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The Impact of News, Oil Prices, and International Spillovers on Russian Financial Markets

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Abstract

This paper analyzes the impact of news, oil prices, and international financial market developments on daily returns on Russian bond and stock markets. First, there is some persistence in both bond and stock market returns. Second, we find that U.S. stock market returns Granger-cause Russian financial markets. Third, growth in oil prices has a positive effect on Russian stock market returns. Fourth, there is a significant economic and statistical influence of a specific type of news on the Russian bond market: Positive (negative) news related to the energy sector raise (lower) daily returns by one percentage point. News from the war in Chechnya, on the other hand, do not appear to have a significant influence on financial markets.

JEL: C5, G12, G15, F36.

Keywords: financial market behavior, financial market integration, stock market returns, bonds market returns, news, emerging markets, transition economies.

I. Introduction

Russia is one of the biggest emerging markets today. Despite its sheer size, importance for global investors, and major financial reforms in recent years, there are only a few empirical studies about financial markets in Russia. Other emerging markets, such as those in Asia and South American markets, are already extensively studied.

It is interesting to study the Russian market for several reasons. First, financial market behavior in Russia can be different than in advanced market economies due to historical, cultural, and institutional factors. Second, as an emerging market, Russian markets may offer important diversification benefits for investors (Rockinger and Urga, 2000). Third, since the early 1990s, Russian policy makers have implemented major economic and financial reforms, resulting in the emergence of new financial markets. An important question is whether investors in this market react to “news” in a similar fashion like those in other market economies. Fourth, Russia is rich in energy resources and oil price shocks may have destabilizing effects on Russian financial markets.

This paper contributes to the literature in several significant ways. First, it examines financial market behavior in Russia in response to “news”. To do so, we construct a set of news events that might be of particular importance to investors in Russia and then test market reactions to such news in both stock and bond markets. Second, it tests the degree of integration of Russian financial markets into the world economy. As a result of recent trade and financial liberalization measures, the Russian economy joined the global economy. It is thus expected that world market developments significantly affect the economy as well as financial markets in Russia. Therefore, it is important to observe the sensitivity of Russian financial markets to global market developments. The growing importance of the integration of domestic markets with the world market diminishes opportunities for investors to reduce overall portfolio risk through diversification, resulting in the possibility of contagion in times of crisis. Regulatory policies may be needed to reduce the potentially negative effects of contagion on the domestic economy (Gelos and Sahay, 2001). To address the issue of spillovers from international financial markets onto Russian markets, we employ data on U.S. stock and bond market returns. We can test whether U.S. financial variables Granger-cause their Russian counterparts. If we find such a relationship, then one can argue that the domestic financial markets in Russia have become vulnerable to global financial developments.[1]

An important feature of the Russian economy is its rich energy resources. Exports make up about 33 percent of GDP, and about 50 percent of export revenues come from the energy sector, especially oil (Rautava, 2002). Changes in the world oil prices are therefore expected to significantly affect economic activity in Russia and disturb the financial market activity accordingly as an important source of global risk. [2] Despite its importance, this issue is not studied in the literature. As our third objective, this paper thus provides initial evidence about the role of oil prices in Russian bond and stock markets.

Our findings have significant implications for market participants and policy makers. In the next section, we summarize previous work on this topic. Section III describes the construction of news events and data used, while in section IV we report our empirical results. The last section concludes the paper and discusses policy implications of our findings.

II. Related literature and our contribution

There are only a few empirical studies examining the financial markets in Russia. These studies can be divided into three groups. First, Gelos and Sahay (2001) investigate the impact of Russian stock market movements on a set of central and eastern European stock markets during the recent Russian crisis and find significant contagion effects. Second, Christoffersen and Sløk (2000) test the predictive power of asset prices for real activity, using a panel data that includes Russia and five central and eastern European economies and report

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[1] We employ U.S. data in this paper because the U.S. is the most important economy and considered to be the biggest investor in the Russian economy.

