The impact of fiscal policy on government bond spreads in emerging markets

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Summary

Spreads on government bonds are a collective expression of differences in the level of development, risk, expected returns and other essential characteristics of states or regions the bond yields of which we wish to compare. At issue here is a collective expression of factors that work on the bond supply and demand side. These are for example the political environment (or political risks), expected return, economic risks, expected inflation, expected change in the exchange rate, solvency, way in which the bonds of a given state fit into the portfolios of the major investors and so on. The paper identifies the influence of fiscal and non-fiscal factors on movements in spreads on government bonds in emerging markets. The possibility of isolating fiscal from non-fiscal influences on spreads and the identification of the nature of fiscal impacts can be of great importance for the conduct of fiscal policy. The results obtained can be used for an optimisation of fiscal policy so as to avoid negative impacts on yields (i.e. a growth in yields), that is, a growth in the costs of government borrowing. This paper enlarges the line of research by querying whether the structure of deficit financing (domestic or foreign) has an impact on bond yields in emerging markets, and how this impact is reflected on the other determinants of fiscal policy.

Keywords: fiscal policy, spreads, public debt, foreign debt, public finance, financial crisis, budgetary deficit

1 INTRODUCTION

Government bond spreads are a collective expression of differences in levels of development, risk, expected return and other essential features of countries or regions whose bond yields we would like to compare. When we speak about spreads representing a collective expression of differences between two states or regions we are referring to a collective expression of factors that work on the bond supply and demand side. These are for example the political environment (political risks), anticipated returns, economic risks, expected inflation and expected exchange rate changes, solvency, the way in which the bonds of a given country fit into the portfolios of the most important investors and so on.

Changes in spreads, that is a rise in them, reflect growing concerns of financial markets concerning the capacity and ability of given countries to service their debts in the future. In addition to increasing the costs of borrowing, arise in spreads signalises that investors have ever small motivation to lend funds, which such a country's access to the international capital market. The importance of spreads for the whole of fiscal policy is very great, and hence one of the logical motives for studying the impact of fiscal conduct on spreads is to show how it is possible to save important sums by a correct choice of fiscal policy instruments. It is important to recall that the spreads of government bonds have a great influence on interest rates, that is, the price of borrowing for all the other sectors of the economy that also have a need to borrow.

The problem of explaining the spreads of government bonds is particularly complex for two reasons. Firstly, spreads depend on the relative strength of the effect of the factors mentioned in different countries. In other words, changes in factors that affect bond yields cannot be examined in isolation for individual countries. It is always necessary to observe the relative strength of the functioning of individual factors within a broader group of countries and then choose the group that is relevant. Those countries and regions among which we observe major flows of capital are most often considered to be the relevant group of countries. Another reason for the complexity of the problem is that the prices of bonds, like the prices of all other financial assets, are subject to fluctuations that are very hard to explain, for in part they occur because of changes in the sentiments of market players. Expectations are variable and are from time to time subject to the action of irrational factors ("information cascades" are capable of inciting imitation and herd behaviour). Luckily, bonds, unlike stocks, do have maturity dates. This fact essentially mitigates the effect of fluctuations in the perception of risks on the prices of bonds. In addition, where government bonds are concerned, the credit risk is relatively little in comparison with other financial instruments and in comparison with other issuers of the same kind of bond, but is never entirely absent, which makes yields and spreads more stable than in the case of other financial instruments of long periods of maturity and greater degrees of risk. Hence the idea that yields or spreads could be explained by the variables that have fundamental effects on them. Fiscal policy is one such variable.

Fiscal policy could be among the most important determinants of yields and spreads of government bonds. It is well known that through its working fiscal policy can foster and yet also hamper economic growth. The direction of public expenditure can encourage private investment in capital projects and increase productivity by improving production techniques, for example through consistent enforcement of the law, respect for contracts and deadlines, and good regulations of the financial market. Investment in the physical infrastructure and human capital also has a positive effect on increasing the productivity of work and capital. The taxation system, as is well known, can also distort the allocation of resources, reducing economic growth and welfare. The economic, political and institutional environments affect the efficacy of public spending that might foster growth. Also important is the capacity of the creators of fiscal policy to increase tax revenue and take on credit to finance public expenditure while at the same time minimising the costs that can diminish economic growth. Accordingly, it is expected that a better and more trustworthy fiscal policy will reduce risks, tend to produce a better organisation of public debt instruments and in general underpin economic growth. For this reason expected yields of investors on investments in government bonds will be smaller, and vice versa. A simple practical recommendation follows: a credible fiscal policy needs to be pursued in order for the cost of government borrowing to be reduced to the smallest possible measure.

This paper's subject matter covers the area of fiscal policy, public debt and spreads, the amount of which is determined on the market, in accordance with the handling of fiscal policy, which also comprehends the management of public debt. The objective of the authors of the paper is to investigate the trends in the movements of government bond spreads, primarily their connection with public debt management policy, that is, the structure of the public debt, using a sample of 14 countries that belong to the emerging market.

In the context of a complex market mechanism it will be hypothesised that capital markets are not perfect, but they are open, which in a period of accelerated international financial integration can lead to the deviation of the subjective discount factors of investors from yields on bonds and a large number of changes in the number and structure of the government bond investor population. With these assumptions it is legitimate to test whether the currency structure of the public debt has an effect on government bond spreads. The paper endeavours to determine which characteristics of fiscal policy, or how a credible fiscal policy, can affect yields and spreads, and in particular to attempt to determine whether the currency structure of a debt, or a combination of domestic and foreign deficit financing, has an effect on the yields and spreads of government bonds. The method of the investigation is an estimate of a regression model of panel data for the period from the first quarter of 2003 to the end of 2010.

Mendoza and Oviedo (2003) point out that if one ignores the uncertainty that is anyway inherent to financial markets and political processes, a key factor will inevitably be whether the current level of the public debt is sustainable in the given arrangement of international and domestic economic and financial variables. Asking such a question means that the annual indicators such as ratio of fiscal deficit to GDP, which researchers have used in the context of the traditional approach, cannot reveal essential information about the sustainability of fiscal policy. On the contrary, anti-cyclical fiscal policy can require an increase of the deficit to achieve credibility.

After the introduction the paper begins with a review of the literature, where a commentary is given on previous understanding and knowledge or perhaps theoretical determinants of this theme. Chapter three discusses current trends of movements in emerging market yields, while the fourth chapter considers the effect of fiscal policy on differences in spreads in the emerging market. The central part of the paper is to be found in the fifth chapter, where an econometric analysis of the influence of fiscal policy on bond spreads is carried out. The last chapter provides a conclusion and recommendations.

2 A REVIEW OF THE LITERATURE
The starting point of modern research into bond spreads of the developing countries is to be found in the paper of Sebastian Edwards of 1986. Prompted by the

debt crisis of the 1980s, during which researchers analysed the determinants of interest rates and spreads on international loans, Edwards, following up an idea first proposed by Folkerts-Laundau (1985) considered that yields and spreads of government bonds could provide better information concerning the risk of problems arising with foreign debt repayment in the developing countries.

