (190 times).

integration itself. All these reasons make emerging financial markets sensitive to monetary policy news in the U.S.

In this paper, we address four related research questions. First, what is the economic impact of U.S. monetary policy actions and communications on equity returns in emerging markets? Second, do markets react differently to official rate changes versus less formalized channels of monetary policy like speeches and testimonies? Third, how is the volatility on emerging equity markets influenced by U.S. monetary policy actions and communications? Finally, are there country-specific differences across emerging markets' reactions? Answers to these questions have significant policy implications. Given the current global crisis, which seems to be initiated in the U.S., the findings are of current interest.

The remainder of this paper is organized as follows: in section 2, we give a brief overview of the existing literature and how it relates to our contribution. Section 3 describes the construction of monetary policy news and presents the econometric methodology. In Section 4, we illustrate our results, while in section 5, we outline further specifications and our robustness tests. Section 6 concludes.

2. Related literature and our contribution

A growing literature investigates the effects of U.S. news – and in particular U.S. monetary policy – on emerging *equity* markets. Ehrmann and Fratzscher (2006) analyze 50 equity markets worldwide and show that returns fall on average around 3.8 percent in response to a 100 basis point tightening of U.S. monetary policy, ranging from a zero response in some countries to a reaction of 10 percent or more in others. They find that the degree of global real and financial integration, not a country's bilateral integration with the U.S., is a key determinant of the policy transmission process. Wongswan (2005) documents the impact of U.S. monetary policy surprises on equity indexes in sixteen developed and emerging countries. Using intra-day data, he finds that in most cases foreign equity indexes only react to a surprise change in the current target rate. An unanticipated 25 basis point cut in the Federal Funds target rate is associated with a 0.5 to 2.5 percent increase in foreign equity indexes. It is found that the variation in the response across countries is more related to the degree of financial integration of these countries with the U.S. than trade linkages or the degree of exchange rate flexibility. Hayo and Neuenkirch (2008) show that U.S. monetary policy and macroeconomic announcements have a significant impact on Argentine money, stock, and foreign exchange markets' returns and volatility. Robitaille and Roush (2006) find

FOMC actions leading to an increase in U.S. interest rates to be associated with a systematic increase in bond spreads and decline in the stock price index in Brazil.

Another branch of the literature focuses on the reaction of emerging *bond* markets to U.S. target rate changes and other news. Andritzky et al. (2007) show that global bond spreads respond to rating actions and changes in U.S. interest rates rather than domestic data and policy announcements. Examining country sub-samples, they discover that U.S. news matters less to countries with more transparent policies and higher credit ratings. Arora and Cerisola (2001) explore how country risk – proxied by sovereign bond spreads – is influenced by U.S. monetary policy, country-specific fundamentals, and conditions in global capital markets. They conclude that the stance and predictability of U.S. monetary policy are important for stabilizing capital flows and capital market conditions in emerging markets. Using monthly panel data for 17 countries, Alper (2006) concludes that the unanticipated component of U.S. monetary policy is significant in explaining the movements in emerging markets' sovereign bond spreads. Miniane and Rogers (2007) find little evidence that capital controls effectively insulate countries from U.S. monetary shocks. Other factors, such as the exchange rate regime or the degree of dollarization, explain more of the cross-country differences.

In this paper, we extend the existing studies by examining the effects of Federal Funds target rate changes and all types of informal FOMC communication on emerging equity markets' returns and volatilities. Our paper provides evidence whether formal news has a bigger impact on foreign equity market returns and volatility than informal news. We differentiate between news regarding monetary policy inclination and economic outlook, while examining post-meeting statements, monetary policy reports, speeches, and testimonies. Econometrically, we employ a GARCH model with country-specific fixed effects to capture the autoregressive conditional heteroscedasticity that characterizes many financial series.

