FINANCIAL LIBERALIZATION AND THE IMPACT ON FINANCIAL MARKET

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KEY WORDS: financial liberalization, capital flows, capital account, volatility,
market efficiency, stock market indices.
INTRODUCTION

In the late 1970s and early 1980s, most developing countries were in a crisis of economic policy. Due to adverse circumstances and the deteriorating economic and financial conditions, the financial system proved to have many deficiencies and was unable to generate economic growth. Based on financial aid from the World Bank and International Monetary Fund, many developing countries in Asia, Europe, Latin America and Africa have undertaken economic reforms to create a suitable investment environment and develop the private sector through a economic system based on market mechanisms. Apparently the result of these reforms was to transform developing economies of many emerging economies, where economic growth is underpinned by strong private sector growth and rapid maturation of capital markets.

Financial liberalization was an important component of the reforms mentioned above. The reforme of financial liberalization means to give central banks more authority to conduct monetary policy, to privatize and restructure the banking sector, to liberalize interest rates, to waive the direct loans and, more generally, to develop and promote the role of financial markets in financing the economy. The main objective is to enable emerging economies to emerge from recession, and later to develop rapidly.

State of knowledge. Many studies have been made to highlight the impact of financial liberalization on financial sector and overall economic performance in emerging economies. Thus, some authors praise the benefits of financial liberalization. It had been shown that financial liberalization contributes, on the one hand, to strengthen the functioning of financial systems, to improve the competitiveness of banking and financial sector and to transform savings into funds available for financing the economy. On the other hand, helps to promote international diversification and access to global capital market. For example, Kim and Single (2000) argue that the abandonment of controls on financial sector leads to more efficient capital markets in emerging economies, allows the guidance of existing funds and national economies to most productive investments. Levine and Zervos (1998), Stulz (1999) and Mishkin (2001) argue that liberalization will improve transparency and reduce liquidity problems in emerging countries. Other authors, such as Bekaert and Harvey (2000) and Henry (2000), argue that, especially, participants in emerging markets can enjoy new gains from international diversification and reduce
capital costs, after market liberalization. However, Bekaert et al. (2001) argue that economic growth tends to be improved as a result of financial deregulation.

However, financial liberalization is not a risk free process. Financial crises of the 1990s demonstrates this. Indeed, the banking system was fragile and collapsed in several emerging economies. Economies, where there was high growth rates were turned into economies characterized by severe recessions. And that's not all. A negative phenomenon is to increase the risk of financial instability, which is caused by the free movement of capital.

**Research objectives.** This thesis attempts to provide relevant answers to the questions of great interest in literature, which is why the thesis involves a structure that is designed primarily to those living far controversy for which there is no consensus yet. The difference in views on the expected impact of liberalization in emerging economies may result from the fact that some articles are focused on short-term effect of liberalization, while others are focused on its long-term effect. The authors point out further that in most cases, empirical studies neglect the idea that liberalization is dynamic and progressive, and thus should not be allowed to reach definitive conclusions. Therefore the objectives of this study are to:

- explain the concept of liberalization;
- identify the impact of capital account liberalization on economic growth;
- highlight and model the behavior of conditional volatility in emerging markets;
- analyze the impact of financial liberalization on stock market volatility, respectively on the weak form efficiency in emerging markets;
- identify the politico-economic recommendations for decision makers in emerging countries to prevent and / or reduce financial vulnerability associated with the wave of financial liberalization.

**Research methodology.** Documentation bibliography, a component of the scientific documentation process, has a decisive importance to this, because that enables us, through literature, to know the scientific heritage, assumptions used to explain economic phenomena, methods of analysis and estimation, scientific findings and theories in the field. Further, the scientific explanation of economic phenomena is achieved by an aggregate complex, varied methods, means, techniques and tools. This requirement results
not only from the complexity of economic phenomena studied, but also due to imperfect character of any research methods.

To measure the economic and logical means of assumptions we used: induction and deduction, but also quantitative measurement methods. Another method of analysis is represented by various econometric models built using statistical databases: Datastream, Eurostat, World Bank, International Financial Statistics and World Development Indicators, respectively specialized computer software that: EViews, R and Matlab WinRats.

**The motivation and importance of research.** Delicate and difficult at the same time, financial and monetary field always attracted attention of researchers worldwide, the most illustrious of them basing their theories and forming around them reputable schools, always adapted to the progress of economic life and the need to maintain and restore monetary and general economy equilibrium. One of the challenges of contemporary capitalism, financial liberalization, is a process that also can bring enormous benefits or pose serious obstacles to development and economic prosperity. Financial liberalization is a financial innovation, dereglementation, booming capital market, ie a trend towards financial deleveraging. The effects of capital mobility fueling instability by taking speculative positions and imitative behavior, which causes overadjusting reactions of exchange rates and financial asset prices. In addition, financial liberalization limits the leeway of national decision makers in terms of economic policy formulation. One solution would be to set up and compliance with prudential disposals and information transparency. Prudential provisions are preventive and are distinguished from curative actions occurring after crisis (intervention of any lender). Than rejected, financial liberalization must be accompanied by a prudential policy increase. Too rapid liberalization in a country does not mean the appearance of speed problems in absolute sense, but in a relative sense: in many cases instability occurred because of the difference between impressive speed of financial liberalization and slow adjustment of prudential disposals, banking and financial regulations, respectively monetary policy action.

The need to study and knowledge of both the process itself and its effects on financial markets has emerged as a result of a small number of studies and inconclusive results
regarding the impact of financial liberalization in developing countries in Central and Eastern Europe.

**Structure thesis.** The paper is structured in five chapters. In seeking answers to fundamental questions, the conducted research will allow a better understanding of the role of financial liberalization on the evolution of capital flows, the impact of capital account liberalization on economic growth, respectively the impact of financial liberalization on stock market volatility and efficiency in six European emerging countries (denoted EU6 countries: Hungary, Poland, Czech Republic, Slovenia, Slovakia and Romania).

Chapter 1 "**Theoretical approaches on financial liberalization**" highlights some aspects of financial liberalization process. I made an identification of the advantages, disadvantages of the process, an overview of liberalization methods and indicators used. Moreover, I illustrated methods of measuring intensity of the liberalization process, challenges that arise in measuring the effects of the process, some fundamental questions that are present in the literature regarding the impact of financial liberalization on the cost of capital, informational efficiency and volatility in emerging markets.

Chapter 2 "**Dynamics of capital flows liberalization**" presents the phasing of capital flows, which was made by two economists, Ishii and Habermaier, and some basic rules that a country must meet before the liberalization of capital flows. I also described the evolution process of liberalization in the analyzed countries, the steps that had to go through to complete the process, the evolution of investment flows in the pre-, respectively post-liberalization period, and the factors influencing the decision to liberalize the foreign direct investment flows.

In Chapter 3 "**Capital account liberalization in EU6 countries**", I have described the concept of capital account liberalization, respectively the relationship between crisis and capital account liberalization. As many studies have focused on the impact of capital account liberalization on economic growth (GDP), in this chapter I have approaches this issue. In the absence of a theoretical model that provides a clear explanation of the impact, I built a linear regression where the dependent variable is GDP, and the
independent variables are inflation, interest rate, exchange rate, financial account and a
dummy variable related liberalization.

In Chapter 4 "Financial liberalization and stock market volatility" I analyzed the
impact of financial liberalization on capital market volatility. In the first part of this
chapter I presented some theoretical aspects and scientific studies on the concept of
volatility. Since emerging markets are known to have a much higher volatility than
developed markets, in the second half of the chapter I used econometric GARCH and
IGARCH models to capture the impact of liberalization on volatility and I presented some
preventive measures against the risk of financial instability generated by liberalization
process.

Chapter 5 "The impact of financial liberalization on stock market efficiency" shows
the impact of liberalization on weak form efficiency in six emerging markets. I used unit
root tests of structural breaks (Zivot-Andrews test and Lee-Strazicich test), variance ratio
tests (Automatic Variance Ratio test and Wright test) and the generalized Hurst exponent
for testing long memory property. Since the liberalization of stock markets, there was the
hope that the presence of foreign investors, leading to increased liquidity and transparency
of markets and ensuring competition between prices, will increase the informational
efficiency.
1. THEORETICAL APPROACHES ON FINANCIAL LIBERALIZATION

Financial liberalization is not a contemporary phenomenon. For decades, Western countries and companies were operating in a free economy. Thus, it is difficult to identify the beginnings of financial liberalization, on which is based the economy liberalization. It is sufficient to recall the role of Italian bankers in Renaissance Europe, the importance considered in the nineteenth century of English and French capital in the world, particularly in the colonial empires in Russia, and the influence of American capital movements from the crisis of 1929.