The work of Eichengreen and Mody (1998) put in place a new standard in empirical research. While the Edwards approach to this research was based on an examination of the effects of fundamentals on spreads, Eichengreen and Mody assumed that it was not only the fundamentals of a given country that were important for spreads but also the global market setting. This also applies to the influence of investor sentiment and structural factors such as changes in the quality of the debtor issuing the bonds in global circumstances that have changed. Their paper brought new methodological standards into the literature as well. They pointed out that the variables that affect spreads are the very same variables that affect the decision to issue bonds, while changes in the number and value of issues also affect spreads. Because of this simultaneity, evaluations of parameters by the least squares method will probably be biased, and in this kind of research it is necessary to use more advanced econometric approaches, particularly if the data sample is founded on yields of newly issued bonds.

Eichengren and Mody brought a much more highly worked-out classification of explanatory variables into the literature and also determined their construction much more carefully. In their work there are four groups of variables: bond characteristics (maturity, face value, sale methods); global conditions (yield on ten year American government bonds); issuer characteristics (if it is a government, which global region it belongs to); and characteristics of the country (credit rating or other already mentioned macroeconomic variables). Since credit rating is tightly correlated with fundamental characteristics of the national economy, Eichengreen and Mody used the residual regression of credit rating on macroeconomic fundamentals. Using only the residual from the rating regression in the spreads regression, in fact they used only that part of the information that the rating gives on top of the information contained in variables describing the economic fundamentals of some country. Information about the fundamentals is as a rule widely disseminated and well known to market players, and it can be expected to have a direct effect on spreads independently of information given by the rating.

Prompted by this, Edda Zoli (2004) developed a model in which she integrated the line in the empirical literature that we are presenting with the credit rationing theory (Stiglitz and Weiss, 1981). Edda Zoli showed that the function of supply of funding for emerging market issuers grows up to a certain level of spread, after which it becomes vertical. This means that conditions will occur from time to time in which the amount of the spread, whatever it is, cannot compensate for the risk perception of the terrified investors. The research of Zoli (2004) confirmed the hypothesis that the link

between the external debt/GDP ratio and spread is not linear. There is an upper threshold after which the function of supply of money for emerging markets does become vertical (inelastic in comparison to the spread). From the many other variables, only the following had significant parameters with expected signs: investment risk index, crisis binary variables (proving the existence of the contagion effect), money market interest rate on the US dollar, international reserves expressed in months of imports and the international reserves/GDP ratio.

In 2009, a group of authors from the ECB (Nickel, Rother and Rülke, 2009) conducted research concerning the link between budgetary deficits and government bond spreads. Their contribution to the literature is reflected in the choice of countries analysed: the Czech Republic, Hungary, Poland, Russia and Turkey, for they think that in the new countries there is an interesting relation between fiscal system and financial markets. They were also interesting in finding out what kind of deviations of results of fiscal correlations with government bond spreads there were through an evaluation of panel data. They conclude that fiscal variables do have a significant effect on government bond spreads when panel data are employed. However, the tests that relate to the data for each country separately showed less evidence of the correlation of fiscal data and government bond spreads. Worth mentioning is that the results of the research for individual countries depend on their level of development, and thus only the analyses for Hungary and Russia showed the impact of deficits on a spreads. The authors consider that government bond spreads represented the projected government bond investment risk, and accordingly it is important to comprehend market expectations, which is included in their model via a consensus of economic projections. The research results show a correlation between deficit and spread such that an increase of the deficit of one percentage point brings about an increase on the government bond spread of 4 percent, while the effect for Russia was still more marked, a 1% increase in the deficit leading to a rise in the spread of as much as 13%.

From the perspective of creators of fiscal policy the results of Nickel, Rother and Rülke suggested that it is necessary to conduct a prudent fiscal policy. Cross-country data show that there is no simple connection between fiscal imbalances and the risk premiums that investors insist upon. Accordingly, the level of disequilibrium that might be acceptable to investors could be far lower than those that the creators of fiscal policy intend to implement.

Policy credibility and prudence could be defined as the likelihood that economic policy creators will execute the promised good economic policy, that it will not, resort to a worse economic policy. From the point of view of fiscal policy the requirement of credibility comes down to its long-term sustainability (fiscal solvency) for it is upon this that the capacity of a government to meet its long term liabilities depends. We can find the roots of the approach that stresses fiscal sustainability as early as the paper of Alesina and Perotti (1996). Assuming that a credi-

ble fiscal policy leads to a lower spread, the authors explored various ways of fiscal adjustment in a large number of countries and concluded that a credible fiscal policy is founded on control of expenditure and not on an extraordinary growth of revenue.

Hauner, Jonas, and Kumar (2007) investigated the effects on rating and spreads of eurobonds and yields of domestic bonds denominated in the domestic currency. The hypothesis that they test is that which motivated Luengnaruemitchai and Schadler (2007); they want to show that the EU new member states (NMS) enjoyed lower spreads than other emerging market countries because of the rise in credibility of economic policy thanks to their EU membership. The approach in modelling that they use is as follows: they choose three dependent variables (rating, spread and yield on local bonds), but they go into all three regressions with the same set of potential explanatory variables. They are: external debt and exports ratio, international reserves and imports ratio, current account balance/GDP, government balance/GDP, per capita income and a binary variable for crisis months. Firstly, they evaluate the equation for all the emerging markets in the sample, then only for the new member states, and at the end via observation of differences in parameters conclude on whether the financial markets rewards the new member states by stronger effects on spread reduction. And while the results are dubious for local currency yields, Hauner, Jonas and Kumar (2007) find the reward effect in rating and spreads.

A few papers that more or less explicitly put the focus on fiscal issues have announced a possible continuation of evolution in spreads research. The lack of any integration of the traditional approach and that of fiscal sustainability that Akitoby and Stratmann (2006) only just began represents a serious shortcoming, particularly in the light of the fact that literature about the development of the sovereign debt market shows that there are effects of the development of this market on variables shown to affect the spreads in government bonds (Šonje, 2000).

The first such mechanism is inflation. A review of traditional studies has confirmed that the link between inflation and spreads is of a positive character. However, the inflation effect might well hide the development of the market-for-public-debt-instruments effect. The development of the market for instruments of public debt will reduce the need for inflationary methods of financing fiscal deficits and the development of this market will tend to produce lower spreads via lower inflation (Fry, 1997).

The second mechanism works via reduced oscillations in real output, which also might hide the effect of the development of the public debt instruments market. The development of the public debt market unfolds in parallel with the development of the private financial sector that needs such a market to be able to do business with the state and manage risks more easily. Kumhof and Tanner (2005) point

out that a rich array of government bonds also means a plentiful supply of collateral, without which private financial agents cannot surmount the problem of information asymmetries on the private markets. For this reason it is not surprising that countries with a developed private financial sector and a market for public debt instruments record smaller oscillations in real per capita income (Denzier, Ijigun and Owen, 2000). As Catao and Sandeep (2004) proved there is a correlation between oscillations in output and risks of default, we can conclude that the development of the sovereign debt market can directly or indirectly favour financial development and the reduction in oscillations of real income, which in turn lead to a reduction in risk of default and credit spreads.

