**Influence of macroeconomic fundamentals on country risk and capital market**

Evidence from Brazil

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**RESUMO**

O trabalho pretende fornecer evidências empíricas, com base no método de mínimos quadrados ordinários (MQO) e método generalizado dos momentos (GMM), acerca (i) da influência das variáveis ​​macroeconômicas e das políticas econômicas sobre o risco país e (ii) da influência das variáveis ​​macroeconômicas e do risco-país sobre o principal índice do mercado brasileiro de ações (Ibovespa). É importante destacar que tanto o tipo de análise como também as evidências encontradas neste trabalho não foram realizados por nenhum outro autor. Ou seja, este estudo difere dos outros na literatura sobre os determinantes do risco-país e do desenvolvimento dos mercados de capitais, ao focar no papel que os fundamentos macroeconômicos, a credibilidade do regime de metas de inflação e a reputação do banco central desempenham para redução do risco-país e para o melhor desempenho do mercado de capitais. As evidências encontradas para a economia brasileira sugerem que a política monetária e a gestão da dívida pública, bem como a credibilidade do regime de metas de inflação e a reputação do banco central afetam o risco país e o comportamento do mercado de capitais brasileiro (medido pelo Ibovespa). Os resultados encontrados sugerem novos “*insights*” sobre a influência das políticas econômicas sobre a economia, apontando que a menor percepção de risco-país pelos investidores com base na melhoria dos fundamentos macroeconômicos, favorece a entrada dos agentes econômicos no mercado de capitais brasileiro.

**Palavras-chave:** política monetária, dívida pública, credibilidade, reputação, embi, ibovespa

**ABSTRACT**

The paper aims at providing empirical evidence, based on ordinary least square (OLS) and generalized method of moments (GMM), about *(i)* the influence of macroeconomic variables and economic policies on country risk and *(ii)* the influence of macroeconomic variables and country risk on the main Brazilian index of the stock market (Ibovespa). It is important to highlight that both the sort of analysis and the evidence found in this work were not performed by any other author, i.e., this study differs from others in the literature of determinants of country risk and capital markets development by focusing on the role that macroeconomic fundamentals, credibility and reputation play in lessening country risk and improving the performance of the capital market. The evidence found for the Brazilian economy suggest that monetary policy and public debt management, as well as the credibility of the regime of inflation targeting and the reputation of the central bank affect country risk and the behavior of the Brazilian capital market (measured by the Ibovespa). The results suggest new insights about the influence of economic policies on the economy; pointing out that a lower perception of country risk by investors based on the improvement of macroeconomic fundamentals, encourage the entry of economic agents in the Brazilian capital market.

**Key words:** monetary policy, public debt, credibility, reputation, embi, ibovespa

**JEL Code:** E44, E58, E63, H63

**Área 3 - Macroeconomia, Economia Monetária e Finanças**

**1. Introduction**

Since the beginning of the 2000s, developing countries have been benefited by an extremely favorable environment in the global economy, generated by high global liquidity. Abundant global liquidity and the positive economic performance of developing countries were responsible for the lowest country risk in the history of these countries, measured by JP Morgan “Emerging Markets Bond Index Global” (EMBIG). Even during the global subprime crisis, emerging countries showed greater resistance to the crisis, being the last to feel its effects. At the height of the crisis, the highest level of EMBIG was significantly lower than those recorded during the crises in Russia (1998), Brazil (1999/2002) and Argentina (2001/2002). The level of country risk in these countries quickly returned to levels below 300 basis points in mid-2009.

In Brazil, one of the most important emerging economies in the world, the country risk measured by JP Morgan reached its lowest historical value in May 2007 (142 basis points). During the global financial crisis, the country risk in Brazil did not exceed 500 basis points and quickly returned to levels below 250 basis points in the second half of 2009. Considering the good performance of the Brazilian economy during the subprime crisis and the rapid recovery of the Brazilian stock market, it becomes important to analyze the influence of macroeconomic factors for the reduction of country risk and its importance for the development of the capital market in Brazil.

This paper assesses the influence of macroeconomic variables on country risk, and as a consequence the influence of country risk on the Brazilian capital market. In particular, the paper examines whether economic aspects such as the credibility of the inflation targeting regime, the central bank's reputation and the responsible management of public debt have contributed to reduce country risk and to stimulate the development of the capital market.

In this sense, the paper aims at providing empirical evidence, based on ordinary least square (OLS) and generalized method of moments (GMM), about *(i)* the influence of macroeconomic variables and economic policies on country risk and *(ii)* the influence of macroeconomic variables and country risk on the main Brazilian index of the stock market (Ibovespa). It is important to highlight that both the sort of analysis and the evidence found in this work were not performed by any other author, i.e., this study differs from others in the literature of determinants of country risk and capital markets development by focusing on the role that macroeconomic fundamentals, credibility and reputation play in lessening country risk and improving the performance of the capital market. The evidence found for the Brazilian economy suggest that monetary policy and public debt management, as well as the credibility of the regime of inflation targeting and the reputation of the central bank affect country risk and the behavior of the Brazilian capital market (measured by the Ibovespa). The results suggest new insights about the influence of economic policies on the economy; pointing out that a lower perception of country risk by investors based on the improvement of macroeconomic fundamentals, encourage the entry of economic agents in the Brazilian capital market.