In the late 1970s the phenomenon of deregulation in the U.S. appears to be the object of widening freedom to innovate and take in a system of pure competition, by reducing or scrapping rules authoritarian, which tended: to strictly regulate the operation and access to different markets capital, to strictly regulate the role and freedom of financial intermediaries action to impose limits framework lending operations by their nature, duration, taxation or object.

Financial liberalization includes several elements, as it reflects a variety of restrictions that were imposed. This can include:

- capital account liberalization;
- banking sector liberalization;
- stock market liberalization (table 1).
Table 1: Financial liberalization elements

<table>
<thead>
<tr>
<th>Capital account liberalization</th>
<th>Banking sector liberalization</th>
<th>Stock market liberalization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Criteria for full liberalization</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Borrowing abroad by banks and corporations</td>
<td>Lending and borrowing interest rates</td>
<td>Acquisition by foreign investors</td>
</tr>
<tr>
<td>Banks and companies are allowed to borrow abroad. They must inform the authorities, but an authorization is granted almost automatically. Reserves requirements are less than 10%. Minimum maturity of not more than two years.</td>
<td>There are no controls on interest rates.</td>
<td>Foreign investors are allowed to hold domestic equity without any restrictions.</td>
</tr>
<tr>
<td>and and and and</td>
<td>and and</td>
<td></td>
</tr>
<tr>
<td>Multiple exchange rates and other restrictions</td>
<td>Other indicators</td>
<td>Repatriation of capital, dividends, and interest</td>
</tr>
<tr>
<td>There are not special exchange rates, both for current account transactions, and capital account transactions. There are no restrictions on capital outflows.</td>
<td>There are no controls on lending (subsidies to certain sectors or certain credit allocations). Deposits in foreign currencies are permitted.</td>
<td>Capital, dividends and interest can be repatriated freely within two years from initial investment.</td>
</tr>
<tr>
<td><strong>Criteria for partial liberalization</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Borrowing abroad by banks and corporations</td>
<td>Lending and borrowing interest rates</td>
<td>Acquisition by foreign investors</td>
</tr>
<tr>
<td>Banks and companies are allowed to borrow abroad, but there are certain restrictions. Reserves</td>
<td>There are controls on interest rates or loan or deposit.</td>
<td>Foreign investors are allowed to have up to 49% of the capital of each company. It may be some restrictions to</td>
</tr>
</tbody>
</table>
requirements may be between 10% and 50%. Minimum maturity might be between two and five years. Participate in certain sectors. Also occur indirect ways to invest on the stock market, such as through investment funds.

<table>
<thead>
<tr>
<th>or</th>
<th>and</th>
<th>or</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multiple exchange rates and other restrictions</strong></td>
<td><strong>Other indicators</strong></td>
<td><strong>Repatriation of capital, dividends, and interest</strong></td>
</tr>
<tr>
<td>There are special rates of exchange for current account and capital account transactions. There may be some restrictions on capital outflows.</td>
<td>There may be some controls of credit allocation (subsidies to certain sectors or certain credit allocations). Deposits in foreign currency could not be allowed.</td>
<td>Capital, dividends and interest can be repatriated, but not before the period of 2-5 years from initial investment.</td>
</tr>
</tbody>
</table>

| **Criterii pentru non – liberalizare** |
|---|---|---|
| **Borrowing abroad by banks and corporations** | **Lending and borrowing interest rates** | **Acquisition by foreign investors** |
| Banks and corporations, most often, do not have permission to borrow abroad. Reserves requirements may be greater than 50%. Minimum maturity might be longer than five years. Restrictions are more for some sectors. | There are controls on both the rates on loans and the rates on deposits. | Foreign investors can not hold domestic equity. |
| or | and | or |
| **Multiple exchange rates and other restrictions** | **Other indicators** | **Repatriation of capital, dividends, and interest** |
| There are special rates of exchange for current | There are controls in the allocation of loans and | Capital, dividends and interest may be returned, but no |


account and capital account transactions. There is an increase of the number of restrictions for capital outflows.

<table>
<thead>
<tr>
<th>deposits in foreign currency are not allowed.</th>
<th>sooner than five years from initial investment.</th>
</tr>
</thead>
</table>

Source: Souza (2004)

Financial liberalization can be recognized by official data and the occurred effects of liberalization, such as the introduction of ADR and investment funds, respectively a significant increase in U.S. capital flows. To better understand this reform, it is important a thorough study of the effects occurred. This analysis seeks, first, to show to what extent indicators of liberalization may cause changes in emerging markets, and second, to identify the theoretical basis for constructing necessary measures of liberalization.

Henry (2000), Bekaert and Harvey (2000) and Kim and Singles (2000) states that "financial liberalization is not determined by a single event but a sequence of events".

Measuring the intensity of financial liberalization process is of great interest to investors, since they can understand the openness of the market in emerging countries. The most important thing to note is that the intensity of liberalization is not identical for all emerging countries, because each of them has differently liberalized their capital markets.

In finance, the most often cited method is proposed by Bekaert (1995) regarding concerns about the intensity of liberalization. Construction of the indicator is based on eligible indices of IFC. Thus, for each emerging market, the indicator (investment rate = IR$_it$) is constructed by dividing the market capitalization of S&P / IFC Investable Index to S&P / IFC Global index, after as follows:

$$IR_{it} = \frac{MC_{it}^{IFCI}}{MC_{it}^{IFCG}};$$

where:

- $MC_{it}$ = market capitalization at the time $t$ of the considered two indices for each emerging market;
- $S&P / IFCG$ = total domestic market capitalization;
S&P / IFCI = percentage of the national market, which is legally available to foreign investors.

An investment rate equal to one indicates that emerging markets are fully liberalized. Conversely, if the market is completely closed to foreign investors, the rate will be zero. This rate investment reflects only market deregulation reforms progress, because it relies on the theoretic level of foreign equity. Edison and Warnock (2003) attempts to measure the intensity of controls on capital flows by deducting the investment rate of Bekaert (1995) from value one. The new value obtained is in the range [0,1], where zero reflects an open market with a low capital control and the value of one indicates a high degree of capital controls.

The impact of financial liberalization has been studied by many papers of financial literature. Financial liberalization is a key factor in the spectacular growth in emerging markets. However, liberalization produces structural changes in developing countries, helping to accelerate the development of stock markets. Thus, emerging markets tend to approach to the structure of developed markets. However, the impact of liberalization is not only limited to positive effects, among others, to stimulate economic growth, to reduce of capital costs and interest rates on international diversification in a global market. In fact, for some time, the fragility of the financial system to which are associated frequent financial crisis, concerns not only decision makers from countries that have liberalized markets, but also the market participants. Thus, existing questions in the financial literature are:

- does the cost of capital reduce?
- does market efficiency strengthen?
- is stock volatility enhanced?
- does transmission volatility increase?

Financial literature has not yet provided satisfactory answers to previous questions. This explains the reasons of empirical studies from the following chapters. I consider these questions as basic as they are at the heart of decision makers in emerging markets.
2. DYNAMICS OF CAPITAL FLOWS LIBERALIZATION

Perfect market models suggest that international capital flows generate benefits both debtors and creditors. Since international investment is the inter-temporal trade, the commercial trade between periods and international transactions of the countries that have similar effects on the welfare economy. The case of an open capital account is similar to the case of free trade, but the model indexes differ. Looking from another point of view, the case of international financial coincides with the case liberalization of domestic financial liberalization. If domestic financial markets can be considered as a means of efficient allocation of resources, which can not be considered and international financial markets?

The answer could be that the efficient markets paradigm is fundamentally misleading when applied to capital flows. Limits for capital movements are a distortion.

