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JEL Classification G15, E44, H6
Preliminary statement

DO FISCAL VARIABLES AFFECT STOCK MARKET RETURNS IN EU COUNTRIES?

This paper investigates the relationship between macroeconomic variables and stock market returns on the EU countries dataset. The link is explored between stock market returns and the set of fiscal and macroeconomic variables, including government debt, government expenditures, inflation rate, broad money supply, money market interest rate, foreign currency reserves and foreign direct investments. We used panel data models on developed and emerging EU markets to explore the difference in impact of macroeconomic variables on stock market returns depending on the level of market development. The empirical evidence showed the existence of relationship between inflation and money market interest rate on the one side and developed EU stock market returns on the other. On the other hand, emerging markets prove to be more vulnerable to fiscal developments. In particular, we found only a fiscal variable to be statistically significant in affecting stock market returns on emerging EU markets.

Keywords: *Stock market, fiscal variables, macroeconomic variables, emerging market, EU*

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1. Introduction

Various authors have analyzed impact of different macroeconomic fundamentals on the stock return.[1]Information on changes in macroeconomic variables is widely and frequently available and investors incorporate them in their estimates of the future stock returns. The stock market is affected by economic activity to the extent that the latter affects general earnings.

While number of studies explored the impact of inflation, interest rates, industrial production, money supply, exchange rates, GNP or GDP, previous stock returns and unemployment (Fama, 1981, 1990; Chen et al., 1986; Fama and French, 1989; Schwert, 1990; Dumas, Harvey and Ruiz, 2003; Thorbecke, 1997; Patelis; 1997; Shiller, 1981, Flannery and Protopapadakis, 2002; Campbell and Shiller, 1988; etc.), the potential influence of fiscal variables on stock markets performance has attracted less attention in the economic literature. To the best of our knowledge, there are only few studies that tackled this issue (Darrat, 1990; Jansen et al., 2008; Ardagna, 2009; Afonso and Sousa, 2012; Chatziantoniou et al., 2013; Croce et al., 2016; Liu, 2016). Fiscal policy can affect stock market in several possible directions. In a Keynesian framework, fiscal policy is an important tool for stimulating economy and pushing stock prices up. On the other hand, classical economists point to the tendency for a government debt to raise the real interest rate and crowd out private investment by competing with businesses for scarce financial capital. Earlier modeling often proved only small significant direct influence of fiscal policy on asset markets, however, strong indirect impact was found through its interdependence with monetary policy. More recent research Croce et al. (2016) and Liu (2016) identify government debt as a risk factor priced in stock returns.

The current economic crisis revealed weak fiscal positions in majority of EU member states. Many of them are still trying to correct excessive budget deficits or excessive public debt levels. The crisis severely affected the European capital markets too and brought into discussion the importance of gaining better understanding of the effects of fiscal policy not only on the economy as a whole, but also on the European stock markets. It should be noted that those markets differ substantially with respect to level of development, liquidity and efficiency.

[1] Many of them investigate this relationship in order to explain the informational efficiency of the stock markets. The theory (Fama, 1970) suggests that financial market informational efficiency represents the security prices capacity to instantly and fully reflect all relevant available information affecting them. The idea is following: if macroeconomic variables affect stock prices, on the efficient market all available information about economic variables are readily embedded in stock prices.

In this paper, we explore the relationship between a range of macroeconomic (including fiscal) variables and stock market returns using a large sample of both developed and emerging member countries of European Union. We hypothesize that influence of macroeconomic variables on stock market returns may differ in old and new EU member states. Therefore, in further testing of the possible relationship, we model the impact of selected fiscal and macroeconomic variables on stock market returns in emerging EU markets separately, by employing panel data regression analysis.

The rest of the paper is organized as follows. In section 2 we review the empirical literature on the relationship between stock market indices and macroeconomic variables. Data and empirical model are presented in section 3, while two last sections, 4 and 5, provide discussion of results of the analysis and concluding remarks.

2. Literature review

Many empirical studies provide evidence on significant relationship between equity market returns and macroeconomic variables. By using models based on arbitrage pricing theory that allow asset returns to be explained with multiple risk factors, Fama (1981; 1990), Chen, Roll and Ross (1986); Fama and French (1989), Schwert (1990), Dumas, Harvey and Ruiz (2003) document a strong positive relationship between equity returns and real economic activities such as industrial production, capital expenditures and GNP for developed countries.