For this purpose, the paper is organized as follows: next section presents a small review of the literature concerning the influence of macroeconomic variables for country risk and for the development of capital markets; section 3 presents empirical evidence for the Brazilian economy through an econometric analysis about the relation between macroeconomic variables, country risk and the main Brazilian index of the stock market (Ibovespa); and the last section shows the conclusion.

**2. The literature on the determinants of country risk and capital markets development**

There are several studies that examined the relationship between country risk and the internal and external economic factors. Some argue that shocks originating in developed countries are primarily responsible for the evolution of country risk and thus emphasize the external factors (Kamin and von Kleist, 1999; Calvo, 2002 e 2005; García-Herrero and Ortíz, 2006; Rozada and Yeyati, 2006). On the other hand, another part of the literature studies the effects of domestic economic fundamentals in the determination of the country risk (Eichengreen and Mody, 2000; Arora and Cerisola, 2001; Kamin, 2002; Çulha et al., 2006).

The work of Arora and Cerisola (2001) analyzed the effect of U.S. monetary policy on sovereign spreads as well as the influence of domestic macroeconomic fundamentals over the country risk. The evidence found suggests that the macroeconomic fundamentals of individual countries – such as the adoption of responsible fiscal policy – are extremely important to reduce the country risk.

 Çulha, et al. (2006) analyzed both short-run and long-run determinants of the sovereign spreads in a set of 21 emerging countries over the period 1998-2004. They worked with daily and monthly data, and they estimated individual regressions for countries and panel regression. The evidence showed that domestic macroeconomic variables have significant influence on the behavior of short-term country risk.

Regarding Brazil, some studies attempted to investigate the relationship between country risk, macroeconomic variables and the domestic capital market (Andrade and Teles, 2005; Blanchard, 2005; Favero and Giavazzi, 2005; Nunes, Costa-Jr and Meurer, 2005; Teixeira, Klotzle and Ness-Jr, 2008).

Andrade and Teles (2005) analyzed the effect of macroeconomic policies on the Brazilian country risk in the period from January 1991 to December 2002. They used a model called Country Beta Market Model, where the country risk is a time varying coefficient. The study showed that monetary policy played a relevant role, i.e., the interest rate exerted a negative influence over the Brazilian country risk. Besides, it observed that international reserves had a negative effect over the country risk.

 Favero and Giavazzi (2005) showed that, in Brazil, important financial variables, like exchange rates and domestic interest rates, fluctuated parallel to the EMBI spread over the period 1999-2003. For its turn, Blanchard (2005) estimated the probability of default of the Brazilian government by using EMBI spread data. He showed that the EMBI spread and the probability of default moved together over the 1995-2003 period.

The work of Teixeira and Klotzle Ness-Jr (2008) examined how the Brazilian country risk, in the period from 1992 to 2003, was influenced by some fundamental macroeconomic variables (such as GDP growth, fiscal surplus, debt Public, inflation rate, current account balance and international reserves). The results indicated that the country risk is influenced by the deviations of the domestic economic variables from their long run tendencies in different points of time. However, if we assume that the intensity and direction of those deviations depend on external conditions, the results show that, in the long run, the external scenario has the greatest influence over the country risk. The work of Ferreira (2010) found evidence that macroeconomic fundamentals, such as current account balance as a percentage of GDP, public debt as a percentage of GDP and international reserves, largely explain the evolution of country risk in Brazil.

Regarding the theoretical literature on the relationship between capital market and macroeconomic variables the works of Dornbush and Fischer (1980), Blanchard (1981), Hansen and Singleton (1983), Campbell (1993) and Pagano (1993) may be highlighted. Regarding the empirical literature, the works of Fama (1981), Kaul (1987), Barro (1990), Ajayi et al (1998), Lee and Solt (2001) and Rigobon and Sack (2001) should be highlighted. Regarding the Brazilian case, the work of Nunes, Costa-Jr. and Meurer (2005) should be highlighted.

The work of Nunes, Costa-Jr. and Meurer (2005) studied the dynamic relationship between macroeconomic variables and the Brazilian stock market. Based on VAR analysis, the study examined the dynamic relationship between country risk and return of the Brazilian stock market (Ibovespa). The study examined the dynamic relationship between some macroeconomic variables (such as GDP, interest rate, inflation rate, exchange rate and the C-bond spreads) and the return of the Brazilian stock market (Ibovespa). As a result, these authors found a significant relationship between the perceptions of foreign investors on the Brazilian economy and the movements of the stock market, the existence of a negative relationship between inflation and the returns on the Brazilian market and a positive relationship between economic activity and the average returns of the Ibovespa. Furthermore, they found a significant relationship between the perceptions of foreign investors on the Brazilian economy and movements in the stock market.

**3. Empirical Evidence for the Brazilian Economy**

Since 1999 the Brazilian economy presents a strategy for conducting the fiscal policy focused on the decreasing of public debt/GDP ratio.[[3]](#footnote-4) Also in 1999 the National Monetary Council determined inflation targeting as the new strategy for the monetary policy. The use of these strategies contributed to an increase in the commitment and accountability of both fiscal and monetary authorities with macroeconomic stability.