The stages of capital flows liberalization
A proposal for the sequencing of capital flows was made by two IMF economists, Ishii and Habermaier (2002) (Figure 1). The fundamental principle is that short-term flows should not be liberalized before the country obtain effective control over monetary and foreign exchange operations. It is unclear in the original diagram if full liberalization can be admitted before the introduction of prudential regulations and efficient systems of management risk. In our opinion, the answer should be negative. In general, non-cooperative behavior of banks and other financial institutions may determine to accept risks above the optimum level. It is a known fact in economics that, on monopolistic markets, noncooperativ behavior leads to a sub-optimal social equilibrium; the dominant presence of foreign ownership may cause large allocative inefficiencies, as competition policy has a lesser impact on these firms. Prudential measures (laws, regulations and procedures imposed by the government) aimed at limiting the margin for non-cooperative behavior by imposing rules of risk management, corporate governance and market performance. They are all the more necessary as the country liberalized their capital flows. Efficient allocation of resources through market mechanisms requires high quality information.
Figure 1: Sequencing capital flows liberalization

Stage I                                   Stage II                                         Stage III             time

Liberalize FDI inflows

Liberalize FDI outflows, other longer-term flows, and limited short-term

Revise financial legal framework

Improve accounting and statistics

Strengthen systemic liquidity arrangements and related monetary and exchange operations

Strengthen prudential regulation and supervision, and risk management

Restructure financial and corporate sectors

Develop capital markets, including pension funds

Full liberalization

Source: Ishii and Habermaier (2002)

Following the Asian crisis, among economists has widely spread the view that emerging economies should not liberalize capital flows if some basic conditions are not met. Liberalization of capital flows can lead to increased market concentration and market power of firms. However, it can generate the conditions for increasing economic instability, when periods of excitement and accelerated growth are followed by deep crisis and stagnation.
As a basic rule, a country should not proceed to full liberalization of capital flows if that fails to:

- maintain under control the inflations, to stabilize the exchange rate and to obtain sufficient foreign economic credibility;
- budget deficit and state extra-budgetary commitments to be within reasonable limits;
- external indebtedness (public and private) are not excessive;
- financial system have sufficient development and efficient prudential rules to be implemented;
- competition policy should be strengthened;
- introduce a statistical information system and efficient.

Transition economies of Central and Eastern Europe have already experienced net inflows of capital (Table 2). They can expect a significant increase in these flows, according to internal developments and progress towards European integration. The European Union has imposed on all countries to open their capital account until accession moment. For the first wave of countries such as Czech Republic, Poland, Hungary, this was a matter of two or three years. Most of these countries have made important progress on macroeconomic stabilization, structural reform and in particular domain of the creation of a solid financial system. For them, the risks associated to current account openness appear diminished. Other economies in transition had to overcome considerable difficulties.
Table 2: Stages of capital flows liberalization in EU6 countries

<table>
<thead>
<tr>
<th>Stage of Liberalization</th>
<th>Romania</th>
<th>Czech Republic</th>
<th>Hungary</th>
<th>Poland</th>
<th>Slovenia</th>
<th>Slovakia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full liberalization of residents' access to money market operations</td>
<td>2004</td>
<td>1999</td>
<td>2001</td>
<td>2001</td>
<td>2002</td>
<td>2003</td>
</tr>
</tbody>
</table>

Source: EU6 countries central banks

Less developed countries in transition could take into account the possibility of applying selective measures of capital controls. After the Chilean model, mandatory unpaid short-term reserves for any input of capital could be particularly attractive, to promote long-term investments at the expense of short-term financing. Also, these countries should be able to prevent speculation on its currency, especially if the central bank pursues a target exchange rate. Therefore, they could build a set of controls on sudden outflows and massive capital, even if such controls would not ever come to be applied, it is mainly to give a credible signal. Finally, some may wish to limit the penetration degree of foreign capital in the banking sector to reduce the mobility of capital outflows near a crisis. Competition policy must be sufficiently strong to prevent the formation of powerful monopolies.

**Capital flows liberalization in EU6 countries**

During the 1990s, EU6 countries were in transition period from command to market economy and a first step consists in establishing a policy on current account convertibility. Obligations of Article VIII of the IMF have been accepted by all EU6
countries in the period 1994 - 1996. Capital flows liberalization approach was more heterogeneous reasons, to each country had corresponded a certain data for process implementation, respectively different macroeconomic conditions and developments during the transition period.

Two main groups can be distinguished between EU6 countries: the country with rapid liberalization process - Czech Republic - and cautious liberalization process countries - Hungary, Poland, Slovakia, Slovenia and Romania. Different starting conditions played an important role in the development of a country's liberalization strategy. For example, because of the relatively high external debt of Hungary and Poland, these countries became more vulnerable to external shocks, and their authorities have adopted a cautious attitude towards the liberalization of capital flows.

An important feature of the liberalization process in EU6 countries was that countries tended to liberalize inflows before outflows. This approach was due to the initial uncertainty about the transformation success. In the early years of transition, the authorities feared that high inflation and currency depreciation could trigger sudden capital outflows. Relatively rapid macroeconomic stabilization in most countries removed this fear, and in the second half of the 1990s capital inflows caused more difficulties than potential outflows.
3. CAPITAL ACCOUNT LIBERALIZATION IN EU6 COUNTRIES

Cobbam (2001) defines capital account liberalization as the process of removing restrictions from international transactions related to the movement of capital. It can involve the removal of controls on both domestic resident of international financial transactions and on investments in the home country by foreigners.

The impact of capital account liberalization on economic growth

Capital account liberalization is one of the most controversial and less understood policies of our days. One of the reasons is the fact that different theoretical perspectives have various implications on the opportunity of capital flows liberalization. Another aspect is that empirical analysis could not provide yet relevant conclusions on this topic.

In this chapter I propose to analyze the impact of capital account liberalization and some variables (inflation, monetary policy interest rate, exchange rate and financial account), considered to be the main key vulnerabilities of EU6 economies associated to capital account liberalization, on gross domestic product.

In the absence of a theoretical model able to provide a clear explication on the capital account liberalization, the following regression was conceived:

\[ \text{PIB}_{i,t} = c + \beta_1 * I_{i,t} + \beta_2 * R_{d_{i,t}} + \beta_3 * C_{S_{i,t}} + \beta_4 * C_{F_{i,t}} + \beta_5 * \text{LIB}_{i,t} + \epsilon_{i,t} \]

where:

- PIB\(_{i,t}\) - gross domestic product at the market price of country \(i\) at moment \(t\), expressed as a pro rata increase comparative with the previous period
- \(I_{i,t}\) - monthly inflation rate (annual increase rate) of country \(i\) at moment \(t\)
- \(R_{d_{i,t}}\) - interest rate (percentage) of country \(i\) at moment \(t\)
- \(C_{S_{i,t}}\) - exchange rate (exchange rate of national currency / EURO) of country \(i\) at moment \(t\)
- \(C_{F_{i,t}}\) - financial account expressed in millions of EURO of country \(i\) at moment \(t\)
- \(\text{LIB}_{i,t}\) – dummy variable that is equal with one when the capital account is liberalized and which is equal with zero when the capital account is not liberalized.
LIB is included within the regression in order to study the effect of capital account liberalization on GDP and on the other variables of the regression. The main objective is to estimate the LIB coefficient, which will indicate by its significant positive or negative value the GDP evolution consecutive to liberalization.

The analyzed period is of ten years for each country and taking into consideration the date when the capital account liberalization process took place. Therefore, were studied the following periods: 2001-2011 (Romania), 1996-2005 (Czech Republic), 1996 Q3 - 2006 Q2 (Hungary), 1997-2006 (Poland), 1998-2002 (Slovenia) and 2004-2008 (Slovakia). The official date of capital account liberalization is considered the breaking rupture (Table 3).

All the data that were utilized are quarterly. For three variables (GDP, inflation, and financial account), data were obtained from Eurostat database. Data concerning interest rate were obtained from IMF database and for the exchange rate evolution were used data obtained from Eurostat and from the official websites of EU6 countries central banks as well.

Table 3: The analyzed sample period for each country

<table>
<thead>
<tr>
<th>Country</th>
<th>Official data of capital account liberalization</th>
<th>Analyzed period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romania</td>
<td>September 2006</td>
<td>2001-2011</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>January 2001</td>
<td>1996-2005</td>
</tr>
<tr>
<td>Hungary</td>
<td>June 2001</td>
<td>1996 Q3 - 2006 Q2</td>
</tr>
<tr>
<td>Poland</td>
<td>October 2002</td>
<td>1997 Q4 - 2006 Q3</td>
</tr>
<tr>
<td>Slovakia</td>
<td>January 2004</td>
<td>1999 - 2008</td>
</tr>
</tbody>
</table>

Source: EU6 countries central banks

Each sample contains 40 observations.

EU6 countries have used various policy responses to capital inputs. Two main factors have determined these policy responses: the nature of influxes and the main macro economical objectives. Macro economical objectives are different from one country to another and from time to time: some of these economies extended the struggle with inflation, while others were more concern about the economic growth, consecutive to the success of inflation diminishing. For the most part, the regulators confronted with
multiple challenges and were constrain to establish very clear the priorities. At the same
time, it is important to notice that continuous improvement in prudential supervision and
regulation was crucial to the capital account liberalization in EU6 countries.