A third mechanism might work via the speed of economic growth. Traditional literature provides arguments tending to support the thesis that more rapid economic growth might be linked with lower spreads. From this point of view it is important that there do exist proofs of the positive effect of growth of a domestic market for public debt instruments on the speed of economic growth. Ali Abbas and Christensen (2007) on a sample of 93 developing countries in the period 1976-2004 find a positive effect of the non-inflationary (moderate) level of domestic public debt (compared to GDP) on economic development. The effect is stronger when the debt can be freely traded, when it is not held by the banks and when the real interest rate is positive.

The fourth mechanism is a set of different influences that cannot easily be distinguished. What is common to them all is that they might appear in addition to effects that work through the standard variables of macroeconomic fundamentals. These impacts will be grouped within the hypothesis concerning the balanced structure of the public debt.

The balanced public debt structure is premised on the average public debt/GDP ratio not differing between Latin America and East Asia, but in the structure of public debt the share of the domestic component is much smaller in Latin America (Jeanne and Guscina, 2006). The reasons for such a state of affairs have been quite well explored. It is necessary to reach a certain level of development of a domestic investor base and domestic savings with respect to maturity and understanding of the instruments for a domestic public debt market to be able to develop appropriately (Claessens, Klingebiel and Schmukler, 2003). Jeanne and Guscina (2006) show that the share of long-term domestic debt with a fixed rate of interest in Latin America fell to about 10% in 2000, from 40% in 1980. The shares of such public debt in developed markets and Asia range between 80% and 90%. These figures confirm the original sin of states with major financial fluctuations that do not manage to develop domestic markets for instruments of public debt and in which, for this reason, a positive correlation between short term interest rates and the nominal exchange rate in conditions of instability arises (Eichengreen and Haussmann, 1999; Haussmann and Panizza, 2003). Such a situation has a negative effect on financial development and economic growth.

Jeanne and Guscina (2006) show that the initial instability that produces such a structure of public debt can be explained by an inflationary shock that is defined as three years running in which the rate of inflation is greater than 100%. Regression analysis shows that after such an inflationary shock the domestic long-term public debt market will be almost completely closed for the whole of the next decade, while the negative effect is apparent even three decades later. This approximately corresponds to the memory of the generation that bore the brunt of inflation and its negative effects. This result is confirmed by the action of the mentioned inflationary mechanism (Fry, 1997), which is linked with the mechanism of fluctuation in growth (Denzier, Iyigun and Owen, 2000) and the speed of growth (Ali Abbas and Christensen, 2007). However, the balanced structure of public debt hypothesis also has much wider implications that future research should take into consideration.

For if the effect of the development of a market for instruments of public debt were to work only through the variables of macroeconomic fundamentals (speed of growth, real output fluctuations and rate of inflation), then variations of the variables of the debt structure would not be able to explain the additional part of the variation of spreads over and above the part of the variations explained by the macroeconomic fundamentals. However, similarly to the value of the residual information content of the rating proved by Eichengreen and Mody (1998), economic literature provides support for the proposition that the structure of a public debt instrument market could contain a residual effect over and above that which is explained by the fundamentals.

If we look at the presented evolution of the literature about the determinants of spreads the conclusion inevitably arises that economic studies are entering a period in which there will be an increasing search for links between the variables of fiscal sustainability and spreads. After the first attempts, which gave very good results (Akitoby and Stratmann, 2006) it is to be expected that in the future greater attention will be devoted to the effect of the development and structure of the market for public debt instruments on the yields and spreads of government bonds.

3 CURRENT TRENDS IN EMERGING MARKET SPREADS

Fiscal policy has to provide a stable and predictable environment in which the market can work effectively and encourage public trust in fiscal policy and a political consensus. That is, fiscal policy in developed market economics has its impact on prices, real interest rates, risk premiums and aggregate demand and potential production. Furthermore, its basic role is the allocation of resources between public and private sectors, to savings and investment, and consumption. Every perception that public finances are unsustainable will create uncertainty, which will encourage economic agents to take this fact and its consequences into consideration in their decisions. Increased uncertainty can lead to contracts being made short term, and the increase in the costs of risk insurance reduces the potential for

economic growth. In general, fiscal sustainability is crucial for economic stability and economic risk.

Fiscal sustainability is universally defined as the ability of a government over the course of time to service its debt. This requires running a fiscal policy aimed at stabilising relations between discounted current value of primary deficits and the remaining amount of the public debt. According, a positive difference between average rate of interest and economic growth means, all other things being equal, that a higher level of remaining debt will require greater primary surpluses in order to ensure fiscal sustainability.

Analysis of current trends in bond spreads gives an empirical answer to the analysis of fiscal sustainability for all countries are planned to be covered in this paper, which are, including Croatia: Bulgaria, the Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia, Mexico, China, Turkey and Ukraine. These countries have several characteristics in common. All of them are countries with a faster or slower tempo of integration into the world economy and international financial markets. Most countries are large issuers of public debt, but their development status is not entirely the same. Ten countries are members of the EU and accordingly are counted within the circle of countries that are more developed than the others in the sample, while some of the countries can still be treated as countries in transition from developing to developed countries.

The current trends in bond spread movements cover data for bonds that mature within five to ten years. The choice of long-term bonds is made accordingly because during the life cycle of a bond a number of changes occur depending on the economic situation of the moment (inflation, economic growth, competitiveness, crisis), the implementation of economic policy, political changes (elections, entering associations), the economic situation in the immediate environment because of the spillover effect, external shocks, the trends in international and domestic interest rates, exchange rate trends and other reasons. The bond spreads of each country are calculated according to the benchmark bond, in this case the German government bond popularly known as the *bund*. For each of these countries, bonds issued on the international market with maturities of ten years were taken.

Data in the movement of spreads cover the period up to December 2010. It can be stated that the data clearly show the ending of the crisis, but not any return to the pre-crisis level. The spreads in 2010 were maintained at 2005 levels, above all because of the continuing fiscal situation, more difficult than the 2007 period. Figure 1 shows the movement of spreads for Croatia, Bulgaria, Mexico, Turkey, Russia, Poland and China.

We can find a significant difference in the spreads before and after the crisis. The current trends in movements of bond spreads show that the recent financial crisis produced a structural shift in spreads to a higher level for almost all the countries,

save for China. Figure 1 shows that not a single bond except the Chinese returned to the pre-crisis levels, all of them being at levels that are regularly higher than those at the beginning of 2005. The situation is nevertheless considerably better than during the period of the financial crisis, for the high level of volatility on the bond market that came out of the crisis turbulence of 2008/2009 started to drop to the normal level in early 2010. The financial crisis started with the bankruptcy of one of the five biggest investment banks in the world, Lehman Brothers, on September 15, 2008, which very greatly increased the perception of risk, bringing about an escalating world financial crisis and creating distrust among the market players themselves.