Being a measure of liquidity in the economy, any change in money supply should have an impact on the investment decisions of the individual investors. Pearce and Roley (1985) found that unexpected announcements in monetary policy had a significant influence on stock prices. It can be argued that the increase in money supply leads to a fall in real interest rates and hence to lower discount rates against future cash flows, and also respond to increasing income by adjusting their investments so as to generate greater sales and profits resulting in higher future cash flows and higher stock prices. On the other hand, nominal increases in money supply might be regarded as a leading indicator of future inflation, which in turn hurts stock returns and leads to a portfolio rebalancing toward other real assets (Davidson and Froyen, 1982). Jain (1988) also noted that announcements about money supply and consumer price index are negatively associated with stock price changes. Errunza and Hogan (1998) found that lagged money supply growth rates Granger cause stock market return volatility in Germany and France. In Italy and Netherlands, return volatility was more responsive to real economic uncertainty than monetary uncertainty.

Short-term nominal interest rates are assumed to contain information about future economic conditions and to capture the state of investment opportunities. In that vein, changes in interest rates facilitate substitution between money market and stock market instruments. Interest rates increase tends to have an adverse impact on corporate profitability through the increase in the cost of capital. Assumption that macroeconomic factors have an influence on the stock prices, by affecting future expected cash flows or the discount rate, was confirmed by Shiller (1981), Flannery and Protopapadakis (2002) and Campbell and Shiller (1988). Results of latter analysis suggested that long term moving average of earnings predicted by dividends and the ratio of earnings to current stock price was powerful in predicting stock returns over several years.

There is a strong consensus about a negative relationship between inflation rate and stock prices, arising either from the interaction of the inflation with the tax system (Feldstein, 1980) or investors undervaluing the stocks during inflationary periods (Summers, 1981; Amadi and Odubo, 2002). The rise (fall) in inflation, beside its impact on interest rates, directly reduces (increases) the purchasing power of investors and thus should have an impact on equity investment decisions made by investors on the market. Using cointegration technique on monthly data over 40 years, Humpe and Macmillan (2009) showed that US stock prices were positively influenced by industrial production and negatively influenced by inflation and the long interest rate, while money supply had an insignificant influence over the US stock prices.

To the best of our knowledge, there are only few studies that incorporated fiscal variable when assessing the relationship between macroeconomic variables and stock market. Jansen et al. (2008) find that fiscal deficits do not influence stock and Treasury bond markets directly, but instead report strong indirect influence through the interconnectedness between fiscal and monetary policy. Similar finding documented Chatziantoniou et al. (2013). Using structural VAR model, they showed that fiscal and monetary policy affect UK stock market both directly and through their interaction, while for Germany there was no direct effect of the fiscal policy on stock market although an indirect effect on DAX30 was proven through the interest rate channel. Ardagna (2009) demonstrates that stock prices tend to surge in periods of restrictive fiscal policy and fall in periods when fiscal policy is loose. Employing a fully simultaneous system approach in a Bayesian framework, Afonso and Sousa (2012) show that stock prices are negatively influenced by government spending shocks and positively influenced by government revenue shocks though the latter effect tends to be rather small. They also performed VAR counter-factual model to show that fiscal policy shocks play a minor role in stock and housing pricing in the U.S. and Germany. While assets markets in UK are significantly influenced by both spending and revenue shocks, Italian asset markets

are affected only by government revenue shocks. Hsing (2013) explores impact of fiscal, monetary and other macroeconomic variables on Poland's stock market and finds no significant impact of fiscal variables on stock market unless deficit-to-GDP and debt-to-GDP ratios rise rapidly. Croce et al. (2016) and Liu (2016) find that the government debt significantly predicts higher future average stock returns. In particular, Liu (2016) suggests that government debt-to-GDP ratio outperforms other predictors of excess stock market returns.

While literature offers prominent evidence on relationship between macroeconomic fundamentals and developed stock markets, research of emerging markets is still scarce. Harvey (1995) examined returns of 20 emerging stock markets and founds return predictability to be greater in the emerging markets than in developed ones. Hanousek and Filer (2000), Samitas and Kenourgios (2007), Horobet and Dumitrescu (2009), Barbic and Condic (2011), Hsing (2013), Anghelache et al. (2014) investigated relationship between macroeconomic fundamentals and stock markets in CEE equity markets, providing rather ambiguous conclusions. Asian-Pacific and African emerging markets have recently become more intensively explored (Mayasmai and Koh, 2000; Brahmasrene and Jiranyakul, 2007; Mahmood and Dinniah, 2009; Yartey, 2008, Gowriah et al., 2014).