Monetary policy and exchange rate policy were the most common responses to capital
influxes towards Central Europe. The main response to foreign direct investments was
sterilized intervention, which can be associated with flexible or fixed exchange rates. Fix
exchange rates have been maintain by Czech Republic until 1997 and by Slovakia until
1998. Slovenia maintained a powerful exchange rate during the entire period, while the
exchange rate from Poland and Hungary has fluctuated strictly within the variation until
2000 and 2001. The monetary authoritie had need to find a delicate equilibrium between
continuation of disinflation, minimization of sterilization costs and maintaining external
competitiveness.

Crossing from a more flexible exchange rate was partially motivated by the increasingly
capital flows. As an effect of the currencies fluctuations, the monetary authorities have
differences their responses based on the nature of the capital flow. After 1990, Czech
Republic and Slovakia received large amounts of foreign direct investments. They react
especially by sterilized intervention. Poland and Hungary have attracted large amounts of
major capital influxes dependent on the exchange rate. Both of these countries have
renounced at sterilized intervention and permitted significant appreciations of the nominal
exchange rates. In the same time, the interest rate become more active in four countries -
Czech Republic, Hungary, Poland, and Romania. All of these four countries have
introduced an inflation-targeting official regime.

Within the inflation-targeting regime, Poland, Hungary, Romania and Czech Republic
have followed different strategies. In Poland, interest rate was used strictly for inflation
aiming, taking into consideration capital flows that succeeded and exchange rates
evolution. The non-intervention policy transferred the volatility costs of capital flows on
the participants market and discouraged foreign exchange transactions. On the other hand,
Hungary and Romania have utilized interest rate in order to maintain the exchange rate
within a short variation, which was considered to be in concordance with inflation aim
objectives. Settling disinflation within the process of inflation aim was a great success and
inflation it is expressed with a single number since 2002 in Poland and since 2005 in
Romania an Hungary. Nevertheless, one of the consequences was major capital influxes dependent on interest rate and accompanied by a firm monetary policy. In the Czech Republic, the interest rate was less active, because it lead to a low level of inflation in short time after the inflation aim regime was introduced.

Before liberalization, inflation had a positive impact but also insignificant on Poland's GDP. The impact on other countries' GDP was also negative, but in the same significant for countries like Romania and Czech Republic. Interest rate positively and insignificantly influences the GDP of Romania, Hungary, Poland, and Slovenia; it negatively and insignificantly influences the GDP of Czech Republic and Slovakia. Evolution of national currency interest rate in relation with Euro had a positive and significant impact only on Romania's GDP. Financial account does not represent a positive impact on GDP before the capital account liberalization process took place. Dummy variable reveals that the presence of controls regarding capital account had a positive and significant influence on the GDP of Romania, Hungary, Poland, and Slovenia (Table 4).

Table 4: The impact of inflation, interest rate, exchange rate and financial account on GDP

<table>
<thead>
<tr>
<th>Country</th>
<th>c</th>
<th>I</th>
<th>Ed</th>
<th>Cx</th>
<th>CT</th>
<th>LIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romania</td>
<td>2.083683*</td>
<td>-0.043632*</td>
<td>1.541115</td>
<td>11.37341*</td>
<td>-0.028576</td>
<td>1.275***</td>
</tr>
<tr>
<td></td>
<td>(1.694624)</td>
<td>(3.209093)</td>
<td>(1.203536)</td>
<td>(2.58976)</td>
<td>(-0.516872)</td>
<td>(1.18252)</td>
</tr>
<tr>
<td>Czech</td>
<td>1.028493**</td>
<td>-0.129465**</td>
<td>-0.37929</td>
<td>9.167078</td>
<td>0.000876</td>
<td>0.195</td>
</tr>
<tr>
<td>Republic</td>
<td>(2.513234)</td>
<td>(2.25595)</td>
<td>(-0.534034)</td>
<td>(-1.323545)</td>
<td>(0.083808)</td>
<td>(1.110002)</td>
</tr>
<tr>
<td>Hungary</td>
<td>1.231512*</td>
<td>-0.011705</td>
<td>0.496525</td>
<td>1.725908</td>
<td>-0.013008</td>
<td>1.07***</td>
</tr>
<tr>
<td></td>
<td>(4.905606)</td>
<td>(0.586457)</td>
<td>(0.306556)</td>
<td>(0.362227)</td>
<td>(-0.448443)</td>
<td>(16.90707)</td>
</tr>
<tr>
<td>Poland</td>
<td>0.39869</td>
<td>0.053636</td>
<td>1.35927</td>
<td>6.095748</td>
<td>-0.006553</td>
<td>0.805***</td>
</tr>
<tr>
<td></td>
<td>(0.607626)</td>
<td>(0.763736)</td>
<td>(0.476717)</td>
<td>(1.125511)</td>
<td>(-0.164532)</td>
<td>(4.922277)</td>
</tr>
<tr>
<td>Slovenia</td>
<td>2.971194**</td>
<td>-0.164567</td>
<td>3.234552</td>
<td>-4.235812</td>
<td>0.085755</td>
<td>1.045***</td>
</tr>
<tr>
<td></td>
<td>(2.408437)</td>
<td>(1.061181)</td>
<td>(1.803757)</td>
<td>(1.482587)</td>
<td>(1.356128)</td>
<td>(5.976052)</td>
</tr>
<tr>
<td>Slovakia</td>
<td>0.747736</td>
<td>-0.065206</td>
<td>-3.132392</td>
<td>11.18103</td>
<td>-0.080828</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>(0.783862)</td>
<td>(0.560702)</td>
<td>(-0.339208)</td>
<td>(0.597503)</td>
<td>(-0.686269)</td>
<td>(1.566808)</td>
</tr>
</tbody>
</table>

Source: Author processing in Eviews

Note: *, ** and *** is the confidence values 1%, 5%, respectively 10%. In parentheses are t- Student values.

Elimination of controls on capital account caused inflation to have a negative impact on GDP in Czech Republic, in other countries the impact is insignificant. Interest rate on monetary policy positively affects the GDP in Romania and Czech Republic. As regards exchange rates, the evolution of RON / EUR exchange rate has a negative impact on
GDP. The financial account does not affect GDP, even after capital account liberalization. The process of liberalization positively affects GDP of all countries EU6 (except for Romania) (Table 5).

**Table 5**: The impact of inflation, interest rate, exchange rate and financial account on GDP

<table>
<thead>
<tr>
<th></th>
<th>$c$</th>
<th>$I$</th>
<th>$R_d$</th>
<th>$C_3$</th>
<th>$C_F$</th>
<th>LIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Romania</td>
<td>0.655999</td>
<td>-0.002812</td>
<td>5.931669**</td>
<td>-21.95963***</td>
<td>0.618034</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>(0.334333)</td>
<td>(0.009127)</td>
<td>(1.766573)</td>
<td>(1.966933)</td>
<td>(1.097365)</td>
<td>(1.497342)</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>1.394086*</td>
<td>-0.191358***</td>
<td>3.048644**</td>
<td>-7.956804</td>
<td>-0.003362</td>
<td>0.965***</td>
</tr>
<tr>
<td></td>
<td>(6.106808)</td>
<td>(2.117582)</td>
<td>(2.440765)</td>
<td>(1.107587)</td>
<td>(0.066121)</td>
<td>(5.493086)</td>
</tr>
<tr>
<td>Hungary</td>
<td>0.839619**</td>
<td>0.03008</td>
<td>0.111845</td>
<td>1.332054</td>
<td>-0.179185</td>
<td>0.97***</td>
</tr>
<tr>
<td></td>
<td>(2.78785)</td>
<td>(0.548479)</td>
<td>(0.166306)</td>
<td>(0.286408)</td>
<td>(-1.358544)</td>
<td>(15.32697)</td>
</tr>
<tr>
<td>Poland</td>
<td>1.816302*</td>
<td>-0.252296</td>
<td>1.827526</td>
<td>-0.850392</td>
<td>0.009759</td>
<td>1.275***</td>
</tr>
<tr>
<td></td>
<td>(4.48768)</td>
<td>(-1.429274)</td>
<td>(0.839241)</td>
<td>(-0.161681)</td>
<td>(0.185049)</td>
<td>(7.796153)</td>
</tr>
<tr>
<td>Slovenia</td>
<td>2.099722**</td>
<td>-0.241025</td>
<td>-0.008455</td>
<td>-9.94219</td>
<td>0.011843</td>
<td>1.195***</td>
</tr>
<tr>
<td></td>
<td>(5.725406)</td>
<td>(-2.025261)</td>
<td>(-0.00727)</td>
<td>(-0.19634)</td>
<td>(0.447191)</td>
<td>(6.833859)</td>
</tr>
<tr>
<td>Slovakia</td>
<td>2.594611*</td>
<td>-0.198457</td>
<td>3.254889</td>
<td>1.173327</td>
<td>0.119622</td>
<td>1.765***</td>
</tr>
<tr>
<td></td>
<td>(3.119247)</td>
<td>(-1.157812)</td>
<td>(1.152339)</td>
<td>(0.070108)</td>
<td>(0.563707)</td>
<td>(5.422383)</td>
</tr>
</tbody>
</table>