3. Data and econometric methodology

In our analysis, we use a new data set introduced and extensively described in Hayo et al. (2008). It covers 1439 speeches and 151 congressional hearings by FOMC members as well as 68 post-meeting statements and 20 monetary policy reports (MPR). Following the literature (e.g. Ehrmann and Fratzscher, 2007), we split the communications' content into a monetary policy and an economic outlook component. The coding for the U.S. economic outlook part is either "positive" (EO+) or "negative" (EO-), while "tightening" (MP+) or "easing" (MP-) are the available categories for the monetary policy stance of the Fed. In the analysis, we employ

dummy variables that are split into positive and negative news to take into account possible asymmetrical reactions of financial markets.[2] In total, there are 16 communication dummies as the 4 types (statements, MPR, testimonies, speeches) can be coded into the 4 different categories EO+, EO-, MP+, and MP-.

In designing these categories of news, we carefully read the speeches twice with a considerable time lag and then coded them independently into the respective dummy categories. In the case of a conflict between the two gradings, we checked the relevant speeches yet another time and adjusted our indicators accordingly. We employed extensive robustness checks to ensure that our results do not depend on the particular coding of ambiguous individual observations. As there are no explicit expectations about the content of an upcoming speech (like the Bloomberg survey before every FOMC meeting), we are not able to extract a surprise component directly from each communication event.

Our emerging market indicator comprises daily closing returns on stock exchange markets in 17 countries over the time period January 2, 1998 to December 29, 2006.[3] The country selection is based on the Emerging Market Index by Morgan Stanley in June 2006 and includes Argentina, Brazil, Chile, China, Egypt, India, Indonesia, Israel, Jordan, Malaysia, Mexico, Pakistan, Peru, the Philippines, Russia, South Africa, and Thailand.[4] Composite stock returns for the stacked sample with country-specific fixed effects are computed by taking the first differences of logged daily stock price indices. The use of a panel framework is helpful for obtaining a larger number of observations for each type of news and it improves estimation efficiency. Potential problems of panel analyses are the assumptions of equal coefficients across countries and a common error structure. As part of our robustness tests, we report estimation results after allowing for heterogeneity across countries.

[2] Evidence of this type of asymmetry can, for instance, be found in the impact of IMF statements on financial returns in emerging markets (Hayo and Kutan, 2005) or in the effects of FOMC communication on U.S. financial markets' returns (Hayo et al., 2008).

[3] We choose daily data instead of intra-day data for two reasons. At a conceptual level, we are interested in the question of whether there are effects of economic importance characterized by a minimum degree of persistence over time instead of just picking out short blips in the data. At a practical level, we find it impossible to time the central bank news precisely in, say, ten minute time intervals as it is possible for newswire reports.

[4] We omitted six countries from the Morgan Stanley Index as we do not categorize them as "full" emerging markets any longer: the Czech Republic, Hungary, and Poland are members of the European Union and the OECD. Büttner et al. (2009) find that European news rather than U.S. news has an impact on these markets. Korea and Turkey are members of the OECD; Taiwan is omitted due to its large market capitalization. Two more countries, Colombia and Morocco, are left out as data are not available for the full period 1998–2006.

Specification for returns

Descriptive statistics show that the emerging market series exhibit excess kurtosis but almost no skewness (see Table A1 in the Appendix), indicating volatility clustering (Engle, 1982). Since preliminary OLS estimations show significant ARCH effects (F(1,37911) = 2103**), we employ a GARCH model in this paper. We start with a general GARCH(1,1) specification (Bollerslev, 1986) as follows:

$$
\begin{aligned}
&\text{returns}_t = \gamma + \sum_{r=1}^{6} \delta_r \text{ control variables}_{t-r} + \zeta \text{ country dummies} + \eta \text{ ID9/11} \\
&+ \sum_{r=-1}^{1} \theta_r \text{ FFTR changes}_{t-r} + \sum_{r=-1}^{1} \iota_r \text{ communication dummies}_{t-r} + \lambda h_t + \mu_t, \\
&\mu_t = \varepsilon_t h_t^{1/2}, \\
&h_t = \alpha_0 + \alpha_1(\mu_{t-1} - \kappa_1)^2 + \kappa_2 \tau(\mu_{t-1} - \kappa_1)^2 + \beta_1 h_{t-1}, \\
&\tau = 1 \text{ if } u_{t-1} < \kappa_1 \text{ and zero otherwise,}
\end{aligned}
\tag{1}
$$