[2] Rautava (2002) provides evidence that oil price fluctuations have a significant impact on the Russian economy.

that asset price movements Granger-cause output growth. Third, Rockinger and Urga (2000) test the predictability and efficiency of the Russian and central European stock markets. They conclude that Russian market returns are highly correlated, indicating significant predictability. With respect to weak market efficiency, they cannot draw strong conclusions.[3] In addition, this study reports that stock returns in these countries exhibit ARCH effects.

As the brief review of the literature indicates, this paper addresses three issues that have not been analyzed so far. A specific feature of our study is the analysis of the influence of "news" on the Russian stock and bond markets. In addition, we also investigate the impact of oil price changes and U.S. financial market developments on the two markets in a consistent econometric set-up. Compared to the existing work in the literature, our study provides a more comprehensive analysis of Russian financial markets.

III. Construction of news

The construction of news events is the most labor-intensive part of the data preparations. We use two examples of explicit news events in our study. First, we choose a category of *economic* news that is likely going to be of potentially great importance to the Russian economy. The Russian economy is very much dependent upon the energy sector (see, Rautava, 2002). Thus, over the time period September 1995 to November 2001, we methodically sieve through the news announcements published on the yahoo website of daily news, **http://dailynews.yahoo.com/fc/World/Russia/**. We then collect those announcements, actions, or events that relate to the energy sector. For the question at hand, we categorize the "news" into three different types: news that is good, neutral, or bad for the energy sector. Table 1 provides an overview of these news categories, their definitions and the number of events in our sample. The news categories are translated into (0,1) dummy variables for the

[3] They argue that the predictability does not necessarily imply inefficiency because the former may be due to either risk premium or lack of liquidity in the market.

purpose of empirical analysis. We make sure that results are fairly robust with respect to news that is difficult to classify. In all estimations, we use the event dates.

Second, using the same data source, we choose an area of *political* news that takes up a lot of space in the international media, namely the war in Chechnya. The hypothesis here is that Russia winning the war may be good news for the Russian economy, as well as achieving an end to the conflict. Moreover, we think that Chechnya winning the war or a continuation of the conflict is bad for Russian financial markets. Based on this classification, we construct again three categories of war news, namely good, neutral, and bad.

IV. Data and econometric methodology

The dependent variables in our study are daily closing stock and bond returns for Russia over the time period 1 September 1995 to 30 November 2001.HYPERLINKHYPERLINK Daily returns are computed as growth rates (in percent). The stock data are obtained from the website of the Russian Trading System (RTS) http://www.rts.ru/engl/rts/index_dhist.stm[4] while the bond data are available from Morgan Stanley's "Emerging Market Bond Index" website, http://www2.jpmorgan.com/MarketDataInd/EMBI/embi.html. [5]

As argued above, we have to account for the integration of Russian markets in international financial markets. It will be interesting to see whether U.S. market developments Granger-cause Russian financial variables. Consequently, we include the U.S. Standard & Poors Stock Price Index daily returns and the three-month US bond price daily returns in our estimations, computed accordingly. The U.S. data were obtained from the Yahoo finance website, http://finance.yahoo.com/ and are employed with their lagged values only. This is

[4] Following previous studies, we utilize the RTS index, which includes stocks of the largest and most liquid companies and reflects the general trends in the Russian stock market quite well.

[5] Due to the Russian crisis in 1998 and the resulting debt default, complete data on the domestic bond market are not available. Therefore, we have decided to use this emerging market bond yield for Russia.

necessary due to the different time zones the U.S. and Russia are in, as well as it is a pre-requisite for a test of Granger-causality.

As pointed out above, oil exports play a crucial role for the Russian economy Thus, we would expect that oil prices have a positive influence on financial markets in Russia. To measure the impact of oil prices on financial markets in Russia, we include the daily growth rate (in %) of the crude oil (spot) price. The oil data were obtained from the website of the United States Energy Information Administration, http://www.eia.doe.gov/emeu/international/crude1.html.[7]

Descriptive statistics for both variables can be found in Table 2. The average returns in the US and Russian stock markets are quite similar, while the nominal daily return on the Russian bond market is much higher than on its US counterpart. Russian financial markets, in particular the bond market, are much more volatile than US markets. The standard deviation of Russian bond returns is more than 25 times higher than that of US bond returns, while the standard deviation is only about three times higher in the case of the stock markets.