Source: Author processing in Eviews

Note: *, ** and *** is the confidence values 1%, 5%, respectively 10%. In parentheses are t-student values.
4. FINANCIAL LIBERALIZATION AND STOCK MARKET VOLATILITY

Modern financial theory shows that the volatility of financial assets should be analyzed in order to build efficient portfolios. The concern dedicated to volatility is due to the fact that investment decisions depend not only by the expected returns, but also by the risks of various assets comprising the portfolio. In emerging markets, stock market volatility issues raise some questions. Thus, it was necessary to study the volatility of emerging markets and, in particular, the importance of analyzing the relationship between financial liberalization and volatility. Currently, most used models to study the conditional volatility are ARCH / GARCH models.

To test various aspects of behavior indexes, following the implementation process of capital market liberalization I used daily closing prices of six indices from european emerging stock markets: Hungary (BUX), Poland (WIG), Czech Republic (PX), Slovenia (SIB), Slovakia (SAX) and Romania (BET). Analyzed time begins from the first day publication of each stock market index and ends on June 30, 2011 (except for Slovenia's stock market index). All of values are collected from Datastream database. These indices are denominated in local currency.

Volatility analysis by heteroscedastic models

Construction of ARMA-GARCH models requires that the return series to be stationary, respectively those stock exchange indices to be integrated of order 1.

To test the stationarity / nonstationarity of return series I used Augmented Dickey-Fuller test (ADF) and Kwiatkowski-Phillips-Schmidt-Shin test (KPSS).

Augmented Dickey-Fuller test and Kwiatkowski-Phillips-Schmidt-Shin were applied throughout the period under review, respectively on the unadjusted data. I applied the two tests with constant model and I found that the return series of six indices are stationary.

In order to analyze the existence of dependencies in the return series I used ARMA(p,q) model. Establishing ARMA model was based on three criteria: the Akaike information
criteria (AIC), Ljung-Box statistics and the analysis of correlograms of residuals. ARMA model with the smallest value of AIC, for which the portmanteau test does not show significant results, is used to remove the linear dependences from return series. These structures were removed in the case of three indices: BET, PX and SAX. McLeod-Li test statistics of squared residuals is significant to 1%, which shows us the presence of nonlinear dependencies in the return series.

To analyze the impact of liberalization on return volatility of the six indices series, I used GARCH model in which introduced a dummy variable related to liberalization. Thus, the GARCH model is:

$$\sigma_t^2 = \omega + \sum_{i=1}^{p} \alpha_i \cdot \varepsilon_{t-i}^2 + \sum_{j=1}^{q} \beta_j \cdot \sigma_{t-j}^2 + \gamma \cdot D_t$$

where $D_t$ is the dummy variable that takes the value zero for the pre-liberalization period, respectively one for post-liberalization period.

The results in table 6 shows that financial liberalization has a positive impact on the volatility of stock markets in Hungary and Czech Republic, respectively a negative impact on stock market volatility in Poland.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>BET</th>
<th>BUX</th>
<th>PX</th>
<th>SAX</th>
<th>SBI</th>
<th>WIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>GARCH(3,1)</td>
<td>GARCH(2,1)</td>
<td>GARCH(1,1)</td>
<td>GARCH(2,1)</td>
<td>GARCH(4,1)</td>
<td>GARCH(2,1)</td>
<td></td>
</tr>
<tr>
<td>$\alpha_1$</td>
<td>0.345582*</td>
<td>0.294876*</td>
<td>0.148982*</td>
<td>0.089856*</td>
<td>0.34496*</td>
<td>0.130253*</td>
</tr>
<tr>
<td>$\alpha_2$</td>
<td>-0.14876*</td>
<td>-0.186334*</td>
<td>-0.040701*</td>
<td>-0.147693*</td>
<td>-0.036349***</td>
<td></td>
</tr>
<tr>
<td>$\alpha_3$</td>
<td>-0.100925*</td>
<td>-0.160198*</td>
<td>-0.036349***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\alpha_4$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\beta_1$</td>
<td>0.899688*</td>
<td>0.877626*</td>
<td>0.83002*</td>
<td>0.939613*</td>
<td>0.934224*</td>
<td>0.891199*</td>
</tr>
<tr>
<td>$\Sigma \alpha + \Sigma \beta$</td>
<td>0.995585*</td>
<td>0.986168*</td>
<td>0.979002*</td>
<td>0.988768*</td>
<td>1.002051</td>
<td>0.985103</td>
</tr>
<tr>
<td>$Q_{ss}(5)$</td>
<td>2.8175</td>
<td>2.0932</td>
<td>3.3066</td>
<td>7.508</td>
<td>5.815</td>
<td>6.4741</td>
</tr>
<tr>
<td>$Q_{ss}(10)$</td>
<td>5.0102</td>
<td>5.5029</td>
<td>5.9783</td>
<td>9.562</td>
<td>1.1242</td>
<td>9.8182</td>
</tr>
<tr>
<td>Dummy</td>
<td>-0.000000244</td>
<td>0.00000159*</td>
<td>0.00000239*</td>
<td>0.00000238</td>
<td>-0.000000111</td>
<td>-0.0000352*</td>
</tr>
</tbody>
</table>

Source: Author processing in Eviews
Note: $Q_{ss}(k)$ is McLeod-Li statistic.
* , ** and *** is the confidence values 1%, 5%, respectively 10%.

As a part of linear dependencies have been removed, it is necessary to analyze whether in the return series are present nonlinear dependencies. For this I applied the BDS test on standardized residuals of GARCH model.
Probabilities resulting from BDS test are above the threshold of acceptance of the null hypothesis of 10%, only in the case of return series of polish stock exchange index, which means that the standardized residuals of GARCH(2.1) model are independent and identically distributed. Nonlinear dependencies are maintained in the other returns series.

The persistence of volatility induced by shocks \((\Sigma \alpha_i + \Sigma \beta_j)\) seems to be permanent, because the values are close to unity. Therefore I applied the Integrated GARCH test. IGARCH model mathematical expression looks as follows:

\[
\sigma_i^2 = \sum_{i=1}^{p} \alpha_i \varepsilon_{t-i}^2 + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2
\]

According to table 7, financial liberalization has a positive impact on return stock market indices volatility in Hungary, Czech Republic, Poland and Slovakia. For the other two stock markets the impact is insignificant.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>BET</th>
<th>BUX</th>
<th>PX</th>
<th>SAX</th>
<th>SBI</th>
<th>SBI</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGARCH(3,1)</td>
<td>IGARCH(2.1)</td>
<td>IGARCH(1.1)</td>
<td>IGARCH(2.1)</td>
<td>IGARCH(4.1)</td>
<td>IGARCH(2.1)</td>
<td></td>
</tr>
<tr>
<td>(\alpha_1)</td>
<td>0.273486*</td>
<td>0.292305*</td>
<td>0.11894*</td>
<td>0.110187*</td>
<td>0.296574*</td>
<td>0.152116*</td>
</tr>
<tr>
<td>(\alpha_2)</td>
<td>-0.114137*</td>
<td>-0.244847*</td>
<td>-0.070027*</td>
<td>-0.1276*</td>
<td>-0.079901*</td>
<td></td>
</tr>
<tr>
<td>(\alpha_3)</td>
<td>-0.103651*</td>
<td>-0.8106*</td>
<td>0.959839*</td>
<td>0.953647*</td>
<td>0.927786*</td>
<td></td>
</tr>
<tr>
<td>(\beta_1)</td>
<td>0.944303*</td>
<td>0.952541*</td>
<td>0.88106*</td>
<td>0.953647*</td>
<td>0.927786*</td>
<td></td>
</tr>
<tr>
<td>(\Sigma \alpha_i + \Sigma \beta_j)</td>
<td>1.00000</td>
<td>1.00000</td>
<td>1.00000</td>
<td>1.00000</td>
<td>1.00000</td>
<td></td>
</tr>
<tr>
<td>(Q_{(5)})</td>
<td>1.7854</td>
<td>4.2916</td>
<td>2.0645</td>
<td>31.857</td>
<td>0.8357</td>
<td>2.695</td>
</tr>
<tr>
<td>(Q_{(10)})</td>
<td>7.3542</td>
<td>8.7496</td>
<td>4.5608</td>
<td>37.63</td>
<td>1.3167</td>
<td>4.937</td>
</tr>
<tr>
<td>Dummy</td>
<td>0.000000106</td>
<td>0.00000131*</td>
<td>0.00000233*</td>
<td>0.00000107*</td>
<td>0.000000326</td>
<td>0.0000011*</td>
</tr>
</tbody>
</table>

Source: Author processing in Eviews
Note: \(Q_{(k)}\) is McLeod-Li statistic.
* , ** and *** is the confidence values 1%, 5%, respectively 10%.