According to the work of de Mendonça and de Guimarães e Souza (2009)[[4]](#footnote-5), with a credible inflation targeting regime and a central bank presenting strong and well defined reputation, less effort is necessary by the monetary authority for the achievement of the inflation target due to the increased capacity of affecting the public expectation. Thus, it is expected that a high credibility, *ceteris paribus*, is associated with a lower volatility of the interest rate for the achievement of the inflation target.

Based on data from the Brazilian economy (Figure 1), this paper seeks evidence to support the following argument: the efforts of both fiscal and monetary authorities have been essential for macroeconomic stability (Montes and Bastos, 2010; de Mendonça and Nunes, 2011) and thus to reduce the country risk[[5]](#footnote-6) and to stimulate the capital market. Regarding the consequences of fiscal efforts, a lower debt/GDP ratio signals to investors the country's commitment to honor its debts. In this sense, a decrease in the debt/GDP ratio over time implies lower country risk. A lower perception of country risk by investors and an improvement in the expectation of sustainable economic growth, both based on the improvement of macroeconomic fundamentals of the country, encourages the entry of economic agents in the Brazilian capital market, thus increasing the *Ibovespa*.

**Figure 1 – Macroeconomic environment, country risk (EMBI) and Ibovespa**

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*Source: author’s elaboration*

* 1. **Methodology and data**

The macroeconomic stability is crucial for creating a favorable environment for reducing country risk and to stimulate the development of capital markets. Hence, in order to estimate the impact of macroeconomic variables on Brazil’s country risk (*EMBI*), and the impact of country risk and other macroeconomic variables on the main index of the stock-market in Brazil (*Ibovespa*), an empirical analysis was conducted using ordinary least squares (OLS) and generalized method of moments (GMM).[[6]](#footnote-7)

One reason for using GMM is that while OLS estimates have problems of serial autocorrelation, heteroskedasticity or non-linearity, which is typical in macroeconomic time series, this method provides consistent estimators for the regression (Hansen, 1982). As pointed out by Wooldridge (2001, p. 95), “to obtain a more efficient estimator than two-stage least squares (or ordinary least squares), one must have overriding restrictions”. The weighting matrix in the equation was chosen to enable the GMM estimates to be robust, considering the possible presence of heteroskedasticity and autocorrelation of unknown form. In addition, the use of instruments needed to be dated to the period t-1 or earlier as a condition for predicting the contemporaneous variables which were unavailable at time t.

The period of analysis runs from December of 2001 to September of 2010.[[7]](#footnote-8) The (monthly) series[[8]](#footnote-9) used in the estimates of the country risk (EMBI) are:

* Country risk (*Embi*): The Emerging Markets Bond Index (*Embi*) was created by JP Morgan in 1992 in order to meet the needs of investors, because they needed a benchmark to measure investment risk in emerging markets. The *Embi* is composed of those emerging countries that have at least moderate risk of not honoring their commitments. The *Embi* measures the daily performance of the debt of emerging countries and shows the average daily return difference of the prices of these securities compared to the return of securities similar to the U.S. Treasury, which are a reference to the bond market of very low risk. The greater this difference, the greater the risk perception of investors regarding investments in a country.
* Public debt/GDP ratio (*Pub\_debt*): this variable is often used as an indicator of fiscal performance. The higher the debt stock, the greater the difficulty the public sector in meeting the debt service, thus increasing the risk of insolvency or default of debt (Guardia, 2004). Therefore, a positive correlation between public debt and country risk is expected.
* Current account (*Curr\_accoun*): a current account surplus increases the liquidity of the country, reducing the likelihood of the country does not honor its commitments. It is expected a negative correlation between the current account surplus and the country risk.
* International reserves (*Reserves*): the volume of international reserves is associated with the degree of liquidity in the country. Considering the definition of Williamson (1973), that international liquidity measures the ability of a country to honor a current account deficit without resorting to undesirable actions, thus, as the country has more reserves, the greater its flexibility to adjust to shocks. Therefore, it is expected a negative correlation between international reserves and country risk.
* Inflation targeting credibility (*Credibility*): the regime of inflation targeting aims to anchor market expectations about the behavior of inflation. When the inflation targets are successfully achieved, the economic agents incorporate the inflation targets previously announced by the monetary authority in their future expectations. In this sense, the inflation targeting regime gains credibility and wins public confidence. In order to control adverse economic shocks, the central bank sets the interest rate with the aim to neutralize or mitigate the effects of these shocks on both inflation and the real economy. A central bank with low credibility will need to establish a high interest rate to achieve this goal. Due to the fact that the Brazilian public debt is strongly indexed by basic interest rate (SELIC), thus, when the Central Bank sets a high interest rate, the outcome is an increase in the debt/GDP ratio over time and a higher country risk (Bresser-Pereira and Nakano, 2002). Empirical evidence suggests that a higher credibility requires smaller changes in interest rates to control inflation, thus resulting in minor variations of employment and output (Amano, Coletti and Macklem, 1999; de Mendonça and Souza, 2007). Therefore, it is expect a negative correlation between credibility and country risk. The credibility of the inflation target is measured using the methodology developed by de Mendonça (2007). The credibility index has a value equal to 1 when the annual expected inflation[[9]](#footnote-10) (E(π)) is equal to the target inflation and decreases in a linear way while inflationary expectation deviates from the announced target. Therefore, the credibility index shows a value between 0 and 1 strictly if the expected inflation is situated between the maximum and minimum limits (πt\*) established for each year and assumes a value equal to 0 when the expected inflation exceeds one of these limits. Hence,