Russian and US financial market returns series exhibit excess kurtosis but not much skewness, and the distributions show clear evidence of ARCH effects (Engle, 1982). This implies that classical methods of estimation are not efficient. To take the volatility clustering into account, we employ the GARCH model developed by Bollerslev (1986) and some variants of it.

The general specification is an autoregressive-distributed lag model with six lags that allows for a number of special features (see equation 1). First, student-t distributed residuals (Bollerslev, 1987) are used that provide a better approximation to the non-normality of the residuals. Second, the variance enters the mean equation (Engle et al., 1987), and we can test

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[7]We also experimented with the premium on oil price futures for various time horizons but were unable to uncover any interesting statistical relationships.

whether volatility, a measure of risk, is priced in Russian 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. Finally, asymmetry thresholds (Glosten et al., 1993) are captured when κ_2 is not equal to zero.

A model that works well for both bond and stock markets in Russia with regard to capturing ARCH effects is a GARCH (1,1) model. In the actual estimation we proceed using a consistent general-to-specific modelling approach (see Hendry, 1995). This ensures that the inferences based on statistical tests are valid throughout the modelling process.

The general specification is as follows:

$$
\begin{aligned}
&\text{Returns}_t = \mu + \sum_{r=1}^{6} \delta_r \text{Returns}_{t-r} + \sum_{r=1}^{6} \gamma_r \text{S \& P}_{t-r} \sum_{r=1}^{6} \varphi_r \text{USBonds}_{t-r} + \sum_{r=1}^{6} \lambda_r \text{Oilprice}_{t-r} \\
&+ \eta \text{h}_t + \phi \ \text{Dummies} + \text{u}_t, \\
&\text{with:} \quad \text{u}_t = \varepsilon_t \text{h}_t^{1/2}, \qquad (1) \\
&\qquad \text{h}_t = \alpha_0 + \alpha_1 (\text{u}_{t-1} - \kappa_1)^2 + \kappa_2 \tau (\text{u}_{t-1} - \kappa_1)^2 \beta_1 \text{h}_{t-1}, \\
&\qquad \tau = 1 \text{ if } \text{u}_{t-1} < \kappa_1 \text{ and zero otherwise,}
\end{aligned}
$$

and: α, β, μ, κ_1, κ_2, δ, γ, φ, λ are parameters, ϕ is a vector of parameters, Dummies is a vector of news dummies, τ is an indicator function, and $\varepsilon_t | \Gamma_{t-1} = t[\nu]$; with Γ_{t-1} capturing all information up to t-1, and $t[\nu]$ a t-distribution with ν degrees of freedom.

Testing is undertaken by employing the robust standard errors developed by Bollerslev and Wooldridge (1992) to account for the nonnormality of the returns (Table 2). Our sample period is 1 September 1995 to 30 November 2001. The actual estimation uses data until end of August 2001, while we keep two months of observations for out-of-sample analyses (35 observations). This allows not only to evaluate the stability of our estimated models in general but also to specifically see whether the terrorist attacks on the World Trade Center and the Pentagon on 11 September 2001 have a significant impact on the data generating process.

V. Analyzing the effect of news, oil shocks, and U.S. market movements on bond and stock returns

We start off the modelling process with an equation for daily *bond returns*. Here we encountered a problem related to an observation dated 23 October 1997, which has a strong influence on the outcome of ARCH-tests. In view of our large sample size, we see no major disadvantage of adding an impulse dummy to the model that effectively removes this problem.[8] In addition, the out-of-sample tests will reveal any detrimental effects that this might have on the forecasting ability of our model. Then, reducing the number of variables and special features in a consistent testing-down process ($Chi^2(30) = 26.2$), we arrive at a much more parsimonious model presented in column two of Table 3. It is a threshold GARCH(1,1) model with student t(5)-distributed errors.