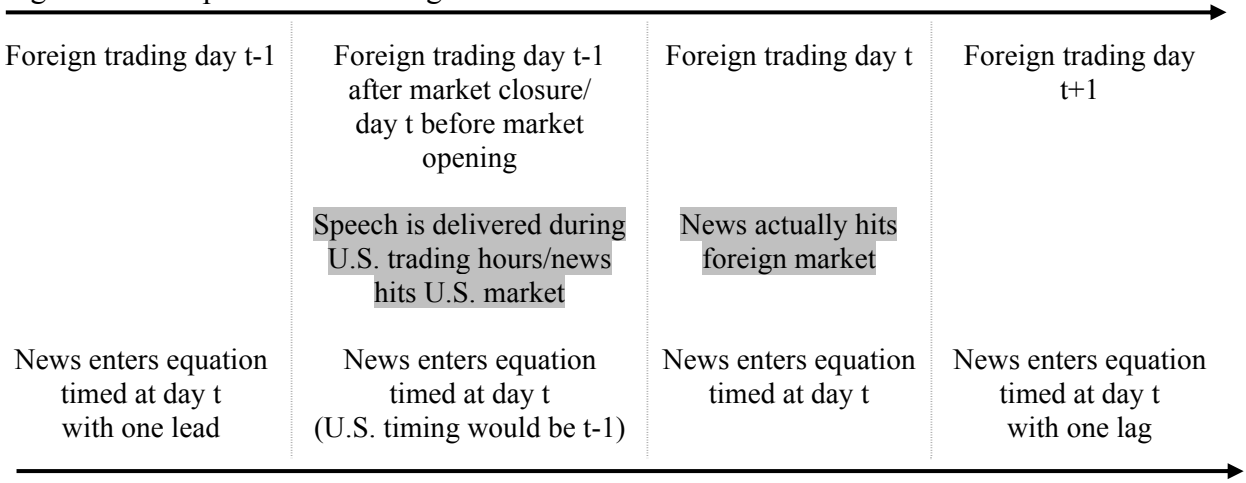
where α_0, α_1, β_1, μ, κ_1, κ_2, γ, δ, ζ, η, θ, ι, and λ are parameters or vectors of parameters, τ is an indicator function as defined in the last line above, and $\varepsilon_t|\Gamma_{t-1} = t(v)$, with Γ_{t-1} capturing all the information up to t-1, and t(v) a t-distribution with v degrees of freedom.

The general specification (1) is an autoregressive-distributed lag model with six lags. The vector of control variables contains past emerging market returns, S&P 1200 returns to proxy world stock market conditions, growth rates of the EMBI+ global spread to approximate an emerging market bond environment, and growth rates of the broad U.S. dollar index to control for movements in the external value of the U.S. dollar.[5] The contemporaneous other markets' and U.S. returns are left out to avoid simultaneity problems. Country-specific effects are captured by step dummies[6] and an impulse dummy measures the market-depressing incidents on September 11, 2001.

Federal Funds target rate changes (split into hikes, cuts, and inter-meeting cuts) and our FOMC communication dummies enter the equation in three-day windows also capturing the impact on the day before the actual event and the day afterwards.[7] Thereby, we have to account for time-zone differences, as e.g. a noon speech in the U.S. happens after the Philippine stock exchange closes. The timing issue is described in Figure 1. According to this scheme, the variables enter the equation on the day when the news actually hits the respective market (and with one lead/one lag according to this timing).

[5] Data sources: Thomson Datastream for stock market data, JPMorgan for EMBI+ Spread, and Federal Reserves' statistical releases H.10 for Broad U.S. FX index.
[6] Argentina is used as a base category for the country dummies.
[7] The Federal Funds rate changes are coded as follows: 25 bps change: 1; 50 bps change: 2; otherwise: 0.