3. Data and empirical model

3.1. Data

In order to perform our analysis, we used stock indices and selected macroeconomic variables annual data of EU countries for the period from 2000 to 2012.[2] Variables are presented in more details in Table 1.

[2] The period before 2000 was not taken in consideration in order to avoid breaks in data series on emerging markets. We expect data breaks in the series due to infrequent trading on emerging stock markets and relatively inconsistent macroeconomic variables as a result of macroeconomic stabilization programs in early 1990-ies.

Table 1.

DATA DESCRIPTION

Variable		Time period (yy)	Description	Data source
Returns	Return	2000 – 2012	ln of annual stock market return	Bloomberg
Foreign exchange reserves	FXR	2000 – 2012	ln of total reserves	WB
Inflation	Inf	2000 – 2012	annual % change	Eurostat
Money supply (M1)	rM1	2000 – 2012	ln of real value	IFS
Money market interest rate	MMIR	2000 – 2012	ln of 3-month Euribor	Bloomberg
Foreign direct investments	FDI	2000 – 2012	ln of net inflows	WB
General government expenditures	GovtExp	2000 – 2012	% of GDP	Eurostat
General government debt	GovtDebt	2000 – 2012	% of GDP	Eurostat

Data were collected from Bloomberg, Eurostat, World Bank and IFS database. We employed leading national indices to proxy for EU equity markets developments. In line with the existing literature, the selection of the macroeconomic variables focuses on those which are assumed to be related with the stock market behaviour. Since it would be almost impossible to incorporate every potential aspect of macroeconomic activity to explain the stock market behaviour, this study is limited to following macroeconomic variables: money supply, foreign exchange reserves, money market interest rates, harmonized index of consumer prices and set of fiscal variables.

3.2. Empirical model

In our empirical model, we estimate the impact of selected macroeconomic variables on stock market returns in developed and emerging EU markets throughout the period from 2000 to 2012. In line with that, we employ econometric methods that fit regression models to panel data.

Our extended empirical model is set as follows:

$$Return_{it} = \alpha + \beta_1 FX_{Rit} + \beta_2 Inf_{it} + \beta_3 rM1_{it} + \beta_4 MMIR_{it} + \\ + \beta_5 FDI_{it} + \beta_6 GovtExp_{it} + \beta 7 GovtDebt_{it} + \varepsilon_{it}$$

where *Return* is the average stock market return of country *i* in year *t*, FXR_{it} are total forex reserves of country *i* in year *t*, Inf_{it} is inflation of country *i* in year *t*,

$rM1_{it}$ is deflated money supply of country *i* in year *t*, FDI_{it} is net inflows of foreign direct investments in country *i* in year *t,* $MMIR_{it}$ is money market interest rate of country *i* in year *t*, $GovtExp_{it}$ are general government expenditures of country *i* in year *t*, $GovtDebt_{it}$ are general government debt of country *i* in year *t*.[3]

In line with the previous findings in the literature and our expectations, foreign exchange reserves and money supply should have positive effect on the stock market returns. On the contrary, stock markets returns should be negatively affected by upward change in money market interest rate, inflation rate and government expenditures. The relationship between foreign direct investment and development of stock markets is twofold. On the one hand, FDI is viewed as a complement of stock market and hence positively contribute its development (Claessens et al., 2001). On the other hand, foreign direct investment can be treated as a substitute for stock markets and could be negatively correlated with the development of stock markets (Hausmann and Fernandez-Arias, 2000).

As far as the expected sign of government debt is concerned, we hypothesize that higher government debt leads to higher future aggregate stock returns at longer horizons, in a sense that the government debt should be perceived as a risk factor and built in accordingly in required stock returns (Croce et al., 2016). In other words, the risk premium in the capital asset pricing model measures the excess return investors demand for transferring their money from a risk-free investment (government-issued security) to an average risk investment. Risk premium is influenced by investors' risk aversion and riskiness of average risk investment. In good times, i.e. when the economy performs well, investors are more prone to take higher risks. On the other hand, in bad times (and periods when a government runs heavy debt loads are perceived as bad times) they become more risk averse and therefore require a higher premium for holding average risk stock.