We find that all parameters of the GARCH(1,1) terms are significant. This finding is consistent with the evidence of ARCH effects reported in Rockinger and Urga (2000) for the Russian stock market. A sufficient condition for the conditional variance h_t to be non-negative is that α_0, α_1, and β_1 are non-negative, which is fulfilled here. Moreover, the sum of α_1 and β_1 is less than unity, ruling out that the model is an integrated GARCH (see Nelson, 1990). The data appear to be closer to a student-t distribution than a normal distribution. In particular, the estimate of the degrees of freedom of the student-t points towards a distribution with five degrees of freedom, which has fatter tails than a normal distribution.

The diagnostics tests for the bond equation indicate that there is neither any trace of ARCH left nor is the Portmanteau-type test for autocorrelation significant. The only problem

[8] There was a meeting of the CIS (Community of Independent States) countries taking place in Moldowa around this time. On this specific day an announcement was made that the leaders of the participating countries are unable to agree to any meaningful perspective of this organisation for the future.

is the remaining non-normality of the residuals. To compensate for that we use robust standard errors based on Bollerslev and Wooldridge (1992).

Next, we want to assess how the model performs out-of-sample. Figure 1 provides forecasts and their 95% confidence intervals for the months September and October 2001. Note that about one working week of data are missing after 10 September. Although there is one observation (4 September 2001) outside the confidence bands, in general the model performs satisfactory. Thus, the estimated equation appears to be stable even during a time of financial upheaval.

With regard to the remaining variables, we find that the first lag of the dependent variable is significant. This implies first that there is persistence in Russian bond returns in that Russian returns are predictable with a univariate model. Hence, (weak) market efficiency appears to be violated on Russian bond markets. The degree of persistence is not very high, though, as the lagged dependent variable takes on a value of less than 0.10. It might well be the case, as argued by Rockinger and Urga (2000) that this reflects varying risk premia and thin markets rather than a violation of market efficiency.

In addition, there is a significant influence of U.S. markets. Surprisingly, it is not the U.S. bond market that shows an influence but the U.S. stock market. A one-percentage point increase in S&P returns lead to an increase of Russian bond returns by 20 basis points. Thus, U.S. financial markets Granger-cause Russian bond markets. The economic effects are twice as strong as those of the lagged Russian bond returns.

We find some evidence, though only significant at a 5% level, for threshold asymmetry (Glosten et al., 1993). It implies that negative forecast errors last period have a larger impact on the current volatility of the Russian bond market than positive ones. This can also be interpreted as unspecified negative news, which are being captured in the forecast error, having more influence than unspecified positive news. The problem with this approach is that the forecast error may reflect all sorts of influences, not least weaknesses in the econometric model, and not only news. We think that this is a serious problem, and thus we continue our analysis using the explicit news categories described above.

Starting with energy news, we observe that there is a clear difference in the way the content of news affects bond returns. Neutral energy news influences the market in no significant way. On the other hand, positive (negative) news raise (lower) market returns, suggesting that the content of news plays an important role.

The impact of good and bad news is not only of statistical but also of economic importance, as good news increase bond returns by about one percentage point and bad news decrease returns by about the same amount. This influence is five times higher than the effect of U.S. S&P on Russian returns. Making use of statistical testing, we cannot reject the symmetry hypothesis, in absolute terms, of the impact of good and bad news on bond returns ($Chi^2(1) = 0.01$). Given the size of the coefficients, it seems worthwhile to test the estimates against the hypothesis of a unit influence of news on bond returns. We cannot reject these hypotheses ($Chi^2(2) = 0.02$). Therefore, we conclude that good (bad) energy news raise (lower) daily stock returns by one percentage point.

Moving the analysis to war news in the bonds equation, Table 3 reveals that none of the coefficients are statistically significant. Thus, the Chechnya war has no noticeable impact on bond market returns.