Figure 1: Example of news timing in a different time zone



The model allows for several special features. First, student-t distributed errors (Bollerslev, 1987) are assumed; these provide a better approximation to residuals that are not normally distributed. Second, the variance enters the main equation (Engle et al., 1987) to test whether volatility as a measure of risk is priced in the markets. Asymmetric effects of shocks (Engle and Ng, 1993), defined as last periods' forecast errors, are included in the model if κ_1 is significantly different from zero. In addition, asymmetry thresholds (Glosten et al., 1993) are captured when κ_2 is not equal to zero. Starting from these comprehensive GARCH(1,1) models, we exclude all the insignificant variables in a general-to-specific testing-down approach.

Specification for volatility estimation

The specification put forward in (1) turns out to be too demanding for the analysis of an impact of news variables on the conditional variance as the large number of dummy variables in the models prevents convergence of the estimators (Doornik and Ooms, 2008). Therefore, we had to simplify the models as given in equation (2):

$$
\begin{aligned}
&\text{returns}_t = \gamma + \sum_{r=1}^{6} \delta_r \text{ control variables}_{t-r} + \zeta \text{ country dummies} + \eta \text{ ID9/11} + \mu_t, \\
(2)\quad &\mu_t = \varepsilon_t h_t^{1/2}, \\
&h_t = \alpha_0 + \alpha_1 \mu_{t-1}^2 + \beta_1 h_{t-1} + \theta \text{ communication events}_t.
\end{aligned}
$$

where α_0, α_1, β_1, μ, γ, δ, ζ, η, and θ are parameters or vectors of parameters, τ is an indicator function as defined in the last line above, and $\varepsilon_t|\Gamma_{t-1} = t(v)$, with Γ_{t-1} capturing all the information up to t-1, and t(v) a t-distribution with v degrees of freedom.

We have to exclude the communication dummies and target rate changes from the level equation as this overburdens the model. Additionally, we omit all GARCH features besides the student-t distributed errors to achieve robustly converging models. We employ three different sets of regressions: first, we test whether two dummy variables covering all the communication events (speeches, testimonies, monetary policy reports, and statements) and all the target rate changes, respectively, affect the conditional volatility of financial markets' returns. Second, we distinguish between positive events (EO+, MP-, target rate cuts) and negative events (EO-, MP+, target rate hikes). Third, we differentiate the communication events by including a variable for each type of communication while controlling for the impact of rate changes. After estimating these models, we exclude all the insignificant variables using a general-to-specific approach. In case we cannot rule out an integrated GARCH process, we ensure stationarity by imposing appropriate a priori restrictions.

4. Impact on market returns and volatility

Impact on returns

In this section, we firstly describe the impact of FOMC communication and target rate changes on the markets' returns. When using a single dummy variable (for each type of news) describing the reaction of all emerging markets in the panel, we obtain only one significant coefficient for target rate changes, namely the influence of inter-meeting cuts. Furthermore, there are only two significant communication variables, speeches indicating loose monetary policy and monetary policy reports stating a negative economic outlook. However, in a pooled model, all the countries are treated as equal. Therefore, in the next step, we explore the heterogeneity in our sample in more detail by conducting separate regressions for each country.[8]

As it turns out, there are notable differences in the reaction of the American countries, Argentina, Brazil, Chile, Mexico, and Peru, compared with the countries throughout the rest of the world. The former react to various forms of communication while the latter are only affected by a few variables. Figure 1 shows an obvious difference in the transmission mechanism. While in American countries speeches and target rate changes mostly occur during trading hours, in other countries these events take place after market closure (or before market opening on the subsequent day).[9] Although we address this timing problem by coding the news on the day when it actually hits the respective markets, the difference between

[8] To conserve space, we do not report these regressions in detail. All the omitted results are available upon request.
[9] Scheduled target rate changes are always communicated at 2.15 p.m. ET.

American markets and the rest of the world remains. As a reflection of this heterogeneity in the panel, we created separate dummy variables for the American and the non-American countries. The results are reported in Table 1.