I applied the BDS test on the standardized residuals of IGARCH model, too. Existence of nonlinear dependency issues do not disappear. Compared with results obtained by applying the BDS test on standardized residuals of GARCH model, it appears that fewer nonlinear dependencies have been removed.

The financial crisis that began in the U.S. prime mortgage market in 2007 and spread rapidly in Europe became a global crisis that affects the financial systems worldwide, and economic activity in almost all countries. Global financial turmoil has caused a deep crisis in several emerging European markets. The results obtained from rolling window
methodology show an increase in volatility due to the occurrence of financial crisis in emerging markets. Therefore I applied the GARCH and IGARCH models on the time period that does not take into account the related crisis. Thus, the periods analyzed are: 1 July 2001-23 July 2007 (Hungary), 1 January 2001 - June 7, 2007 (Poland), 1 January 2001 - 15 October 2007 (Czech Republic), 1 January 2002 - 31 August 2007 (Slovenia), 1 January 2001 - 26 March 2008 (Slovakia) and 1 January 2006 – 25 August 2008 (Romania).

Applying ARMA model I obtain lower values for AIC. In addition, linear structures are removed only for two stock markets (Romania and Slovakia) and nonlinear dependencies remain at 1% significance level for all indices.

GARCH model results show that financial liberalization leads to lower volatility in stock markets in Hungary, Czech Republic and Poland (table 8). By applying the BDS test on standardized residuals of GARCH models, a large number of nonlinear structures were removed. Null hypothesis is rejected by stock index WIG; in almost all cases, it is rejected by BET and BUX; and in half of cases by the PX and SAX index.

<table>
<thead>
<tr>
<th>Table 8: GARCH(p,q) Model</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODEL</strong></td>
</tr>
<tr>
<td>MODEL</td>
</tr>
<tr>
<td>$\alpha_1$</td>
</tr>
<tr>
<td>$\alpha_2$</td>
</tr>
<tr>
<td>$\alpha_3$</td>
</tr>
<tr>
<td>$\alpha_4$</td>
</tr>
<tr>
<td>$\beta_1$</td>
</tr>
<tr>
<td>$\Sigma \alpha$ + $\Sigma \beta$</td>
</tr>
<tr>
<td>$Q_{ss}(5)$</td>
</tr>
<tr>
<td>$Q_{ss}(10)$</td>
</tr>
<tr>
<td>Dummy</td>
</tr>
</tbody>
</table>

Source: Author processing in Eviews
Note: $Q_{ss}(k)$ is McLeod-Li statistic.
* , ** and *** is the confidence values 1%, 5%, respectively 10%.

The results of IGARCH model show that the liberalization has a positive and significant impact on two capital markets (Slovakia and Slovenia). For the other four stock markets, financial liberalization leads to a decrease in volatility (table 9). BDS test does not eliminate the nonlinear dependencies (except for WIG index).
Table 9: IGARCH Model

<table>
<thead>
<tr>
<th>MODEL</th>
<th>BET</th>
<th>BUX</th>
<th>PX</th>
<th>SAX</th>
<th>SBI</th>
<th>WIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>IGARCH(3,1)</td>
<td>0.259532*</td>
<td>0.30023*</td>
<td>0.106389*</td>
<td>0.140252*</td>
<td>0.282327*</td>
<td>0.179679*</td>
</tr>
<tr>
<td>IGARCH(2,1)</td>
<td>-0.093068*</td>
<td>-0.253765*</td>
<td></td>
<td>-0.024107*</td>
<td>-0.12829*</td>
<td>-0.10853*</td>
</tr>
<tr>
<td>IGARCH(1,1)</td>
<td>-0.121494*</td>
<td></td>
<td>-0.015519*</td>
<td>-0.128751*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IGARCH(4,1)</td>
<td></td>
<td>-0.071989*</td>
<td>0.020625**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IGARCH(4,1)</td>
<td>0.95503*</td>
<td>0.953535*</td>
<td>0.893611*</td>
<td>0.971363*</td>
<td>0.954089*</td>
<td>0.928851*</td>
</tr>
<tr>
<td>IGARCH(2,1)</td>
<td>1.000000</td>
<td>1.000000</td>
<td>1.000000</td>
<td>1.000000</td>
<td>1.000000</td>
<td>1.000000</td>
</tr>
<tr>
<td>$Q_{ss}(5)$</td>
<td>1.3529</td>
<td>3.683</td>
<td>2.5911</td>
<td>6.0798</td>
<td>0.8081</td>
<td>3.635</td>
</tr>
<tr>
<td>$Q_{ss}(10)$</td>
<td>7.7933</td>
<td>7.5755</td>
<td>5.6863</td>
<td>9.245</td>
<td>1.2612</td>
<td>6.8362</td>
</tr>
<tr>
<td>Dummy</td>
<td>-0.00000062*</td>
<td>-0.00000128*</td>
<td>-0.0000203**</td>
<td>0.00000593*</td>
<td>0.00000343**</td>
<td>-0.00000136*</td>
</tr>
</tbody>
</table>

Source: Author processing in Eviews

Note: $Q_{ss}(k)$ is McLeod-Li statistic.

* and ** is the confidence values 1%, 5%, respectively 10%.

The results from the econometric models presented correspond to those obtained in the graphs by applying the rolling window methodology. The results are consistent with those of Bekaert and Harvey (1997), Cuñado et al. (2006) and Nguyen and Bellalah (2008).

A priori, it would be better for developing countries to liberalize their capital markets in order to allow domestic investors to benefit from financial integration, such as diversification of risk and reduction of capital cost, respectively to make stock markets more efficient, more liquid and competitive.

However, the increase in volatility after financial liberalization is not always a negative element. This may reflect a consolidation of informational efficiency of stock markets, which increases asset price fluctuations on arrival of new information, due to feedback from investors. Therefore, creating a transparent investment environment is essential to reduce the negative effects of herding behavior and lack of investor confidence.
5. THE IMPACT OF FINANCIAL LIBERALIZATION ON STOCK MARKET EFFICIENCY

Capital market liberalization may have a favorable impact on the economy in many aspects. For example, several empirical studies have shown that liberalization had a positive effect on developing economies, led to lower impact of capital cost, increase profitability and investment by individuals. However, liberalization can make a country be sensitive to some economic "turbulence" and foreign policy, leading, ultimately, in a higher volatility of domestic markets. Some researchers argue that, in part, because of policies of stock market liberalization, the Asian crisis of 1997 is an example of "turbulence" on domestic markets [Laopodis, (2004)].

In empirical studies, the authors attention is focused mainly on changes in the weak form efficiency in stock market before and after liberalization. Date of financial liberalization is used to separate the two sub-periods.

Methods for estimating the informational efficiency

A. Unit root tests with structural breaks
In financial literature can be found classical unit root tests and tests that take into account the existence of possible structural changes. From classical tests were used Augmented Dickey- Fuller test and Kwiatkowski-Phillips-Schmidt -Shin test, and from the tests with structural changes I used Zivot - Andrews and test Lee -Strazicich.

B. Variance ratio tests
Variance ratio tests include: classical tests, such as Lo-MacKinlay and Chow-Denning and improved variants based on wild bootstrap (Choi) and signs and ranks (Wright), which were shown to have superior properties for finished samples.

C. Long memory process: Generalized Hurst Exponent
Generalized Hurst exponent is a robust statistical tool. Hurst exponent is a method of measuring fractal distribution. In this distribution there is no characteristic time scale. Hurst exponent values fall in the interval [0,1].
Financial liberalization and the impact on informational efficiency in emerging markets

I analyzed the stock market informational efficiency of six stock markets in pre-, respectively post-liberalization period using daily closing price indices from the previous chapter.