Next, we analyze the Russian *stock market*. The modeling strategy is similar to the one described above for the bond market and need not be repeated here. Testing-down of variables in the general model of the stock market equation ($Chi^2(28) = 32.8$) leads to a more parsimonious model with regard to the GARCH features than the bonds equation. We do not have to include the outlier dummy as in the case of the bonds equation, and we cannot find any trace of threshold asymmetry. The degree of non-normality is relatively less severe. Figure 2 displays the out-of-sample performance of the equation. It is apparent from the graph that no violation of the hypothesis of stable parameters occurs. Note, however, that the confidence band is much wider compared to the one of the bonds equation in Figure 1.

Regarding the variables in the model, we again observe persistence in returns. This evidence is consistent with findings by Rockinger and Urga (2000). The degree of persistence is larger than in the case of bond returns but still not very high. Again, we find evidence for the S&P index to influence Russian markets. This time, a one percentage point increase of U.S. stock market returns leads to an rise of Russian stock returns by 0.54 percentage points after the first period. However, this impact is weakened after the second period, which leaves an overall effect of U.S. returns of 0.4 percentage points. This is twice as large as in the case of the bonds equation, and more than three times higher than the impact of lagged stock returns.

We now keep the first lag of the oil price growth in the equation after the testing-down process. An increase of one percent in the oil price raises stock prices by about one-tenth percentage points. This effect is significant but not very strong in economic terms. It has only about 20% of the impact U.S. financial markets have on Russian stock returns.

However, this time we do not find any significant news effect in the model. There is neither an asymmetry of forecast errors on the conditional variance nor is there an influence of the explicit news categories referring to energy news and Chechnya war news on stock returns.

Finally, there is the question of whether the explicit news categories have an impact on the volatility of financial markets. Or, more technically, whether news variables enter the variance equation of bonds and stocks models significantly (see Bollerslev and Ghyssels, 1996).[9] We do not find significant effects of news variables in the variance equation. Thus,

[9] We also considered modeling within an EGARCH framework (Nelson, 1991) as a further robustness check. It turned out, however, that we do not get converging estimates for this class of models. The reason for these problems lies in the presence of the “news” dummy variables, which cause serious problems for the optimization algorithms (Doornik and Ooms, 2002).

these news categories – if they have an effect, as in the case of the bonds market – rather affect mean returns than the volatility of the series.

VI. Conclusions

This paper analyzes Russian financial markets using daily returns on stock and bond markets over the period September 1995 to November 2001. It is found that a GARCH(1,1) model fits the data quite well for both markets. There is some persistency in the returns, providing evidence against (weak) market efficiency. However, the degree of persistence is not very high, and thus it may simply reflect time-varying risk premia and/or thin markets rather than market inefficiency.

In both markets, movements in the U.S. stock market index Granger-cause Russian returns. This finding indicates that Russian markets have become dependent on developments in global financial markets. In the stock market equation, we find a significantly positive effect of the growth in oil prices on returns. The economic impact of oil price growth is lower than the persistence in the series and that of the influence of the S&P index. The turmoil on international financial markets after the terrorist attacks on 11 September 2001 do not appear to have a strong impact on the stability of our estimated models.

A focus of our analysis is the effect of news on financial market returns. There is considerable evidence for news playing an important role on bond markets. Positive (negative) news related to the energy sector are found to raise (lower) bond returns by one percentage point. These effects are both statistically and economically significant. There is also evidence of threshold asymmetry, suggesting that negative forecast errors last period raise today's volatility more than positive ones. This result can also be interpreted as unspecified news having asymmetric effects, with negative news affecting the conditional variance more than positive news. We do not find, however, a statistically significant impact of news from the war in Chechnya on financial markets. Thus, financial markets clearly differentiate between different types of news. Although energy news are priced in the markets, an event as widely publicized in the international press as the Chechnya war does not seem to have much of an influence on both bond and stock markets.

Our results have important policy implications. Further liberalization and deepening of Russian markets will likely result in increased financial market co-movements between Russian and global markets, indicating more spillover effects in the future. Russian policymakers may need to consider designing appropriate regulatory measures to maintain the stability of the domestic market in order to reduce the level of risk in financial markets.