* Central bank reputation (*Reputation*): According to Blinder (2000), the central bank's reputation is built on a credible and effective monetary policy for several years. That is, the central bank's reputation depends on its success in achieving the inflation target for several consecutive years. A central bank with a high reputation of being committed to price stability can control inflation by means of small variations in interest rates. As the central bank's reputation helps in promoting macroeconomic stability, it also helps reduce the country risk. Thus, it is expected a negative correlation between reputation and country risk. The index of central bank reputation is measured using the methodology developed by de Mendonça and de Guimarães e Souza (2009). The framework is similar to that applied for the *Credibility*. The main difference is that the deviations are calculated taking into account the observed inflation[[10]](#footnote-11) and not the expected inflation. Hence,

$Reputation=\left\{\left.\begin{array}{c}\begin{array}{c} 1 if π\_{t Min}^{\*} \leq π\_{t OBS} \leq π\_{t Max}^{\*}\\1- \frac{1}{0.2- π\_{t Max}^{\*}}.\left[π\_{OBS}- π\_{t Max}^{\*}\right] if π\_{t Max}^{\*} < π\_{OBS} <0.2\\1- \frac{1}{-π\_{t Min}^{\*}}.\left[π\_{OBS}- π\_{t Min}^{\*}\right] if 0\% < π\_{OBS} < π\_{t Min}^{\*}\end{array}\\0 if π\_{OBS} \geq 0.2 ou π\_{OBS} \leq 0\end{array}\right\}\right.$

Regarding the relation between country risk (*Embi*) and the index of the stock-market in Brazil (*Ibovespa*), the analysis runs from December of 2001 to September of 2010. The (monthly) series[[11]](#footnote-12) used in the estimates of the *Ibovespa* are:

* Bovespa index (*Ibovespa*): is an index of about 50 stocks that are traded on the [São Paulo Stock, Mercantile & Futures Exchange](http://en.wikipedia.org/wiki/BM%26F_Bovespa). The index is composed by a theoretical portfolio with the stocks that accounted for 80% of the volume traded in the last 12 months and that were traded at least on 80% of the trading days. It is revised quarterly, in order to keep its representativeness of the volume traded and in average the components of Ibovespa represent 70% of the all the stock value traded. The *Ibovespa* reflects not only the variation of stock prices, but also the impact of the benefit distribution, and is considered an indicator that measures the total return of its component stocks. Therefore, the basic purpose of the *Ibovespa* is to serve as an indicator of the average behavior of the Brazilian capital market.
* Country risk (*Embi*): an increase in country risk increases investors' uncertainty about the country's ability to honor commitments and to maintain both political and economic stability. An increase in country risk may reflect a worsening in the performance of macroeconomic variables and create an expectation of currency depreciation. The increased uncertainty of economic agents about the economic fundamentals of a country makes economic agents seek safer investment alternatives, resulting in a capital flight from the capital market. Therefore, the outflow of capital from the stock market driven by the increase in country risk causes a drop in the Bovespa index. Therefore, we expect a negative correlation between the *Ibovespa* and the country risk (*Embi*).
* Real interest rate (*Real*): an increase in real interest rates can make productive investment projects unviable. The impracticability of these projects brings an expectation in the market for lower profits for companies listed on Bovespa. A lower expectation of corporate profits reduces the attractiveness of its shares on the stock exchange. Thus, economic agents choose not to allocate resources in capital markets, and allocate on other options, such as fixed income investment, because an increase in real interest rate increases the attractiveness of this option and also because this option has a lower risk. Hence, an increase in real interest rate causes an outflow of resources from capital markets and therefore a reduction in the *Ibovespa*. It is expected a negative correlation between the *Ibovespa* and the real interest rate.
* Exchange rate (*Exch*): exchange rate depreciation implies injury to foreign investors or opportunity cost to domestic investors. A foreign investor converts dollars into real to invest in the country. Despite the financial performance of the application, exchange rate depreciation implies a loss for investors. This is because at the end of the application, the foreign investor must convert reais into dollars. With the exchange rate depreciation, foreign investors will get fewer dollars than the initial amount of dollars. Therefore, exchange rate depreciations stimulate a flight of foreign investors from domestic capital markets and thereby cause a fall of *Ibovespa*. On the other hand, a domestic investor converts reais into dollars to invest abroad. With exchange rate depreciations, it becomes more attractive for domestic investors to apply abroad, because in addition to gains from financial investment, the domestic investor will get gains from exchange rate depreciations. Thus, domestic investors are encouraged to leave the national capital market and invest in the international market. This flight of domestic investors from domestic capital markets causes a reduction in the Ibovespa. Therefore, it is expected a negative correlation between exchange rate and the Ibovespa
* Economic growth (*Growth*): an increase in the rate of economic growth creates the expectation of increased sales for companies listed on Bovespa. This also implies an increase in market expectations for higher profits of these companies. This expectation of higher profits of companies encourages investors to allocate their resources in capital markets. Thus, an increase in the rate of economic growth causes an increase in the Ibovespa, i.e., it is expected a positive correlation between economic growth and *Ibovespa*.
* Foreign direct investment (*Fdi*): refers to the net inflows of [investment](http://en.wikipedia.org/wiki/Investment) to acquire a lasting management interest in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital. These capital flows usually enter the country in order to finance large investment projects of enterprises. The increase in foreign direct investment in 12 months signals to investors that the productive capacity of enterprises is increasing. This increase in potential production capacity of companies raises expectations of future profits on the part of economic agents, making their shares more attractive. Thus, an increase in foreign direct investment in 12 months stimulates an increase in the *Ibovespa*.
* Foreign portfolio investment (*Fpi*): These capital flows usually enter the country aiming to earn arbitrage gains with financial assets offered by the country. Due to these capitals are mostly short-term and very volatile, your monthly flow should be considered. A higher monthly flow of *Fpi* provides greater liquidity for financial assets, making them more attractive. This increased attractiveness of financial assets implies its valuation on the stock market and a greater volume of business with these assets, thus, reflecting an increase in the *Ibovespa*.
* United States unemployment rate (*Unemp\_us*): the US unemployment rate serves as a proxy for investors' perception about the world economic situation. An increase of this rate is interpreted as a worsening in the global economy. The increased uncertainty about the performance of the world economy implies a capital flight from emerging countries, like Brazil, for developed countries. Therefore, the worsening of the global economic scenario causes a drop in the *Ibovespa*.