Turning to the GARCH specification, we are able to rule out an integrated GARCH process (Nelson, 1990; $Chi^2(1) = 23.8$**). Student-t errors with 4 degrees of freedom provide a better approximation to the non-normal normal residuals. However, diagnostic testing shows that non-normality is still present and we consequently use robust standard errors as suggested by Bollerslev and Wooldridge (1992). We find that the last period's negative forecast errors have a larger impact on the current volatility of the emerging market indicator than positive ones. This implies that unspecified negative news has more influence on volatility than positive news. Finally, we are not able to remove serial correlation in spite of experimenting with a wide range of specifications.

The performances of the Indian, Pakistani, and Russian stock markets are better and those of Chile, China, Jordan, Malaysia, and the Philippines worse than average. These findings are consistent with the descriptive statistics reported in Table A1. (Weak) market efficiency is violated as the first and fourth lag can be used to predict today's outcome. Emerging equity markets are affected by global stock market conditions via lagged S&P 1200 returns. An ascending EMBI+ spread (i.e. the spread between emerging market bonds and a U.S. benchmark bond) depresses today's stock market returns. This implies that investors move their capital out of emerging equity markets in times of higher bond returns. However, when comparing the impact of the global stock market environment and bond conditions in the emerging markets, the cumulative impact of the former is larger ($Chi^2(1) = 48.8$**). Finally, an appreciation of the broad U.S. dollar index leads investors to move out of emerging equity markets. The absolute impact of the exchange rate is statistically smaller than that of global stocks ($Chi^2(1) = 7.2$**) and equal to that of bonds ($Chi^2(1) = 1.9$).

The differences in the impact of news on American and non-American countries can be inferred from the number of news variables that remain after the testing-down process. Target rate changes only matter for the American indices if these imply looser monetary policy and, in particular, if the decision was made during an unscheduled FOMC meeting. Returns move up by 0.16 percentage points in expectation of a regular rate cut. Inter-meeting cuts do not seem to be fully unexpected as there is already a positive reaction of equity returns on the day before the actual announcement, which is statistically of equal size ($Chi^2(1) = 0.59$).

Table 1: Explaining emerging market equity returns

	Coefficient	**Standard Error**
α_0	0.0000018**	0.0000002
α_1	0.09429**	0.00602
β_1	0.8879**	0.00644
Student-t	4.43	
Threshold	0.05239**	0.00726
Constant	0.00062**	0.00008
Chile	-0.00035**	0.00013
China	-0.00064**	0.00024
India	0.00079**	0.00028
Jordan	-0.00066**	0.00014
Malaysia	-0.00062**	0.00015
Pakistan	0.0008**	0.00027
Philippines	-0.00065**	0.00024
Russia	0.00128**	0.00037
Returns $_{t-1}$	0.06779**	0.00542
Returns $_{t-4}$	0.01686**	0.00494
S&P 1200 $_{t-1}$	0.10991**	0.00619
S&P 1200 $_{t-2}$	-0.01443*	0.00574
S&P 1200 $_{t-3}$	0.03155**	0.00584
EMBI+ $_{t-1}$	-0.01598**	0.00269
EMBI+ $_{t-2}$	-0.00841**	0.00266
EMBI+ $_{t-3}$	-0.00776**	0.00264
EMBI+ $_{t-5}$	-0.00758**	0.00247
Broad U.S. FX $_{t-1}$	-0.06707**	0.01891
American emerging markets		
FFTR Cut $_{t+1}$	0.00161**	0.00054
FFTR Inter-Meeting Cut $_{t+1}$	0.00243*	0.00107
FFTR Inter-Meeting Cut $_{t}$	0.00333**	0.00111
FFTR Inter-Meeting Cut $_{t-1}$	0.00182**	0.00056
Statement Economic Outlook Negative $_{t+1}$	-0.00341**	0.0009
Statement Economic Outlook Negative $_{t}$	-0.0012*	0.00059
Speech Economic Outlook Positive $_{t}$	0.00087*	0.00043
Non-American emerging markets		
FFTR Inter-Meeting Cut $_{t}$	0.00273*	0.0012
Statement Economic Outlook Positive $_{t}$	0.00138*	0.00055
Monetary Policy Report Economic Outlook Negative $_{t}$	-0.00241*	0.00115
Log-likelihood	112478	
No. of observations	38063	
Testing exclusion restriction:	$Chi^2(121) = 146.7$	
Normality test:	$Chi^2(2) = 78326$**	
ARCH 1-2 test:	$F(2,38025) = 0.52$	
Portmanteau test:	$Chi^2(195) = 466$**	

Notes: * (**) indicates significance at a 5% (1%) level. Standard errors are heteroscedasticity-consistent.