This expected growing importance of global integration is also likely to diminish opportunities for U.S. investors to reduce portfolio risk through diversification. Therefore, other transition economies, such as those in the central and eastern Europe, may provide a better alternative for diversification. The correlations of the latter markets with the U.S. is expected to be relatively low, as the latter are the candidate countries for the European Union and, thus, may be more influenced by financial markets in the Euro area than by U.S. markets.[10] However, European financial markets are also correlated with U.S. markets and the growing international interdependency makes it more and more difficult to successfully diversify risk.

Our finding that the Russian stock market is sensitive to oil price changes is consistent with the evidence that oil prices fluctuations have significant effects on domestic output and real exchange rate (Rautava, 2002). Our finding also suggests that oil price movements may significantly destabilize Russian markets. Given the growing tensions in the Middle East, the ongoing crisis may cause significant oil price fluctuations in the future, bringing about a higher level of market volatility in Russian markets and hence the risk. International investors

[10] Gilmore and McManus (2002) examine the correlations between the U.S. stock and central European markets. They find no significant long run relationship. Their evidence also indicates that the U.S. market does not Granger-cause any of the European markets.

may diversify such risk by investing in other emerging markets that are not as dependent on rich energy resources as Russia.

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Table 1: Defining news categories

Category	Definition	No. of cases
Energy:		
Energy good news	Announcements, actions, or events with positive implications for the energy sector	7
Energy neutral news	Announcements, actions, or events relating to energy with neither obvious good or bad implications	14
Energy bad news	Announcements, actions, or events with negative implications for the energy sector	5
Chechnya:		
War good news	Announcements, actions, or events that imply either Russian gains or an ending of the conflict	17
War neutral news	Announcements of Russian or Chechen military actions	28
War bad news	Announcements, actions, or events that imply either Russian losses or a continuation of the conflict	17

Table 2: Descriptive Statistics of daily returns (growth rates in %)

	Mean	St.Dev.	Min	Max	Skewness	Excess kurtosis
Russian bonds	0.08	2.64	-25.78	23.33	-0.32	2.64
Russian stocks	0.06	3.45	-19.03	16.83	-0.07	3.49
US bonds	-0.03	0.10	-4.75	4.84	0.19	2.03
US stocks	0.05	1.17	-6.87	5.12	-0.07	2.63
Oil price	0.01	2.51	-20.04	17.65	-0.06	5.86

Notes: The sample period is 1 September 1995 to 30 November 2001, with a total of 1388 consistent observations.

Table 3: Explaining returns using a GARCH (1,1) model with t- distributed errors

	Bond returns		Stock returns	
	Coeff.	SE	Coeff.	SE
α_0	0.02**	0.01	0.55**	0.19
α_1	0.07**	0.02	0.25**	0.06
β_1	0.90**	0.02	0.72**	0.06
Student-t degrees of freedom (ν)	5.1		6.7	
Threshold	0.08*	0.03		
Constant	0.12**	0.03		
Dummy 10/23/1997	-3.13**	0.03		
Bond return$_{t-1}$	0.09**	0.03		
Stock return$_{t-1}$			0.15**	0.03
Stock return$_{t-6}$			0.05	0.03
S&P return$_{t-1}$	0.20**	0.03	0.54**	0.07
S&P return$_{t-2}$			-0.14*	0.07
Oil price growth rate$_{t-1}$			0.08**	0.03
Energy neutral news	0.23	0.31	0.01	0.80
Energy good news	1.04**	0.23	-0.76	0.49
Energy bad news	-1.00**	0.26	-1.12	0.71
War neutral news	0.31	0.27	0.37	0.49
War good news	-0.28	0.21	-0.49	0.53
War bad news	-0.04	0.28	0.19	0.56
Number of observations	1347		1347	
Log-likelihood	-2535.5		-3341.1	
Normality test	$Chi^2(2) = 2574$**		$Chi^2(2) = 66.9$**	
ARCH 1-2 test	F(2, 1328) = 0.03		F(2, 1328) = 1.31	
Portmanteau test	$Chi^2(25) = 17.7$		$Chi^2(25) = 36.4$	