**3.2 Estimates**

According to Teixeira, Klotzle and Ness-Jr. (2008, p. 51), “*country risk has two components: domestic and external risk. Domestic risk refers to the specific country risk determinants, which are related to the economic fundamentals, such as for example the fiscal and balance of payments situation, the stock of international reserves, the real growth rate of the economy and the inflation rate*”.

There are several studies on what are the determinants of country risk (for instance, Min, 1998; Nogués and Grandes, 2001; Andrade and Teles, 2005; Teixeira, Klotzle and Ness-Jr., 2008). These studies basically agree that the country risk is explained by both domestic and external factors. Among domestic factors, often found in studies to be significant, include: public debt, international reserves and current account.

Although external factors are important to explain the country risk, this work is concerned about analyzing the influence of domestic factors. Hence, besides the influence of public debt, international reserves and current account, the function used to analyze the influence of domestic factors on the country risk (*EMBI*) includes the impact of credibility and reputation, and is given by the basic equation below (the expected signs for the relationships are expressed through partial derivatives):

**(1)** $EMBI=f(Pub\\_debt;Curr\\_acoun;Reserves;Credibility;Reputation) $

$$\frac{∂f}{∂pub\\_debt}>0;\frac{∂f}{∂curr\\_acoun}<0;\frac{∂f}{∂reserves}<0;\frac{∂f}{∂credibility}<0;\frac{∂f}{∂reputation}<0$$

A first condition to be analyzed before applying the estimations is to check if series have unit root. Therefore, the unit-root test Augmented Dickey-Fuller (ADF) was applied (see Table A.1 at the appendix).[[12]](#footnote-13) It is possible to estimate using all series in level, if all are I(1) and if they are cointegrated. Hence, the cointegration test was performed for the set of series – *embi, pub\_debt, reserves, cur\_acoun, reputation* and *credibility*. The choice of the VAR lag order was determined using the Schwarz (SC) and Hannan-Quinn (HQ) information criteria. It is observed that both models (with and without constant) indicate that the lag order for VARs is 2 and that the best-fit model is with constant (Table A.2 at the appendix). The cointegration test proposed by Johansen (1991, LR test statistic), based on the significance of the estimated eigenvalues, indicates that the trace statistic rejects the non-cointegration hypothesis (Tables A.3 and A.4 at the appendix).

Table 1 presents the estimates by OLS[[13]](#footnote-14) and GMM[[14]](#footnote-15). The estimates include dummy variables in order to capture: *(i)* the political crisis due to the 2002 presidential election – “Lula effect” – called *dummypresid*, from June 2002 to December 2002, and *(ii)* the subprime crisis, called *dummycrise*, from November 2008 to February 2009. According to the estimates in table 1, the dummies are positive and are statistically significant in all specifications, justifying its inclusion in the model.

As can be seen, the signs of the coefficients of the explanatory variables are those to be expected, in all specifications. The estimated effect of debt on country risk (*Embi*) shows that, except for specification (3) by OLS, all estimated coefficients for both methods (OLS and GMM) are statistically significant. In other words, a proper management of public debt which aims to reduce the debt/GDP ratio results in a reduction of country risk.