FIGURE 1

Trends in government bond spreads (1) (in basis points)
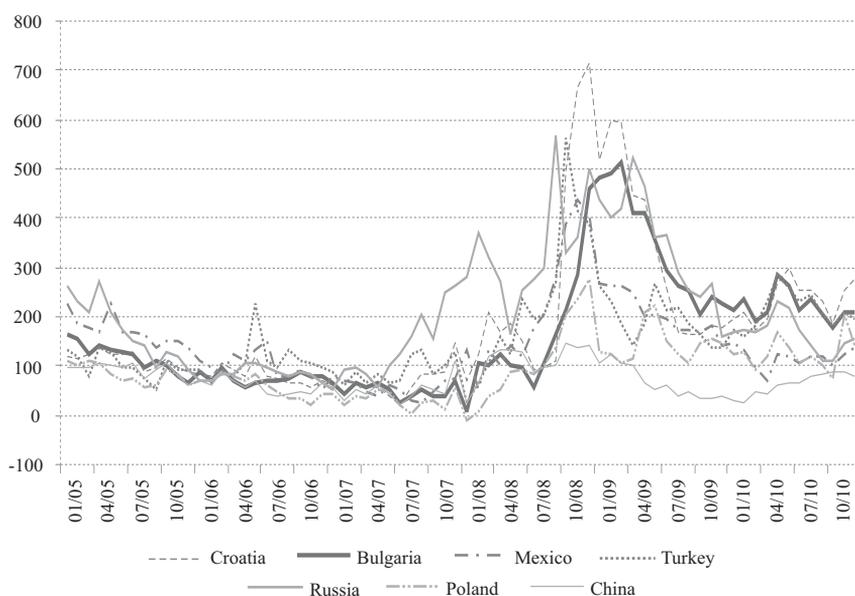
Source: Bloomberg, Reuters.

The beginning of the crisis can be clearly seen in the growth of spreads for all countries, which are, however, differentiated by the intensity of change in spreads. In this short analysis we can see that of the observed European countries, Poland had the smallest growth in spreads, while Croatia had the biggest. One of the reasons must be that Croatian is not a member state of the EU, unlike Poland. But Russia and Mexico also recorded smaller spreads than Croatia, clearly the consequence of economic fundamentals, which are not to Croatia's advantage. China is a special case here, for the movement in spreads was almost untouched by the financial crisis, and a structural advance was made in a positive direction, in that the spread during 2010 on Chinese bonds fell to the lowest level after the crisis.

Figure 2 shows the spreads of government bonds of the more advanced NMS, with Slovenia and Slovakia, which had introduced the euro, being in the foreground.

The biggest surprise in this group are certainly Hungary and the Baltic states, which for the whole period of the transition were models of economic development and the running of a sensible and consistent economic policy; however, even before the global financial crisis their vulnerability had been seen. Investors in the capital market very quickly perceived the risk and turned it into a higher spread as against the benchmark bond.

FIGURE 2

Movement in the spreads of government bonds (2) (in basis points)
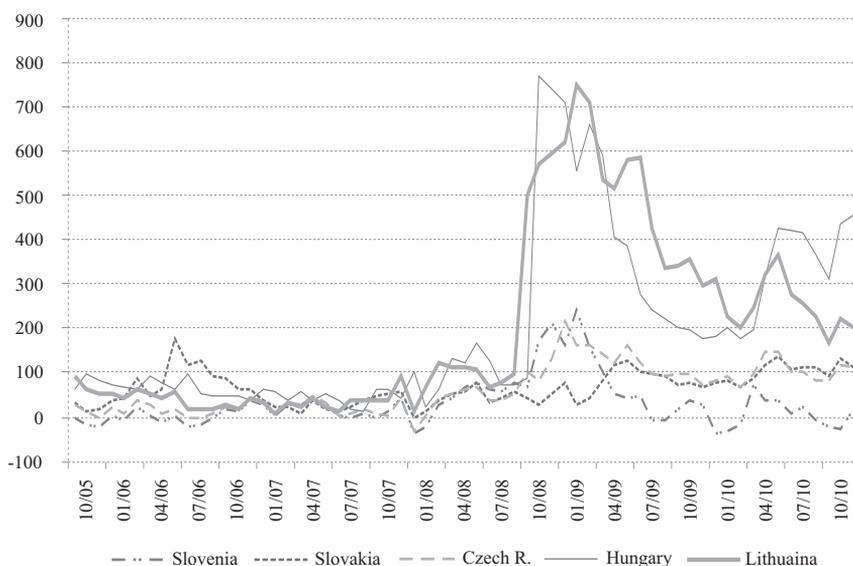
Source: Bloomberg, Reuters.

Current trends in spread movements can also be analysed via statistical indicators of the movement of spreads in the period from 2003 to 2010. Table 1 shows the basic statistical indicators, the minimum, maximum, average, standard deviation and coefficient of variation for the movement of spreads on government bonds for seventeen countries. The sources of data for this table are Bloomberg and Reuters and they are calculated as the difference of current yields on ten year euro-denominated government bonds for each one of these countries as compared with the benchmark bond.

The result of the analysis shows that the smallest (i.e. negative) bond spreads are in the countries of the EU, led by Slovenia, followed by the Czech Republic, Slo-

vakia and so on. It is interesting that China has the smallest average deviation from the central value.

TABLE 1

Statistical indicators of spreads, 2003-2010 (in basis points)

Country	Minimum	Maximum	Mean	Standard dev.	Coefficient of variation (%)
Bulgaria	6.4	514.0	168.4	111.7	66.3
Czech R.	-31.8	217.6	51.9	52.2	100.5
Croatia	21.9	714.7	190.0	140.4	73.9
China	20.0	144.9	75.8	32.4	42.7
Latvia	13.1	822.4	191.2	213.6	111.7
Lithuania	7.8	749.7	178.1	176.5	99.1
Hungary	14.9	767.7	182.0	170.4	93.6
Mexico	0.4	439.3	137.7	111.2	80.8
Poland	-10.2	277.6	114.3	66.0	57.7
Romania	25.4	965.1	225.7	179.1	79.3
Russia	53.7	565.5	212.7	123.7	58.2
Slovakia	-21.5	176.2	67.1	39.5	58.8
Slovenia	-54.5	239.4	16.1	53.1	330.2
Turkey	24.3	688.4	202.2	139.8	69.1
Ukraine	134.8	2.709.6	625.3	633.1	101.3

Source: Authors' calculation.

In the whole period from 2004 to 2010 the Chinese government bond moved in a narrow range of spreads from 20 to 144.9, and as can be seen from figure 1 the financial crisis did not seriously impinge on the Chinese economy. This observation shows how great is the influence of economic fundamentals on the capital market, that is, better quality economic indicators enable lower spreads to be maintained because investors do not seek risk premiums. China has proved exceptionally resistant to the global financial crisis and is emerging from that crisis with the fewest consequences.

At the peak of the crisis in 2009, the Chinese economy recorded a growth of 8.7%, which was above official government forecasts, which had amounted to 8%. The rapid growth in spite of the fall in exports (because of the recession in the USA and the EU) was recorded because of large investments in capital goods, which spurred domestic demand (Gligorov, 2010).