Altogether, returns are raised by 0.76 percentage points over the 3-day window. Rate hikes do not have a significant impact on any market. A possible explanation is that these are mostly anticipated, in particular during the last tightening cycle in the period 2004–2006. Target rate changes outside America only matter when these are unscheduled rate cuts. A cut by 25 basis points (bps) causes higher returns on non-American equity markets of 0.27 percentage points. Comparing this figure with the corresponding impact on American markets, one cannot statistically differentiate between the influence on the actual day ($Chi^2(1) = 0.13$) but over the 3-day window, where the influence on American markets is statistically larger ($Chi^2(1) = 5.7$*).

Considering informal communication, statements referring to a negative economic outlook already trigger lower returns in American markets on the days before FOMC meetings (0.12 percentage points) as well as on the actual announcement days (0.34 percentage points). Non-American markets are affected positively by statements reporting a bright economic outlook (0.14 percentage points). Although one cannot statistically distinguish between the impact of positive and negative statements in the respective regions on the actual day of release ($Chi^2(1) = 0.05$), the latter is larger when also including the anticipatory effects ($Chi^2(1) = 7$**). This could be another instance of a larger reaction of American markets but it may also be due to an asymmetric reaction to good and bad news. Negative EO news reported in monetary policy reports moves down non-American markets by 0.24 percentage points. Finally, the least formalized channel of Fed communication, speeches by Board of Governors members, trigger higher returns (0.09 percentage points) in America if a sound economic outlook is reported.

Neither American nor non-American markets react to news comprising monetary policy inclination other than actual rate moves. This can be seen as evidence that the real economic component of FOMC *communication* is more important for non-U.S. markets. Considering the size of the reaction, one should take into account an average absolute daily return of 1.08 percentage points, which implies that the news is of economic relevance.

In our view, differences between American and non-American markets can be traced back to two causes. First, Figure 1 shows that news hits the former (mostly) at the time when it occurs and there is a time lag (mostly overnight) before the latter are affected. Our results suggest that the impact of news (partly) vanishes overnight as non-American markets do not react to the same extent as American markets. Second, the trade share of American countries with the U.S. is between 44 and 59 percent (see Table A2 in the Appendix). Although increasing, non-American countries have trade shares of only 13 to 16 percent. Third, the

financial integration of American countries, measured by the share of portfolio investment from the U.S., is between 47 and 54 percent (see Table A3 in the Appendix). In contrast, the share of portfolio investment in non-American countries is smaller (36 to 45 percent) and decreasing. Thus, we argue that the larger reaction of American markets can be explained by (more) overlapping trading hours and the better timing of news, as well as larger trade and financial integration with the U.S. This list of factors goes beyond those put forward by Ehrmann and Fratzscher (2006) and Wongswan (2005), who emphasize the importance of global integration and financial integration with the U.S., respectively.

Finally, we want to consider the impact of central bank communication in comparison with actual target rate changes by taking into account that the former occur much more often than the latter. Table 2 shows the cumulative effects of communication events over our sample, differentiated across markets and concentrating on the significant coefficients from Table 1.

Relatively few instances of interest rate cuts generate noteworthy effects on returns. However, the cumulative effect of informal methods of communication over time is of a similar size. When aggregating the cumulative effects of statements and speeches, it is substantially larger than the impact of actual interest rate changes. This indicates that the coefficients estimated for single informal communication events may disguise their actual importance for financial market movements.