The effect caused by "*Curr\_accoun*" is robust and statistically significant in all specifications of both methods. In this sense, as indicated by the literature, current account surplus increases the liquidity of the country thus reducing the likelihood of the country does not honor its commitments and the risk associated with this country. In addition, estimates of the effect of international reserves on the country risk shows that although the coefficients estimated by OLS are not statistically significant, their signs are strong and negative for all specifications of both estimation methods. On the other hand, the coefficients estimated by GMM have high statistical significance and the sign remains robust and negatively correlated with country risk. In other words, the accumulation of international reserves contributes for the reduction of country risk, as it indicates to investors the country's ability to react to external shocks.

In order to evaluate the effects of macroeconomic stabilization in Brazil and, in particular, the effects of the regime of inflation targeting on the evolution of country risk in the 2000s, the variables credibility and reputation were included in the basic model. The negative signs of *Credibility* and *Reputation* represent relevant results. In both methods of estimation, OLS and GMM, except for specification (2) of the GMM, the coefficients of credibility and reputation are highly statistically significant. This is important because it confirms the hypothesis that the reputation of the monetary authority and the credibility of the inflation targeting regime have an inverse relation with the country risk. Hence, the evidence suggest that the credibility of the inflation targeting regime and the reputation of the monetary authority are variables that played an important role in reducing the country risk in Brazil in the last 10 years. Therefore, the greater the public confidence in the regime of inflation targeting and the stronger the reputation of the monetary authority, the lower the EMBI.

**Table 1 – Estimates of equation (1)**

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 Several studies have examined the relationship between macroeconomic variables and the evolution of asset prices in the capital market. Theoretically, we highlight the works of Blanchard (1981), Hansen and Singleton (1983), Campbell (1993) and, Dornbush and Fischer (1980). Empirically, we can highlight the works of Fama (1981), Kaul (1987), Barro (1990), Shah (1989), Kwon and Shin (1999), Rigobon and Sack (2001), Ajayi et ali (1998) and, Lee Solt (2001). In Brazil, we can highlight the empirical work of Nunes, Costa Jr. and Meurer (2005). These studies often use the following relevant macroeconomic variables to explain the evolution of capital markets: economic activity or GDP, interest rates, exchange rates, inflation and a variable that captures the country risk.

The function used to analyze the impact of country risk and other macroeconomic variables on the main index of the stock exchange in Brazil (*Ibovespa*) is given by the basic equation below (the expected signs for the relationships are expressed through partial derivatives):

**(2)** $IBOVESPA=f(Embi;Real;Exch;Growth;Fdi)$

$$\frac{∂f}{∂embi}<0;\frac{∂f}{∂real}<0;\frac{∂f}{∂exch}<0;\frac{∂f}{∂growth}>0;\frac{∂f}{∂fdi}>0$$

A first condition to be analyzed before applying the estimations is to check if series have unit root. Therefore, the unit-root test Augmented Dickey-Fuller (ADF) was applied (see Table A.1 at the appendix). It is possible to estimate using all series in level, if all are I(1) and if they are cointegrated. The choice of the VAR lag order was determined using the Schwarz (SC) and Hannan-Quinn (HQ) information criteria. It is observed that both models (with and without constant) indicate that the lag order for VARs is 4 and that the best-fit model is with constant (Table A.5 at the appendix). Hence, the cointegration test was performed for the set of series – *Ibovespa, Embi, real, exch, growth* and *fdi*. The cointegration test proposed by Johansen (1991, LR test statistic), based on the significance of the estimated eigenvalues, indicates that the trace statistic rejects the non-cointegration hypothesis (Tables A.6 and A.7 at the appendix).

 Estimates of equation (2) through OLS[[15]](#footnote-16) and GMM[[16]](#footnote-17) are presented in Table 2. The same dummy variables of the previous analysis were included in estimates by OLS and GMM. According to the estimates in Table 2, the estimated coefficients of "*dummycrise*" have – except for specification (2) of both estimation methods – statistical significance, and its sign is robust and is consistent with that expected. Moreover, for “*dummypres*”, although this does not present a robust signal, the coefficient of specification (4) of the GMM estimation method has statistical significance and its sign is consistent with that expected. Therefore, the inclusion of this dummy variable is justified by its high significance in specification (4) of the GMM estimation method.

The estimates reveal, for both methods (OLS and GMM), that the constant is positive and presents statistical significance in all specifications. Regarding the effect of country risk (Embi) on the Ibovespa, except for specification (1) of the GMM estimation method, all the estimated coefficients for both methods are statistically significant and their signals are robust and negatively correlated with the Ibovespa. In other words, an increase in country risk causes an increase in economic agents' uncertainty about the economic fundamentals of the country making these economic agents seek safer investment alternatives. Thus, the outflow of capital from the stock exchange, driven by the increase in country risk, causes a drop in the Bovespa index.

The estimated coefficients for the effect of real interest rate on the Ibovespa, in all specifications of both estimation methods (OLS and GMM), have statistical significance and their signals are robust and in line with expectations. Thus, an increase in real interest rate causes a drop in expected earnings of companies, reducing the attractiveness of its shares in the capital market. Moreover, the increase in real interest rate makes other financial options with lower risks more attractive than the assets of the capital market. Hence, these two effects of increased real interest rates cause a capital flight from capital markets, reflecting a reduction in the Bovespa index.