We note that for our analysis OLS approach was ruled out from the start, since it is likely to suffer from two specification problems. Firstly, if the unobserved cross-section error term *i* or the unobserved time-variant error term *t* are correlated with the observed variables, the coefficient estimates of the observed variables may be biased. Given the heterogeneity of the stock markets due to traditional, socio-economical and institutional differences, it is to be expected that this model may suffer from unobserved individual country effects and hence OLS estimations will be biased. Moreover, in the OLS model, the regression equation will have a composite error term *i+t+it*, whereas only the last term satisfied all classical assumptions. The time-invariant error *i* is shared by all observations for the same country. The time-variant error *t* is shared by all observation for the same year. Therefore, the composite error term is serially correlated. With serial cor-

[3] The initial model included variable Government revenues, which was omitted after the correlation analysis, due to the strong correlation coefficients with two other fiscal variables.

relation, the standard errors are computed incorrectly. Again, OLS is no longer the most efficient method of estimation.

Since unobserved heterogeneity could be overcome by using either fixed or random effect panel data model, we proceeded to the selection of the panel model that would be most suitable for our analysis, using Hausman test.

Fixed effect models control for unobserved heterogeneity when heterogeneity is constant over time and correlated with independent variables. Fixed effect models remove the effect of those time-invariant characteristics so researcher can assess the net effect of the predictors on the dependent variable. However, Bell and Jones (2015) argue that, in controlling out those differences, fixed effect models effectively cut out much of what is going on. In other words, time-invariant processes can have effects on time-varying variables, which are lost in the FE model, unlike random effect models can explicitly model this differences.

In order to explore the impact of selected macroeconomic variables on stock market returns in EU countries, we estimate two different panel data models. In the first model, we check for the impact of selected macroeconomic variables on stock market returns in developed EU countries. In the other model, we explore whether selected macro variables impact stock market returns in emerging EU countries. Therefore, dependent variable in the first model is stock markets' returns on developed markets and dependent variable in the second model is stock markets' returns on emerging markets. Our empirical model with developed market includes old EU member states, while emerging countries panel include all new EU member states (except Malta and Cyprus) that joined EU after 2004. Each model is estimated by employing both fixed and random effects estimators. In order to determine appropriate estimator, Hausman test is employed. Hausman test examines the correlation between individual effects and regressors. The null hypothesis says there is no correlation. If null is rejected, the random effect estimator is inconsistent and fixed effect estimator is preferred. Alternatively, if null hypothesis cannot be rejected, random effect is preferred estimator. In line with the results of the Hausman test, we select and report only the model with the suggested estimator in the following section. Alternative estimates are available upon request from the authors.

4. Results

The results of the empirical analysis are reported in tables 2-3.[4] Table 2 presents the panel data model of the stock market returns in developed EU markets. As

[4] Although we ruled out OLS, we note that results of the F test suggested usage of fixed effects over pooled OLS, while results of LM tests confirmed the appropriateness of proceeding with random effects in comparison to pooled OLS in both models. Results are as follows: (a) for devel-

suggested by the Hausman test, stock market returns in sample of all developed EU member states are estimated with the random effect estimator. Results of the analysis imply that only inflation rate and money market interest rate have statistically significant impact on stock market returns in EU. Although the coefficient is very low, positive relationship between inflation and stock market returns is not in line with our expectations and prevailing evidence in literature. However, there are some findings in the literature suggesting less pronounced relation between inflation and stock market returns in cases when inflation is mostly monetary driven (Marshall, 1992). Even more, Graham (1996) found a positive relationship between inflation and US stock market returns in period when inflation was dominantly caused by money rather than real activity. Money market interest rate has a small and negative impact on stock market return. All other variables, including fiscal ones, have no statistically significant impact on stock markets returns in developed EU countries.

Table 2.

DEVELOPED EU COUNTRIES PANEL DATA MODEL

Variable: stock market returns	**Developed EU**
Estimator	**Random effects**
FXR	-0.00041 [0.816]
rM1	0.00037 [0.519]
Inf	0.00433 [0.000]
MMIR	-0.00222 [0.002]
FDI	0.00029 [0.835]
GovtExp	0.00017 [0.468]
GovtDebt	0.00004 [0.451]
Diagnostics	
Number of observations	195
Within R square	0.1398
Between R square	0.0625
Overall R square	0.1271
Hausman test	9.94 [0.1920]

Note: p values are presented in the brackets

oped EU countries – F test: 5.51 [0.0000]; LM test: 27.2 [0.0003]; (b) for emerging EU countries - F test: 2.10 [0.0485]; LM test: 14.19 [0.0479].