Table 2: Cumulative returns for American and non-American markets

American emerging markets		**Non-American emerging markets**	
FFTR Cut $_{t+1}$	0.03		
FFTR Inter-Meeting Cut $_{t+1}$	0.02		
FFTR Inter-Meeting Cut $_{t}$	0.02	FFTR Inter-Meeting Cut $_{t}$	0.02
FFTR Inter-Meeting Cut $_{t-1}$	0.01		
		Statement EO Positive $_{t}$	0.03
Statement EO Negative $_{t+1}$	-0.06		
Statement EO Negative $_{t}$	-0.02		
		Monetary Policy Report EO Negative $_{t}$	-0.01
Speech EO Positive $_{t}$	0.08		

Impact on volatility

Considering the impact of news on the conditional variance of the equity markets, we conduct several sets of regressions. Firstly, we test whether a dummy variable capturing all communication events and a dummy variable capturing all target rate changes affect the conditional volatility of financial markets' returns. Secondly, we distinguish between positive

and negative events. Thirdly, we analyze the communication events in more detail, as we include a variable for each type of communication while controlling for the impact of rate changes.

As it turns out, only in the third set do we obtain one significant coefficient: the occurrence of a monetary policy report lowers price volatility in both American and non-American countries (see Table 3).

Table 3: Impact on market volatility

	Coefficient	**Standard Error**
α_0	0.0000016**	0.0000001
α_1	0.1057	0.00388
β_1	0.8943**	0.0029
Student-t	4.53	
MPR Event in Variance Equation	-0.0000089**	0.0000035

Notes: * (**) indicates significance at a 5% (1%) level. Standard errors are heteroscedasticity-consistent. Only the variables of interest of the reduced model resulting from the testing-down process are listed. Full tables are available upon request.

Hayo et al. (2008) as well as Hayo and Neuenkirch (2008) show a similar impact of FOMC communication on U.S. and Argentine markets, respectively, and conclude that central bankers calm down markets when communicating with the public. However, another possible explanation is that traders may limit their activities because they want to wait and see whether there is new information in the semi-annual monetary policy report. Overall, monetary policy news has a very limited impact on emerging markets volatility.

5. Further specification and robustness checks

To explore the robustness of our findings, we first conduct a detailed country-specific examination. We obtain only a few additional significant variables and conclude that our pooling approach is not invalidated by a strong heterogeneity across countries. Furthermore, the structure of our results and the separation into American and non-American markets is confirmed.

Second, we confirm that our selection of countries is appropriate. We calculate country-specific models for the Czech Republic, Hungary, Korea, Poland, Taiwan, and Turkey. These countries are not affected as systematically as our selection of "emerging" markets and show different reactions.

Third, we attempt to extend our analysis to bond and foreign exchange markets. However, country-specific estimations as well as pooled regressions reveal puzzling results

with no systematic patterns. One possible explanation is that these markets are either not liquid enough or react more strongly to domestic news.[10]

Fourth, we include further communication variables in the model. Variables comprising speeches by the twelve regional presidents who are also members of the FOMC are inserted into equation (1). In one set of regressions, we check for the impact of this group as a whole, while in another set we split the group into voting presidents and non-voting presidents. As neither specification reveals insights, we keep our more parsimonious design.

6. Conclusions and policy implications

In this paper, we study the effects of Federal Funds target rate changes and all types of informal FOMC communication on emerging equity market returns and volatility. Using a GARCH model, we analyze the single and combined influence of target rate changes, post-meeting statements, monetary policy reports, testimonies, and speeches over the period 1998–2006. We concentrate our analysis on four research questions:

First, what is the economic impact of U.S. monetary policy actions and communications on equity returns in emerging markets? We show that target rate changes and central bank communication have a significant impact on emerging equity market returns. Ranging from 10 to 33 basis points, the magnitude of these effects is not very large in absolute terms but still of economic relevance given that the average returns are only 108 basis points in our sample.

Second, do markets react differently to official rate changes versus less formalized channels of monetary policy like speeches and testimonies? Our point estimates suggest that the reactions are in a comparable range, even though we find a larger share of significant variables for target rate changes. However, taking into account the relatively high frequency of the occurrence of informal methods of central bank communication compared with target rate changes, one can show that the cumulative effects are at least of a similar size.