The premises from which the unit root classical tests start do not include the possibility of one or more structural breaks. And as most of the time series show such breaks and their failure to take into account generates adverse effects on outcomes, I used structural break tests [Zivot-Andrews test (model C), allowing only one break, and Lee-Strazicich test with two stuctural breaks (model AA and CC model)]. I found that the data of stuctural breaks does not coincide with the official date of stock market liberalization.

Wright test

Observed values of joint Wright test present a multiple version of Wright's ranks and signs test. Holding periods coincide with those of previous tests (k = 2,5,10,20,40). Statistics R1, R2 and S1 for Wright variance ratio test are significant at 1% significance level.

Before liberalization, according to table 10, the calculated values of JR1, JR2 and JS1 statistics for unadjusted returns are above critical values, which means a rejection of the null hypothesis, and therefore the rejection the hypothesis of random walk and market efficiency. After correcting the effects of thin trading, all analyzed indexes accept the null hypothesis, so a random walk process acceptance.
Table 102: The result of Wright test on pre-liberalization period

<table>
<thead>
<tr>
<th>Index</th>
<th>Nonadjusted returns</th>
<th></th>
<th></th>
<th>Adjusted returns</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>JR1</td>
<td>Confidence value</td>
<td>5%</td>
<td>1%</td>
<td>JR2</td>
<td>Confidence value</td>
</tr>
<tr>
<td>BET</td>
<td>11.42252**</td>
<td>2.41072</td>
<td>3.03942</td>
<td>12.29164**</td>
<td>2.43132</td>
<td>3.06297</td>
</tr>
<tr>
<td>BUXT</td>
<td>9.704389**</td>
<td>2.42121</td>
<td>3.01490</td>
<td>8.844833**</td>
<td>2.43223</td>
<td>2.93131</td>
</tr>
<tr>
<td>PX</td>
<td>14.04163**</td>
<td>2.37411</td>
<td>2.76535</td>
<td>15.13375**</td>
<td>2.42851</td>
<td>2.85239</td>
</tr>
<tr>
<td>SAX</td>
<td>3.726784**</td>
<td>2.40049</td>
<td>2.89019</td>
<td>3.006699**</td>
<td>2.39224</td>
<td>2.95884</td>
</tr>
<tr>
<td>SBI</td>
<td>12.85881**</td>
<td>2.37244</td>
<td>3.01920</td>
<td>13.13007**</td>
<td>2.44718</td>
<td>3.03001</td>
</tr>
<tr>
<td>WIG</td>
<td>11.3844**</td>
<td>2.41401</td>
<td>3.06547</td>
<td>12.73783**</td>
<td>2.46582</td>
<td>2.96159</td>
</tr>
</tbody>
</table>

Source: Author processing in R
Note: *, ** and *** is the rejection of null hypothesis for confidence values 1%, 5%, respectively 10%.

After the implementation process, the Hungarian stock market index accepts the null hypothesis based on unadjusted returns, and later (taking into account the adjusted returns) all indices follow a random walk, ie accept the hypothesis of weak form efficiency (Table 11).

I find that by eliminating the effects of thin trading, return series of analyzed stock market indice support the null hypothesis for both subperiods (before liberalization, that after liberalization). But if I apply the joint Wright test only on unadjusted returns, I see that financial liberalization has a positive impact on BUXT index. Therefore, the Hungarian capital market is weak form efficient as a result of the liberalization process.
Table 11: The result of Wright test on post-liberalization period

<table>
<thead>
<tr>
<th>Index</th>
<th>Non-adjusted returns</th>
<th></th>
<th></th>
<th>Adjusted returns</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test value</td>
<td>Confidence value</td>
<td>Test value</td>
<td>Confidence value</td>
<td>Test value</td>
<td>Confidence value</td>
</tr>
<tr>
<td></td>
<td>5%</td>
<td>1%</td>
<td>5%</td>
<td>1%</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>BET</td>
<td>2.694863***</td>
<td>2.45349</td>
<td>3.05520</td>
<td>2.941675***</td>
<td>2.44232</td>
<td>3.11841</td>
</tr>
<tr>
<td>BUX</td>
<td>0.95546</td>
<td>2.42361</td>
<td>2.85047</td>
<td>1.77111</td>
<td>2.39210</td>
<td>2.96683</td>
</tr>
<tr>
<td>PX</td>
<td>1.78070</td>
<td>2.38703</td>
<td>2.97006</td>
<td>2.200393*</td>
<td>2.43301</td>
<td>2.94976</td>
</tr>
<tr>
<td>SAX</td>
<td>5.123964***</td>
<td>2.37812</td>
<td>2.92568</td>
<td>4.669875***</td>
<td>2.36843</td>
<td>2.73909</td>
</tr>
<tr>
<td>SBI</td>
<td>14.82957****</td>
<td>2.39137</td>
<td>2.76540</td>
<td>14.18169****</td>
<td>2.35170</td>
<td>2.84371</td>
</tr>
<tr>
<td>WIG</td>
<td>2.319782**</td>
<td>2.28326</td>
<td>2.99708</td>
<td>3.536858***</td>
<td>2.37127</td>
<td>2.90385</td>
</tr>
</tbody>
</table>

Note: *, ** and *** is the rejection of null hypothesis for confidence values 1%, 5%, respectively 10%.

**Automatic Variance Ratio test**

For AVR test I used "wild bootstrap" for the distribution with two points of Mammen and a sample of 1000 iterations. Test values confirm the results obtained in previous tests.

The test results are presented in table 12: for unadjusted data only SAX index supports the hypothesis of unit variances, ie random walk (as the probability for the test are above the threshold of significance of 5% and is within the confidence interval given); as regards the adjusted returns, all the indices support the null hypothesis of random walk.
Table 12: The result for AVR test on pre-liberalization period

<table>
<thead>
<tr>
<th>Indici</th>
<th>Nonadjusted returns</th>
<th>Adjusted returns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>z-stat</td>
<td>p-value</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BET</td>
<td>8.2890</td>
<td>0.000</td>
</tr>
<tr>
<td>BUX</td>
<td>4.3209</td>
<td>0.023</td>
</tr>
<tr>
<td>PX</td>
<td>17.6879</td>
<td>0.000</td>
</tr>
<tr>
<td>SAX</td>
<td>-0.4329</td>
<td>0.512</td>
</tr>
<tr>
<td>SBI</td>
<td>6.4203</td>
<td>0.001</td>
</tr>
<tr>
<td>WIG</td>
<td>8.7242</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Source: Author processing in R

Based on data from table 13, we can say that stock market liberalization had a positive impact, as all indices support the hypothesis of random walk (with the exception of the Polish index, but the result is influenced by the effect of thin trading).

Table 133: The result for AVR test on post-liberalization period

<table>
<thead>
<tr>
<th>Indici</th>
<th>Nonadjusted returns</th>
<th>Adjusted returns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>z-stat</td>
<td>p-value</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BET</td>
<td>1.1816</td>
<td>0.351</td>
</tr>
<tr>
<td>BUX</td>
<td>0.1904</td>
<td>0.807</td>
</tr>
<tr>
<td>PX</td>
<td>0.2945</td>
<td>0.794</td>
</tr>
<tr>
<td>SAX</td>
<td>0.1603</td>
<td>0.725</td>
</tr>
<tr>
<td>SBI</td>
<td>3.7290</td>
<td>0.106</td>
</tr>
<tr>
<td>WIG</td>
<td>3.0610</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Source: Author processing in R
I made an identification of generalized Hurst exponent, which shows the type of memory. Generalized Hurst exponent of time series is always greater than 0.5, so the six markets have a persistent time series, and therefore present Joseph and Noah effects. Long-term behavior of the market does not have a well defined Hurst exponent, but instead, is characterized by cycles. Since Hurst exponent stability is closely linked with memory time series, the markets have a long memory, but finite.

The fact that stock markets have become more efficient in recent years is an encouraging sign for decision makers in emerging markets. This shows that they have managed to create a favorable environment for investment, leading to increased informational efficiency. Financial liberalization is recommended for developing countries, as without this reform, it would take more time to meet the necessary conditions for weak form efficiency.
CONCLUSIONS AND RESEARCH PROSPECTS

Reform of financial liberalization is a complex and long-term phenomenon. This implies that the impact of this reform on the financial markets should not be immediate, but rather gradually, over a long period. It is also important to note that liberalization does not manifest uniform in markets. Each country, according to his calculations about the economic climate and the specific of financial markets, has set differently the evolution of liberalization process. There are many potential research on the impact of liberalization on:

- stock market performance;
- return-risk ratio;
- liquidity;
- volatility;
- portfolio investment flows;
- risk premium.