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Analysis of the average value of the spreads shows that the values were lowest in Slovenia, Slovakia and the Czech Republic, with China on their heels, and China had the smallest average deviation from the mean. That the Chinese bond had the best performance of all the bonds is shown by the coefficient of variation, the lowest for the Chinese bond spread.

The standard deviation of spreads (table 1) is smallest for China, which has been concluded to have gone through the crisis untouched. Then came the EU NMS, which are in addition among the best developed, i.e. Slovenia, the Czech Republic, Slovakia and Poland. Hungary is interestingly far from this group and the standard deviation of its spreads is closer to the NMS that do not have very good indicators. Unlike previous years, when Hungary was in the forefront of the convergence on EU standards, in 2009 and 2010 its indicators and achievements were closer to the countries of Eastern Europe. The fiscal consolidation that Hungary started in 2006 did not produce very satisfactory results, which was reflected on the movement of Hungarian bond spreads because investors required a greater risk premium for holding its bonds.

Countries that maintain an average spread at a level of over 200 basis points (2 percentage points) above the benchmark are Romania and Russia. On the other side of the spectrum, with an average spread of below 100 basis points are Slovenia, the Czech Republic, Slovakia and China. The market had concluded that the risks entailed with the government bonds of Romania and Russia were so great that holding these bonds required a greater yield for the risk. Turkey had an average spread of 199, and Croatia also had a spread of a high 183 basis points above the benchmark bond. The average spread for such a long period of time clearly shows the quality of the conduct of economic policy. Every day, investors on the capital market evaluate the quality of the economy from which they buy bonds, and from these average spreads it is possible to draw conclusions about the average state of the economy of each of the countries observed. The spread shows how much of a risk premium investors seek to keep the government bonds of a given country. Transition countries and countries in which a market economy is being created perform poorly in maintaining economic stability and a fully functioning market irrespective of the economic or political unions they have joined. An example here is Romania, which because of the halting of reforms had at the beginning of 2010 to negotiate a stand-by arrangement with the IMF. Here one should say that Poland too (the only country in the EU not to have suffered an economic decline) and Mexico (a country from the sample) also sought IMF help through a so-called flexible credit line. Croatia, as a non-member of the EU has a relatively high average spread of 183 basis points above the benchmark bond, which is a consequence of the process of convergence on European integration, for accession to the EU implies a course of processes of reforms and harmonisation with European market economy standards. Clearly the market has the perception that running an economic policy requires more concrete results.

4 INFLUENCE OF FISCAL POLICY ON SPREADS IN EMERGING
  MARKETS

How does movement in spreads correlate with individual countries' deficits? General government deficit expressed as percentage of GDP (table 2) surged in the last few years in all countries and in 2009 all the countries recorded a deficit, even those that proverbially are in surplus.

The calculation of the correlation between budgetary deficit (table 2) and spreads shows, for most countries, a positive relationship with on the whole a high coefficient of correlation. The result explains that the greater the deficit the higher will be the spreads on government bonds in relation to the benchmark.

TABLE 2

General government deficit as % of GDP (in basis points)

| Country	2003	2004	2005	2006	2007	2008	2009	2010*
Bulgaria	-0.30	1.60	1.90	3.00	0.10	1.8	-4.7	-3.9
Czech R.	-6.60	-3.00	-3.60	-2.60	-0.70	-2.7	-5.8	-4.8
Croatia	-4.50	-4.30	-3.50	-3.00	-2.50	-1.4	-4.1	-5.7
Latvia	-1.60	-1.00	-0.40	-0.50	-0.30	-4.1	-10.2	-8.0
Lithuania	-1.30	-1.50	-0.50	-0.40	-1.00	-3.2	-9.2	-8.0
Hungary	-7.20	-6.40	-7.90	-9.30	-5.00	-3.8	-4.4	-4.0
Poland	-6.30	-5.70	-4.10	-3.60	-1.90	-3.7	-7.2	-7.9
Romania	-1.50	-1.20	-1.20	-2.20	-2.50	-5.7	-8.6	-7.5
Russia	2.37	4.85	7.51	7.45	6.13	4.9	-6.3	0.0
Slovakia	-2.80	-2.40	-2.80	-3.50	-1.90	-2.1	-7.9	-8.0
Slovenia	-2.70	-2.20	-1.40	-1.30	0.00	-1.8	-5.8	-6.0
Turkey	-11.30	-4.50	-0.60	0.80	-1.00	-2.2	-6.7	-4.0
Ukraine	-0.25	-2.65	-1.73	-0.66	-1.15	-1.5	-4.1	-6.0

* Estimate.
Source: Eurostat, WIIW.

A positive correlation of spreads and a budget deficit is a signal that this is one of the most important indicators to the market of the quality of a bond that the investors have in their portfolios. It is logical that there should be an effect on bond spreads not only from the budgetary deficit but also from other economic indicators, but the objective here is to show current trends in the impact of fiscal policy on bond spreads, and we know that the deficit is one of the most important results of fiscal policy. Figure 3 shows a positive correlation for all countries save for Hungary, which had divergent results of fiscal policy with respect to movement in spreads. During 2007 Hungary retrospectively reviewed its deficit for it had pu-

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blished data concerning deficits that were lower than had really been made. During the period of economic growth in the whole of Europe Hungary had a high deficit because of the poorly managed fiscal policy, and yet the spreads were relatively low, because of the perception that the overall economic situation was positive.

FIGURE 3
Correlation of budgetary deficit and government bond spreads (2003-2010)
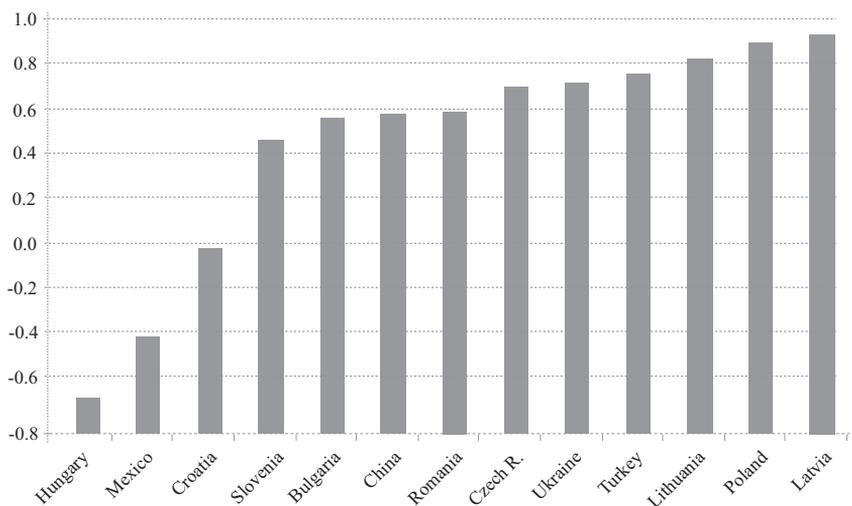
Source: Authors' calculation.