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

Fig. 1: Out-of-sample performance of daily bond returns equation with 95 %-intervals

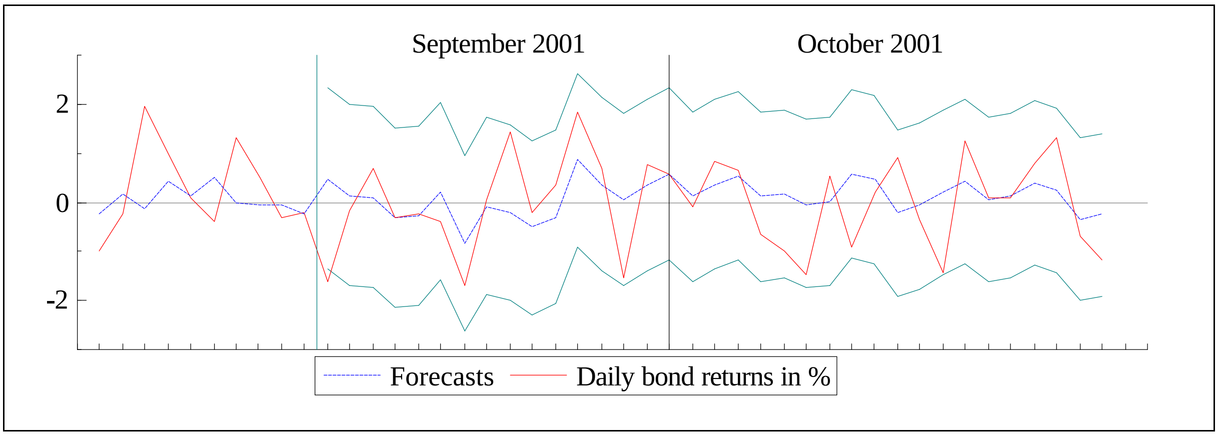
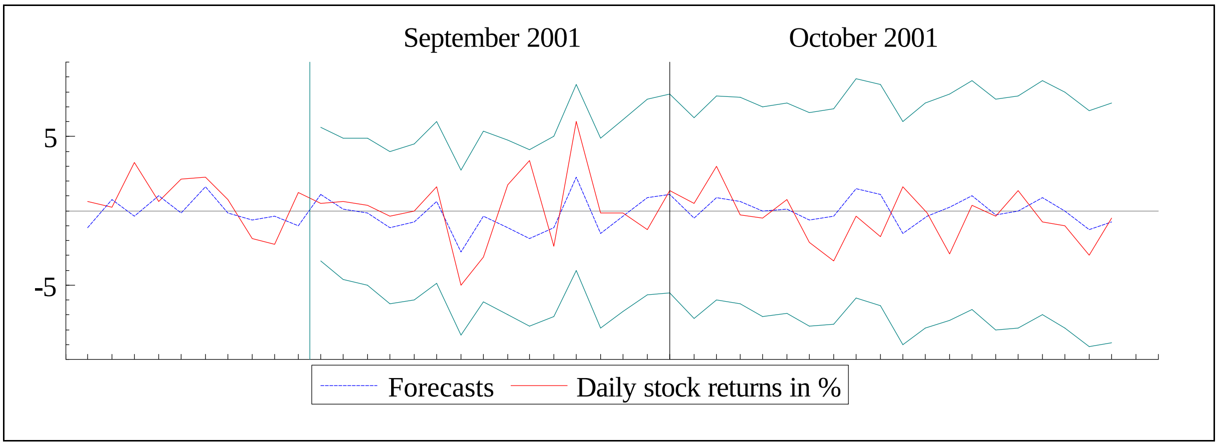


Fig. 2: Out-of-sample performance of daily stock returns equation with 95 %-intervals



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