Estimates of the effect of exchange rate on the Ibovespa shows that all coefficients are statistically significant and the signs are robust and negatively correlated, as expected. In other words, exchange rate depreciations stimulate the outflow of investors from capital market and hence cause a drop in the Bovespa index. In turn, the effect of *Fdi* is robust and positively correlated with the Ibovespa. All specifications of both estimation methods, OLS and GMM, show that the estimated coefficients are statistically significant.

The effect caused by the country's economic growth on the Bovespa index is robust and statistically significant in all specifications of both estimation methods. Thus, as expected, an increase in the rate of economic growth reinforces the expectations of higher corporate profits, encouraging investors to allocate their resources in capital markets and increasing the *Ibovespa*.

**Table 2 – Estimates of equation (2)**

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Figure 2 illustrates how shocks on macroeconomic variables implied effects on the country risk and how important were macroeconomic variables for the development of the capital market in the Brazilian economy from December of 2001 to September of 2010.

**Figure 2: macroeconomic variables, country risk and IBOVESPA**

Estimated effects:

It has economic relation:

**CREDIBILITY**

**REPUTATION**

**PUB\_DEBT**

**RESERVES**

**CURR\_ACOUN**

**EMBI**

**FDI**

**EXCH**

**GROWTH**

**REAL**

**IBOVESPA**

 *Source: author’s elaboration*

The scheme presented through Figure 2 shows that a more stable macroeconomic environment, in which the central bank has a high reputation and the regime of inflation targeting presents high credibility, has a direct influence on reducing the country risk. In addition, macroeconomic stability reduces the volatility and the level of real interest rate. As the real interest rate is an important variable in the process of investment decision, a lower and stable real interest rate encourages investments and hence economic growth. Thus, since both reputation and credibility help keeping macroeconomic stability and, as a consequence, stimulate economic growth and reduce country risk, they exert significant influence on the development of capital markets in the country.

The responsible management of public debt has a direct impact on the country risk. A lower debt / GDP ratio implies a lower risk perception by investors, resulting in a reduction of country risk. Therefore, the responsible conduct of fiscal policy has a direct influence on reducing the country risk, and indirectly supports the development of capital markets.

As shown by the scheme and based on evidence found in the estimations, international reserves and current account balance exert a direct effect on the country risk, i.e., a higher level of international reserves and a larger current account surplus collaborate to reduce country risk. In turn, the exchange rate and the foreign direct investment have a direct effect on the capital market in Brazil.

In this sense, the conduct of economic policies and the behavior of policymakers are important for macroeconomic stability and to reduce country risk and, therefore, to economic growth and development of the capital market in the country.

**Conclusion**

After macroeconomic stabilization that occurred as a result of the Real Plan (July 1994), the Brazilian stock market began an upward trajectory of growth and importance within the national economy. However, it was from the 2000s that Brazil began to observe a sudden development of its capital market. The amount of daily trades recorded on the BOVESPA and the value of companies participating in the Bovespa index had significant real growth over the past 10 years. According to data from the BMF&BOVESPA, the average monthly volume of daily business reported on BOVESPA and the value of companies participating in the Bovespa index, between December 2001 and September 2010, showed, respectively, a real growth of about 492.66% and 301.12%.

Furthermore, since the adoption of inflation targeting in 1999, the Brazilian economy performs better in terms of macroeconomic stability, which is important for a better risk assessment by investors. Considering that the macroeconomic environment affects country risk, and country risk influences investment decisions on capital markets, the paper analyzed the relation involving macroeconomic stability, country risk and the development of capital markets.

The findings suggest that monetary policy and public debt management, as well as the credibility of the regime of inflation targeting and the reputation of the central bank affect country risk and the main Brazilian index of the stock market (Ibovespa). Moreover, the results suggest new insights about the influence of economic policies on the economy; pointing out that a lower perception of country risk by investors based on the improvement of macroeconomic fundamentals, encourage the entry of economic agents in the Brazilian capital market.

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**Appendix**



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**Table A.8 – OLS Tests *Embi***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | specification 1 | specification 2 | specification 3 | specification 4 |
|   | F-stat | Prob. | F-stat | Prob. | F-stat | Prob. | F-stat | Prob. |
| Ramsey RESET (1) | 44.82 | 0.00 | 24.91 | 0.00 | 14.43 | 0.00 | 4.47 | 0.04 |
| Ramsey RESET (2) | 26.08 | 0.00 | 26.24 | 0.00 | 18.26 | 0.00 | 24.40 | 0.00 |
| ARCH (1) | 25.77 | 0.00 | 9.26 | 0.00 | 8.26 | 0.00 | 5.45 | 0.02 |
| ARCH (2) | 13.07 | 0.00 | 7.61 | 0.00 | 11.53 | 0.00 | 10.75 | 0.00 |
| LM (1) | 25.14 | 0.00 | 15.37 | 0.00 | 10.27 | 0.00 | 8.24 | 0.00 |
| LM (2) | 20.77 | 0.00 | 10.06 | 0.00 | 11.60 | 0.00 | 6.87 | 0.00 |
| Jarque Bera | 38.91 | 0.00 | 13.24 | 0.00 | 38.31 | 0.00 | 47.38 | 0.00 |