The results from figure 3 show conclusively that for most of the countries there is a correlation between movement in spreads and the deficit of general government budget, which is the crucial result of the conduct of fiscal policy. In order to confirm these finds, a step further was taken in the analysis by taking not the deficit for the calculation of the correlation but public debt taken as a percentage of GDP (table 3). The results of the calculation (figure 4) also show a tight relation between movement of public debt and spreads, except for China, which has divergent movements between public debt and spreads. The very close relation between movement in the public debt and spreads (figure 4), and general government deficit and spreads (figure 3) show that fiscal policy has the most important role in the movement of government bond spreads.

From the perspective of conducting economic policy, the results of the analysis carried out show that the creators of economic policy in emerging market countries must pay attention to running a high quality fiscal policy. A significant difference in correlations among the countries show that there is a difference in the treatment of the results, but the link is clear: the lower the deficit and the public

TABLE 3

Public debt expressed as % of GDP

Country	2004	2005	2006	2007	2008	2009	2010*
Bulgaria	41.0	30.5	23.5	18.5	14.6	14.0	15.0
Czech R.	31.2	29.7	29.5	28.9	28.6	33.5	37.1
Croatia	37.8	38.3	35.7	33.1	33.5	37.7	41.0
Latvia	14.9	12.4	10.7	9.0	19.5	33.2	41.6
Lithuania	19.4	18.4	18.0	16.9	15.6	29.9	34.4
Hungary	59.1	61.8	65.6	65.9	72.9	79.0	81.0
Poland	45.7	47.1	47.7	45.0	47.2	51.0	53.2
Romania	18.7	15.8	12.4	12.6	13.6	22.0	27.3
Russia	21.6	14.9	8.6	7.2	5.7	8.1	9.0
Slovakia	41.5	34.2	30.5	29.3	27.7	37.0	37.1
Slovenia	27.2	27.0	26.7	23.3	22.5	34.4	37.2
Turkey	59.2	52.3	46.1	39.4	39.5	47.3	48.0
Ukraine	24.7	17.7	14.8	12.3	19.9	34.8	39.8

* Estimate.
Source: Eurostat, IFS, WIIW.

FIGURE 4

Correlation between public debt and spreads on government bonds
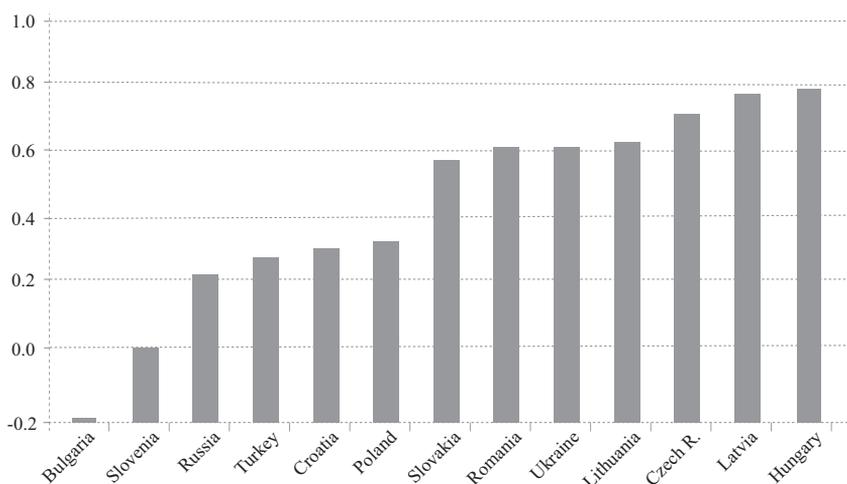
Source: Authors' calculation.

debt, the smaller the government bond spread. Investors reward those countries that they estimate to require a lower risk premium, and this can be concluded only on the basis of economic indicators. Levels of imbalance that might seem acceptable to creators of economic policy might demand from the market greater risk premiums than those creators expected. According to experience to date, with a high level of economic development and market integration, market players can well become concerned at the quality of public finance handling. The best example is Hungary, which revised its deficit data retrospectively, and even after it had set out on the path of fiscal consolidation and achieved certain results, the market still looked at Hungary with a great amount of circumspection. On the other hand, countries in the EU most often have a special status among investors, for they expect that in these countries the rules are carried out and the calculations of economic magnitudes are carried out just as they are in the oldest members of the European Union.

5 ECONOMETRIC ANALYSIS OF THE IMPACT OF FISCAL POLICY ON BOND SPREADS

This part of the paper carries out an econometric analysis of the way fiscal policy is conducted and the structure of the public debt on bond spreads. The evidence used is the data and indicators of 14 countries belonging to the group of emerging markets. Cross-country regressions explore the interdependence of spreads on government bonds and the structure of the public debt, and the manner of running fiscal policy that is most clearly reflected in the government budget deficit. In concert with fiscal policy, also explored is the interrelation of spreads on government bonds and eurozone interest rates, with the movement of real GDP, and with the external debt of every individual country.

Empirical analysis of the interdependence of spreads, debt structure and fiscal policy has constraints in finding qualitative long time series, which has in this paper been successfully solved. Time series of spreads data has been taken from Bloomberg, on which spreads are calculated in relation to the benchmark ten-year bond, in this case the German bond called *the bund*. Other data are taken from relevant international sources – the International Finance Statistics of the IMF, of the ECB, the Web sites of foreign statistics offices and local statistics (from the Croatian National Bank, the Croatian Statistical Bureau, and the Ministry of Finance). The period in which these data were gathered covers the quarters from the start of 2003 to the third quarter of 2010. Regression equations (panel models) will be evaluated separately, and the results obtained analysed separately for the period before the crisis (from the beginning of 2003 to the second quarter of 2008) and for the period that covered the crisis (from the beginning of 2004 to the third quarter of 2010). Panel data regression models are evaluated cross-country, with fourteen countries: Slovenia, Mexico, Russia, Croatia, Turkey, Poland, Slovakia, Lithuania, Romania, Hungary, the Czech Republic, Bulgaria, Ukraine and Latvia.

The equation on the basis of which we test the hypothesis that the structure of deficit financing (domestic vs. foreign) affects the movement of bond spreads is defined in the following way:

$$Spread_{i,t} = Constant + \beta_1 \times Domestic\ debt\ as\ percentage\ of\ public\ debt_{i,t}$$
$$+ \beta_2 \times Government\ budget\ deficit_{i,t}$$
$$+ \beta_3 \times Interest\ rate\ in\ the\ eurozone_t$$
$$+ \beta_4 \times Real\ gross\ domestic\ product_{i,t} \qquad (1)$$
$$+ \beta_5 \times External\ debt_{i,t} + \varepsilon_{i,t}$$

$$i = 1,2,3,4,...,14$$
$$t = Q1\text{-}2003\ ,...,\ Q3\text{-}2010$$

Why have these independent variables been taken for the testing of the hypothesis? Each independent variable given explains specific effects on the dependent variable the spread. The fiscal impact is explained through the variable *government budget deficit*, from which it is expected that a reduction in the deficit (rise in the value of the variable) will lead to a reduction in spread. The global risk appetite is explained by *interest rate in the eurozone*, from which it is expected that an increase in the interest rate in the eurozone will lead to a growth of spread. Real economic impact is explained by *real gross domestic product*, the growth in which is expected to reduce the spread, and the external impact is explained by *rate of change of external debt*, the growth of which will increase the spread.