My research stopped to analyze the impact of liberalization on volatility and weak form efficiency in stock markets, namely the impact of capital account liberalization on economic growth.

Regarding the effect of liberalization in emerging markets, has been shown, on the one hand, that liberalization reduces the cost of capital, help to integrate emerging markets in the world market, improves growth and allow emerging markets to become more mature. On the other hand, liberalization has a very ambiguous and inconclusive impact on informational efficiency and volatility in emerging markets. In addition, a further opening of domestic markets may strengthen the interdependence of markets and therefore lead to the risk caused by volatility transmission.

However, the arguments for financial liberalization, both theoretical and empirical, are relatively fragile, and there are many reasons for skepticism about claims made by proponents of these measures. Indeed, there is good reason to ask us questions about the extent and type of financial liberalization, which is promoted. In many cases, social and economic effects were negative for the poor, who had suffered from poorer conditions during periods of "financial boom", but usually have been hardest hit during a financial
crisis. It is also worth noting that the extreme forms of liberalization are neither effective nor necessary, and that a variety of alternative measures and different degrees of liberalization are not only possible, but can be observed in several developing countries.

In this work I wanted to give a better understanding of the role of financial liberalization and its impact on a sample of six emerging countries.

Capital account liberalization has a positive impact on GDP (except from Romania). Therefore, these results are sharing the same conclusions with those obtained by Quinn’s (1997), Edwards (2001) and Klein&Olivei (1999). Liberalization has not had a positive effect on Romania's GDP and the exchange rate RON/EUR had a negative effect on Romania's GDP. We appreciate that capital account liberalization influenced the manner in which the financial crisis manifests in Romania. The current crisis has brought a number of sensitive issues of the global market. One of them, frequently invoked by financial analysts at the moment was capital account liberalization. Free movement of capital adopted by developed countries, then gradually extended to emerging markets has not been without major incidents throughout modern financial history. It can be seen that the first major international financial crisis coincide with the liberalization started almost simultaneously in Latin America and South-East Asia. Capital account liberalization by emerging markets is considered as one the factors that caused the rapid spread of crisis from American market to the global level, which amplifies the harmful effects of this crisis. In the absence of capital account liberalization, the crisis impact at global level would have been significantly diminished.

Financial liberalization leads to a decrease in volatility in capital markets analyzed sample. Based on GARCH model, it shows a decrease in volatility on stock markets in Hungary, Czech Republic and Poland. Since the GARCH model shows a persistence of volatility, I used IGARCH model. I achieve a reduction in volatility for stock markets in Romania, Hungary, Czech Republic and Slovakia, and for capital markets in Slovakia and Slovenia there is an increase in volatility. The results are consistent with those of Bekaert and Harvey, Cuñado et al. and Nguyen and Bellalah.

The results of Augmented Dickey-Fuller test and Kwiatkowski-Phillips-Schmidt-Shin test show that return series are stationary. Since most of the time series show such breaks and
their failure to take into account generates adverse effects on outcomes, I used structural change tests [Zivot-Andrews test (model C), allowing only a structural break and Lee-Strazicich test with two structural breaks (AA model and CC model)]. I found that the data of structural breaks do not coincide with the official data of stock market liberalization.

Regarding the report of variances tests, I used improved versions (Automatic Variance Ratio test and test Wright), which were shown to have superior properties for finite samples. Previous studies draw our attention on thin and infrequently trading, a feature of emerging markets, it induces a series of errors among the results, too. Thus, the variance ratio tests were applied to unadjusted and corrected returns, respectively before and after the implementation of financial liberalization. There is a difference between the outcomes obtained for unadjusted and corrected data of return series, confirming the fact that the six analyzed countries suffer from the phenomenon of thin trading. As a result of financial liberalization, the six emerging markets have a weak form efficiency. Study results are those obtained in the analysis of alinează Cajueiro et al. and Kim and single.

Successful transition economies must learn to live with considerable capital inflows related to real convergence, ie to try to mitigate the size and interest rate volatility that depends on these inputs. Considering the growing number of open capital accounts, interest rate capital inflows will raise some difficulties in monetary and exchange rate policy until the interest margin is reduced or eliminated. Taking into consideration the expectations regarding the long-term appreciation of exchange rate (Ballasa-Samuelson effect), margin interest shall be eliminated by depressing nominal interest rates on internal market. Based on the experience of the EU6 countries, which are confronting with massive capital inputs, the following conclusions can be identified for countries with similar circumstances:

- Although monetary and exchange rate policies were the main policy instruments for reacting at capital inputs in EU6 countries, the interest rate is less efficient on influencing the internal demand in emergent economies than in mature markets and the independence of monetary policy and exchange rate are not as strong as they appear. Interest rate transmission mechanism is weak, even in inflation targeting regimes, due to the low level of indebtedness of the private sector, easy
availability of loans in foreign currency, high structural demand for loans, respectively the excess liquidity in the financial system. Exchange rate regime is important in influencing capital inflows, because it can mitigate or exacerbate the gaps of price risk [Lipschitz, Lane and Mourmouras (2005)]. As a result of exchange rate fluctuations, there have occurred extended periods of appreciation (or depreciation) in several transition countries. It is important that the authorities do not contribute to encourage speculation through implied warranties or allusions to targeted levels.

- Given the need to reduce domestic nominal interest rates and uncertainties about the interest rate transmission mechanism, it was found that the solution lies in the speed of disinflation. If disinflation is slow, portfolio inflows will be persistent, given the extended period of substantial interest rate margins (a phenomenon that was discovered in Hungary, Romania and Poland). This can lead to increased lending and a large current account deficit. The experience of Czech Republic shows, that an inflation which stands at the same level on mature markets or less over them can be done relatively quickly, and interest rate capital inflows will fall on short or medium term. Thus, the mix of policies should focus on relatively fast and sustainable disinflation, in order to minimize risks associated to current account, financial stability and economic growth.

- Taking into consideration that the efficiency of monetary policy is limited and the openness to global capital markets reduces the possibilities of intervention for monetary policy, tax and income policies shall play a major role in the managing of demand. Tax and income discipline become essential, if the disinflation is rapidly realized. Although several countries have maintained prudent fiscal policies, fiscal tightening was seldom used as a direct response to capital inflows in EU6 countries, and this has contributed to the slow rhythm of disinflation and increased current account deficits in some countries. Even in countries with significantly lower deficits than the EU6 countries, tightening fiscal and wage policy is an important tool to reduce imbalances in developing countries, relying exclusively on a tighter monetary policy. However, it is highly unlikely that a government changes the fiscal stance in a magnitude and a needed speed to compensate for large changes in capital account.
The prudent approach on capital account liberalization seems to be utilized by many of the vulnerable countries of EU6 group. Therefore, Hungary and Poland, two countries having slow disinflation and a high number of securities on stock exchange are advised to precautionary open their capital account. As regard the effect of introducing capital controls, it is preferable that these controls to be limited and temporary within an economy with intensive foreign participation in financial and non-financial sectors.

Finally, other policy measures related to managing debt, banking supervision and regulation can be useful in order to complete the monetary policy and tax measures. Maintaining the incomes obtained from privatization within the inter-banking system (the case of Czech Republic) or paying the precocious external debt (the case of Hungary and Poland) may lead to the decrease of pressure put on the exchange rate. In cases where financial flows are higher even in the absence of interest margins - for example, the desire to gain some market share in retail banking - administrative measures can be the most efficient policy tool. Banking regulatory measures, such as tightening of reserve requirements for foreign liabilities may help to reduce the large financial flows, which causes the credit boom.

During the capital account liberalization process, all transitional countries had applied the above-mentioned measures, which were adapted to the very specific macroeconomic situation of each of them. Those countries who have adopted a precautionary liberalization had received much more portfolio influxes than countries that have preferred an accelerated liberalization process. This result can be partially explained by the existing differences on the liberalization conditions (high internal public debt) and partially by macro economic evolutions during the transition period (a slow disinflation). Each country adopted its own liberalization rhythmus depending on the how it perceived vulnerability at capital inputs. Despite of massive influxes and the increasing lack of restriction efficiency, the precautionary approach of the liberalization had some advantages. Restrictions related to accessing a credit in national currency by non-residents credit and financial derivative instruments have attenuate capital flow volatility and the scope of speculative attacks. In general, restrictions have increased transaction costs and in the same time, they reduce the revenue obtained from interest differences.
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