*Source:* author's estimates

**Table A.9 – OLS Tests *Ibovespa***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | specification 1 | specification 2 | specification 3 | specification 4 |
|   | F-stat | Prob. | F-stat | Prob. | F-stat | Prob. | F-stat | Prob. |
| Ramsey RESET (1) | 197.67 | 0.00 | 271.39 | 0.00 | 164.30 | 0.00 | 232.01 | 0.00 |
| Ramsey RESET (2) | 108.10 | 0.00 | 144.97 | 0.00 | 107.39 | 0.00 | 143.01 | 0.00 |
| ARCH (1) | 28.05 | 0.00 | 24.43 | 0.00 | 50.48 | 0.00 | 37.86 | 0.00 |
| ARCH (2) | 13.66 | 0.00 | 11.85 | 0.00 | 24.66 | 0.00 | 19.65 | 0.00 |
| LM (1) | 71.39 | 0.00 | 54.36 | 0.00 | 73.54 | 0.00 | 54.54 | 0.00 |
| LM (2) | 35.83 | 0.00 | 28.68 | 0.00 | 36.58 | 0.00 | 27.74 | 0.00 |
| Jarque Bera | 7.93 | 0.01 | 3.34 | 0.18 | 6.55 | 0.03 | 6.90 | 0.03 |

*Source:* author's estimates

1. \* Fluminense Federal University, Department of Economics; National Council for Scientific and Technological Development (CNPq). gabrielmontesuff@yahoo.com.br [↑](#footnote-ref-2)
2. \*\* Fluminense Federal University, Department of Economics; National Institute of Social Security of Brazil (INSS). brunotiberto@yahoo.com.br [↑](#footnote-ref-3)
3. The main pillar for this strategy is the adoption of primary surpluses. [↑](#footnote-ref-4)
4. The work presents empirical evidence for the Brazilian economy about the relation between both credibility and reputation with interest rate. [↑](#footnote-ref-5)
5. According to de Mendonça and Nunes (2011), if the fiscal authority is accountable with a policy that stabilizes the public debt/GDP ratio, the consequence is a low Treasury bond risk premium. [↑](#footnote-ref-6)
6. The estimations were performed using the software EViews 5.0. [↑](#footnote-ref-7)
7. The start date corresponds to when the series regarding expectations of inflation is available from the Central Bank of Brazil site. [↑](#footnote-ref-8)
8. The series were obtained from the Central Bank of Brazil site (except the *EMBI*, which was obtained from JP Morgan). [↑](#footnote-ref-9)
9. The series of inflation expectations was obtained and is available at the Central Bank of Brazil site. [↑](#footnote-ref-10)
10. The series of observed inflation is measured by National Consumer Price Index (extended) – IPCA (official price index) accumulated in the last 12 months, available at the Central Bank of Brazil site. [↑](#footnote-ref-11)
11. The series were obtained from the Central Bank of Brazil site. [↑](#footnote-ref-12)
12. The series *reputation* will be considered I(1). Through the ADF test, although the null hypothesis is not rejected at 1%, to 5% significance level is rejected. Moreover, through the analysis of correlograms (Box and Jenkins, 1976), evidence shows that the series is I(1). [↑](#footnote-ref-13)
13. The reported t-statistics in the OLS estimates are based on the estimator of Newey and West (1987), which inconsistent in the presence of both heteroskedasticity and autocorrelation of unknown form. Regarding the OLS estimate of specification 4, several tests for detecting heteroskedasticity in the residuals (ARCH LM test), serial correlation (Lagrange multiplier - LM test), residual normality (Jarque-Bera test), and the problem with the model specification (Ramsey RESET test) were performed (see Table A.8, at the appendix). [↑](#footnote-ref-14)
14. The GMM estimates apply the following instrumental variables: embi-1, embi-2, embi-3, pub\_debt-1, pub\_debt-2, pub\_debt-3, pub\_debt-4, curr\_acoun-1, curr\_acoun-2, curr\_acoun-3, curr\_acoun-4, curr\_acoun-5,   reserves-1, reserves-2, reserves-3, reserves-4, reserves-5, reputation-1, reputation-2, reputation-3, reputation-4, reputation-5, credibility-1, credibility-2, credibility-3, credibility-4, credibility-5. Regarding the GMM technique, Cragg (1983) pointed out that overidentification analysis has an important role in the selection of instrumental variables to improve the efficiency of the estimators. Hence, a standard J-test was performed with the objective of testing this property for the validity of the overidentifying restrictions (Hansen, 1982). [↑](#footnote-ref-15)
15. The stability test and the residual tests are shown in Table A.9 at the Appendix. [↑](#footnote-ref-16)
16. The GMM estimates apply the following instrumental variables in the regressions: Ibovespa-1, Ibovespa-2, Ibovespa-3, embi-1, embi-2, embi-3, real-1, real-2, real-3, exch-1, exch-2, exch-3, growth-1, growth-2, growth-3, fdi-1, fdi -2, fdi -3, fdi -4, fdi -5, fpi, fpi -1, fpi -2, fpi -3, fpi -4, fpi -5, fpi -6, unemp\_us, curr\_acoun, curr\_acoun-1, curr\_acoun-2, curr\_acoun-3. [↑](#footnote-ref-17)