The dependent variable $Spread_{i,t}$ is equal to the spread of ten-year government bonds of a given country in relation to the benchmark ten-year bund for fourteen countries i in time period t which starts from the first quarter of 2003 and finishes in the third quarter of 2010. Source of all data for this variable is the Bloomberg portal.

Percentage of domestic debt in public debt$_{i,t}$ (DOMESTIC) is equal to the ratio of domestic debt in relation to the total public debt of a given country i in time period t. The source for this variable is the Dissemination Standards Bulletin Board of the IMF, established for each member country. This is a high quality source of data concerning the domestic component of the public debt, which can be defined as debt in the domestic currency, which is not indexed, and is issued according to the domestic legislation for each country.

Government budget deficit$_{i,t}$ (DEFICIT) is equal to the deficit of the government budget for fourteen countries (Slovenia, Mexico, Russia, Croatia, Turkey, Poland, Slovakia, Lithuania, Romania, Hungary, the Czech Republic, Bulgaria, Ukraine and Latvia) and is expressed as percentage of GDP. A negative value in the deficit means that the reduction of the deficit is shown in lower negative values.[1] Source of data

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[1] A smaller negative value means that a reduction of the deficit will mean that the deficit will range for example from -4% of GDP to -1% of GDP, which is mathematically seen as a smaller negative value. A lower spread in formula (1) will be influenced by the fall of the deficit, which is a change from -4% to -1% of GDP.

for the deficit of the government is the statistics of the IMF, the IFS – International Financial Statistics. Use of this source enabled a uniform quality of data.

Furthermore, added to the equation is the variable *interest rate in the eurozone$_t$* (EURATE), which signifies the average interest rate on loans in the countries of the EMU, that is, EURIBOR. Source here is the Eurostat database.

The fourth variable in equation (1) is *real gross national product$_{i,t}$ (RGDP)* for country *i* in time which we introduce into the equation to correct domestic non-fiscal impacts on spreads. The annual rate of rise of real GDP at an annual level is used (annualised data). Source of data for rate of rise in GDP is the statistics of the IMF.

The fifth variable in equation (1) is *External debt$_{i,t}$ (EXT_GDP_RATE)* for country *i* in time *t*, which we put into the equation in order to explain the influences of external balances or imbalances on the dependent variable. Sources of data for this variable are national statistics and the joint source of external debt. The variable external debt will be presented in models as annual change of external debt as percentage of GDP.

Also carried out is the testing of the stationarity of the variables observed in the panel data model. Testing of the stationarity of time series is an important step in the analysis of time sequences since the introduction of a non-stationary time series into the econometric model can lead to erroneous conclusions of the connections between the variables. Since we are dealing with the analysis of a panel data model, the IPS (Im, Pesaran and Shin) unit root test was conducted for each variable.

The results of the stationarity test carried out show that the three time series observed are non-stationary: *percentage of domestic debt in public debt$_{i,t}$, government budget deficit$_{i,t}$* and *interest rate in the eurozone$_{i,t}$*. In order to achieve stationarity of series, the first differentiation was carried out, transforming variables into stationary process.

TABLE 4

Results of the IPS test on the existence of a unit root in time series

Variable	IPS test magnitude	P-value	Decision	Order of integration
D(DOMESTIC)	-7.6537	0.0000	Stationary	I(1)
D(DEFICIT)	-6.1791	0.0000	Stationary	I(1)
D(EURATE)	-5.7131	0.0000	Stationary	I(1)
RBDP	-4.4605	0.0000	Stationary	I(0)
EXT_BDP_RATE	-2.0502	0.0202	Stationary	I(0)

The equation evaluated includes nine members of the EU that belong to the group of NMS, as well as Mexico, Russia, Croatia, Turkey and Ukraine (a cross section

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of fourteen countries, then) in two periods: the first covers the period from the first quarter of 2003 to the second quarter of 2008, i.e. the period before the recession, and the second covers the period from the first quarter of 2004 to the third quarter of 2010, i.e. the recession years.

The evaluation of seemingly unrelated regressions (SUR) is based on an evaluation of a system of equations linked only by a cross-equation variance of error (Zellner, 1962). Increasing the efficacy of the evaluation that arises by the use of the SUR method of evaluation is increased with a correlation among the errors of the equations, and is reduced with a correlation among the regressors of the equations. An evaluation of the parameters of the system of equations is carried out with the help of the SUR procedure, which is robust to the problem of heteroscedasticity and correlations within the units, but not within the units of the temporal cross-section (Yaffee, 2003). Accordingly, evaluation of the parameters is carried out with the least squares method, which is expanded, by the use of the SUR procedure, accordingly producing the EGLS (estimated generalised least square) method. This is a transformed model available by the iterative producer, the so-called Cochrane-Orchutt method, used to evaluate parameters of a regression model if the errors of the relation are described by the *AR(1)* model with an unknown coefficient of auto-correlation. The procedure is iterative, which means that the process halts when the evaluations achieve the required degree of convergence (Bahovec and Erjavec, 2009).

The evaluated regression panel data model for the period from the first quarter 2003 to the second quarter 2008 is:[2]

$$SPREAD = 2.285125 - 0.931155 \times D(DOMESTIC)$$
$$- 2.022989 \times D(DEFICIT) - 1.05284 \times D(EURATE) \qquad (2)$$
$$+ 0.017886 \times EXT\_BDP\_RATE - 0.014105 \times RBDP$$

in which *SPREAD* signifies the spreads on government bonds of the countries in the regression model of panel data as compared to the benchmark bond. The variable *DOMESTIC* signifies the percentage of domestic debt in total public debt. Then the variable *DEFICIT* signifies the government budget deficit as percentage of GDP. The variable *EURATE* signifies the benchmark interest rate in the eurozone that is the commercial interest rate for a deposit of up to one year, and the variable *RBDP* signifies the annual real rate of change in gross domestic product, while the variable *EXT_GDP_RATE* signifies the rate of growth of external debt as percentage of GDP.

Interpretation of the results shows that the ratio of domestic public debt (*DOME-STIC*) and the deficit expressed as percentage of GDP (*DEFICIT*) have a marked (statistically significant) negative effect on spreads in the period from the first

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[2] Data of the results of econometric testing are seen in table 5.

quarter of 2003 to the second quarter of 2008 (a larger relative domestic public debt and a large i.e. small negative fiscal balance are correlated with smaller spreads). In the period preceding the crisis, the markets were less concerned about long-term fiscal sustainability, since the budgetary deficits were as a rule low and often turned into surpluses, and the capacity for the development of the domestic market for public debt instruments was interpreted positively (international creditors shared the risk with domestic). Hence it is entirely expected that domestic fiscal fundamental should have an important effect on spreads over and above the general global risk appetite (*EURATE*). The movement of real economic indicators, summed up in the real rate of GDP growth (RGDP) behaves entirely in accordance with the expectation that a higher rate of economic growth would tend to bring about a reduction in spreads, for investors interpret any positive information concerning economic fundamentals as a lower risk of investment in the bonds of a given country. The coefficient alongside the variable of change in external debt (*EXT_GDP_RATE*) is positive, which is also in line with expectations that a higher rate of growth in external debt will lead to higher investor concern, which will in turn increase the value of government bond spreads. Related to the variable change in external debt one should add that the value of the coefficients is small, and hence is a variable of little importance for this model.