Third, how is the volatility on emerging equity markets influenced by U.S. monetary policy actions and communications? The occurrence of a (semi-annual) monetary policy report lowers price volatility. Thus, by communicating with the public, the FOMC manages to calm down financial markets. An alternative explanation is that traders limit their activities because they want to analyze whether there is new information in the monetary policy reports.

Finally, are there country-specific differences across emerging markets' reactions? We find a significant difference in the reaction of American and non-American emerging

[10] To avoid problems with de jure or de facto pegged exchange rate regimes, we only select countries classified by Reinhart and Rogoff (2004) as having flexible exchange rate regimes.

markets. This can be explained by timing issues as news hits American markets when it occurs while non-American markets are hit with a time lag (mostly overnight). In addition, American emerging economies are more closely integrated with the U.S. in real and financial terms than non-American emerging markets and, therefore, Fed monetary policy news has a larger impact on this group of countries.

Our results have important implications for policymakers and investors. First, the finding that American stock markets are more subject to the transmission of policy shocks from the U.S. than non-American stock markets suggests that the former countries are subject to a higher possibility of contagion and a lower degree of diversification opportunities for investors. Second, we find that U.S. monetary policy news has a larger impact on returns than the volatility of returns, indicating mostly wealth effects of the Fed's actions rather than risk effects, measured by the conditional variance of returns in this paper. This means that, given the current global crisis, U.S. monetary policy announcements can significantly change the wealth of the neighboring American economies. Policymakers in these countries need to design strategies to deal with this issue effectively.

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Appendix

Table A1: Descriptive statistics of stock market returns

	Mean	Std Dev.	Skewness	Excess Kurtosis	Minimum	Maximum
Overall	**0.00061**	**0.0167**	**0.0306**	**13.08**	**-0.2034**	**0.2882**
Argentina	0.00057	0.023	-0.0122	4.63	-0.143	0.1612
Brazil	0.0007	0.0224	0.7616	17.09	-0.1723	0.2882
Chile	0.00046	0.0067	-0.0135	4.32	-0.0377	0.0447
China	0.00033	0.0139	0.4212	5.75	-0.088	0.094
Egypt	0.00072	0.016	0.3276	7.81	-0.128	0.137
India	0.00069	0.0172	-0.9604	9.5	-0.1872	0.0833
Indonesia	0.00073	0.0171	0.2538	6.45	-0.0976	0.1313
Israel	0.00056	0.0124	-0.3601	4.05	-0.0842	0.0657
Jordan	0.00053	0.0109	-0.6718	11.97	-0.0953	0.0682
Malaysia	0.00037	0.0146	1.51	35.79	-0.1424	0.2082
Mexico	0.00077	0.0159	0.1293	4.98	-0.1034	0.1215
Pakistan	0.00085	0.0184	-0.4201	5.67	-0.1321	0.1276
Peru	0.00092	0.0109	0.0056	4.64	-0.0688	0.0542
Philippines	0.00029	0.0151	1.04	13.78	-0.0963	0.1618
Russia	0.0008	0.0271	-0.3421	5.58	-0.1878	0.1556
South Africa	0.00073	0.0125	-0.4409	4.19	-0.0856	0.0589
Thailand	0.00031	0.0178	-0.3963	14.65	-0.2034	0.1135

Table A2: Trade with the U.S.

	1998	1999	2000	2001	2002	2003	2004	2005	2006
American countries	250	278	334	311	301	304	342	379	428
%	53%	58%	59%	57%	56%	53%	49%	46%	44%
Non-American countries	174	184	215	209	231	264	330	391	469
%	16%	16%	16%	15%	15%	14%	13%	13%	13%

Trade with the U.S. in billions of USD and as a percentage of total trade
Source: IMF Direction of Trade Statistics

Table A3: Portfolio investment from the U.S.

	2001	2002	2003	2004	2005	2006
American countries	94	83	120	146	195	242
%	47%	51%	50%	51%	54%	53%
Non-American countries	60	73	113	136	183	243
%	42%	45%	41%	38%	37%	36%

Portfolio investment from the U.S. in billions of USD and as a percentage of total investment
Data are not available for China, Jordan, and Peru.
Source: IMF Coordinated Portfolio Investment Survey