We summarized the finding related to the emerging markets panel data model in Table 3.

Table 3.

EMERGING EU COUNTRIES PANEL DATA MODEL

Variable: stock market returns	**Emerging EU**
Estimator	**Random effects**
FXR	0.00276 [0.373]
rM1	0.00240 [0.110]
Inf	0.00013 [0.627]
MMIR	-0.00987 [0.295]
FDI	0.00227 [0.433]
GovtExp	-0.00056 [0.143]
GovtDebt	0.00022 [0.036]
Diagnostics	
Number of observations	132
Within R square	0.0914
Between R square	0.4596
Overall R square	0.1027
Hausman test	7.45 [0.3837]

Note: p values are presented in the brackets.

Our empirical model shows that stock market returns of EU emerging member states are impacted by a fiscal variable. The relationship between the government debt and stock market return is significant and positive, which is in line with our expectations. As expected, the rise in government expenditures has negative influence on stock market returns; however this finding is not statistically significant. Similarly, we found no statistically significant relationship between other selected macroeconomic variables and emerging stock markets returns. Overall, it can be concluded that fiscal policy shocks play more important role in the emerging EU markets in comparison to other selected macroeconomic variables. Also, emerging markets seem to demonstrate higher vulnerability to fiscal developments in comparison to case when developed EU markets are analyzed.

5. Conclusion

This paper is aimed to determine the existence of relationships between stock markets and selected macroeconomic variables in European Union. In our analysis, we used following macroeconomic variables: government expenditures, government debt, inflation rate, money supply, foreign exchange reserves, money market interest rate and foreign direct investment. Two panel data models have been estimated. First model is tested on the developed EU markets and second panel model explores relationship between selected macroeconomic variables and stock markets in emerging EU member states. Results of the first panel model showed the existence of relationship between inflation and money market interest rate on the one side and stock market returns on the other. Analysis revealed no other significant relationship between macroeconomic variables and stock market returns, implying low return predictability on all EU equity markets. However, return predictability conclusions should be made with prudence as we didn't find enough evidence if markets are inefficient and if individual investors are able to build profitable trading rule and hence earn above average returns due to estimated relationships. As far as emerging markets are concerned, we found government debt to be statistically significant in affecting stock market returns. Also, emerging markets seem to demonstrate higher vulnerability towards fiscal developments in comparison to case when developed EU markets are analysed. Such evidence has important implications at macro level as management and supervision of government deficit and debt dynamics is in the focus of interest of EU policymakers. In line with our results, impact of fiscal policy on European emerging equity markets needs to be taken into consideration when assessing macroeconomic effects of fiscal policy.

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UTJEČU LI FISKALNE VARIJABLE NA PRINOSE DIONIČKIH TRŽIŠTA U ZEMLJAMA EU?

Summary

Rad istražuje vezu između makroekonomskih varijabli i prinosa na dioničkim tržištima u zemljama članicama Europske unije. Ispituje se veza između prinosa na tržišne indekse i odabranih fiskalnih i makroekonomskih varijabli koje uključuju javni dug, rashode konsolidirane središnje države, stopu inflacije, ukupna likvidna sredstva (M4), međunarodne devizne rezerve i izravne strane investicije. Koristi se panel analiza na podatcima za stare zemlje članice Europske unije i za tranzicijska tržišta zasebno, kako bi se ispitao utjecaj makroekonomskih varijabli na prinose na dioničkim tržištima ovisno o razini razvijenosti tržišta. Empirijski dokazi su ukazali na postojanje veze između inflacije i kamatne stope na novčanom tržištu s jedne strane i prinosa na indekse na razvijenim dioničkim tržištima EU s druge strane. Zasebna analiza tranzicijskih tržišta pokazuje da su ista osjetljivija na promjenu fiskalnih varijabli od razvijenih dioničkih tržišta u EU. Točnije, rezultati su pokazali da samo javni dug ima statistički značajan utjecaj na dioničke indekse na tranzicijskim tržištima Europske unije.

Ključne riječi: dionička tržišta kapitala, fiskalne varijable, makroekonomske varijable, tranzicijska tržišta, EU