Empirical levels of significance (p-values) for each variable are lower than 5% which suggests the conclusion that all the variables in the model are statistically significant at the 5 percent significance level. The joint F-test also confirms that the zero hypothesis that all the regression parameters are equal to zero can be rejected. The value of the coefficient of determination (R^2) comes to 0.96, an acceptable value[3].

Analysis of the impact of fiscal policy on spreads on bonds has been enlarged by expanding the period of analysis to the third quarter of 2010, which means that regression equation (1) covered the period from 2004 up to the last available figures at the moment the article was written, i.e. the third quarter of 2010, which also means data for the period of the recession that started in the third quarter of 2008.

The evaluated panel data regression model (model 2) for the period from the first quarter of 2004 to the third quarter of 2010 is:

$$
\begin{aligned}
SPREAD = 5.151559 &- 0.905538 \times D(DOMESTIC) \\
&- 3.647916 \times D(DEFICIT) - 2.284368 \times D(EURATE) \\
&+ 0.021695 \times EXT\_BDP\_RATE - 0.037732 \times RBDP
\end{aligned} \tag{3}
$$

Empirical levels of significance (p-values) for each variable are lower than 5% which leads to the conclusion that all the variables in the model are statistically

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[3] Data of the results of econometric testing are seen in table 5.

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significant with a level of significance of 5 percent. The joint F-test also confirms that the zero hypothesis that all the regression coefficients are equal to zero can be rejected. The value of the coefficient of determination (R^2 – R squared) comes to 0.94, which is an acceptable value. The coefficients have the same signs as in model 1 shown in formula (2), which indicates that the basic regression model has been appropriately defined.[4]

In an interpretation of the results of model (3), which covers the period of the crisis, it is necessary to take into consideration that structural breaks of relations occurred in the crisis between fundamental indicators and expected movements in spreads. First, spreads reacted more strongly to the change in the global risk appetite measured by the benchmark eurozone interest rate. Secondly, where the correlation between spreads and the benchmark interest rate is lower, a greater impact from domestic public debt is noticed. The deficit is certainly the variable that has the greatest coefficient and that has the greatest impact on the movement in spreads. The findings of other papers suggest that investors make their financial decision according to the cross section of the geographical situation and market relations as well, and accordingly emerging market economies must be aware of the flight of capital from such markets in the event of difficulties in the whole of the region (Cifarelli, 2006). Hence the investigation of this paper could be expanded by the making of an additional model with different country combinations. The coefficients with other variables in the model with a time series up to the 3rd quarter of 101 also behave in line with expectation. The coefficient of the variable of change of external debt is positive, which means that an increase in external debt will act on average on the enlargement of the spread (with other variables unconnected), which was the case in the model shown in formula (2), the value of the coefficient being however smaller. Coefficients in the evaluation of the model from formula (3) have a greater value than the coefficients obtained by an evaluation of the model in the period that does not include the crisis (except percentage of domestic debt in public debt), which can be explained by the greater engagement of investors in the market that follow the movement of bonds much more attentively. In periods of expansion and economic growth spreads are more determined by global volatility, while in bad times more attention is devoted to the macroeconomic fundamentals that underpin them. Hence it can be concluded that during monitoring of movements of spreads in poor times the interests of investors in macroeconomic fundamentals of bond issuers rises.

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[4] Data of the results of econometric testing are seen in table 5.

TABLE 5

Results of econometric testing

	Model 1	Model 2
	(5.2.)	(5.3.)
C	2.2851	5.1516
Standard error	0.2119	0.1886
Magnitude test (t-Statistic)	10.784	27.3182
p-value (Prob.)	0.0	0.0
D (DOMESTIC)	-0.9312	-0.9055
Standard error	0.1249	0.2543
Magnitude test (t-Statistic)	-7.4519	-3.5615
p-value (Prob.)	0.0	0.0
D (DEFICIT)	-2.0229	-3.6479
Standard error	0.3742	0.8699
Magnitude test (t-Statistic)	-5.4058	-4.1931
p-value (Prob.)	0.0	0.0
D (EURATE)	-1.0528	-2.2843
Standard error	0.1104	0.1046
Magnitude test (t-Statistic)	-9.5305	-21.8398
p-value (Prob.)	0.0	0.0
EXT_BDP_RATE	0.0179	0.02169
Standard error	0.0019	0.0014
Magnitude test (t-Statistic)	29.7107	15.2919
p-value (Prob.)	0.0	0.0
RBDP	-0.0141	-0.0377
Standard error	0.0019	0.0018
Magnitude test (t-Statistic)	-7.1781	-21.4691
p-value (Prob.)	0.0	0.0
Number of observations	294	378
Coefficient of determination	0.9640	0.9442
F-statistic	409.7126	337.3428

6 CONCLUSION AND RECOMMENDATIONS

The result of the analysis shows that the structure of public debt and policy of public debt have an important impact on fiscal policy, particularly in adverse economic environments. Investors are extremely sensitive to economic indicators and while investing in government bonds pay considerable attention to the figures published by the official statistics.

The conduct of fiscal policy in environment of a low price of capital and its almost limitless availability at a global level enables the creators of fiscal policy to borrow on the global financial market in a simple manner. The time of the financial crisis showed how important it is to have access to the domestic market and to be able to rely on both domestic and foreign investors. The analysis has shown that it is more probable for countries that have a larger percentage of domestic within total public debt to enjoy greater trust from investors, which they will price through lower spreads on their bonds. The results clearly show that it is sensible to have a balanced reliance on the domestic and on the foreign market, with a gradually ever greater reliance on the domestic market.

Recommendations for conducting fiscal policy are to ensure fiscal discipline and the long-term sustainability of public finance, crucial in the context of a monetary union. As the financial crisis since the second half of 2008 has shown very clearly, for the weakest point in the monetary union is precisely fiscal policy – fiscal discipline and public debt management. One of the important recommendations for conducting fiscal policy to be drawn from these results is that the market estimate of risks on bonds is, before, during and after a crisis, the most reliable mechanism for the introduction of discipline into the handling of fiscal policy. An additional lesson that might be drawn from the results is that fiscal policy in times when there is no crisis should be reliable and lead towards consolidation to create a space for crisis times.

In the light of recommendations for Croatia it is necessary to enable the creation of a framework for a balanced share of domestic and international investors in the public debt. Accordingly it is important to consider the possibility of transparent auctions of government bonds. In Croatia, subscription to government bonds is not carried out by auction, rather via arrangers through direct negotiations, which can make sense as a kind of insurance, i.e. as access to sources of financing when the foreign markets close down. On the other hand, transparent auctions could product a net gain for the economy, for they would erase the dividing line between foreign and domestic markets, in the long term at least.

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