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An analysis of the impact of the European convergence Phillips Curve: Evidence from US and Euro area in new EU member countries

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Working Paper No. 454

**An Analysis of the Impact of the European Convergence
Phillips Curve: Evidence from US and Euro Area
in New EU Member Countries**

by

Christian Friedrich and Václav Ždárek

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AN ANALYSIS OF THE IMPACT OF THE EUROPEAN CONVERGENCE PROCESS ON INTERNATIONAL INVESTMENTS IN NEW EU MEMBER COUNTRIES

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Abstract

This paper examines how international investors evaluate the change in the risk-return profile of ten Central and Eastern European countries that recently entered the European Union (EU). By supplementing international investment position data provided by IMF's International Financial Statistics with data obtained from Lane and Milesi-Ferretti's External Wealth of Nations Mark II Database, we create a unified data set of external assets and liabilities for new EU member states (NMS) ranging from 1993 to 2007. Drawing from the so called 'push-pull' factor approach and the achievements of Modern Portfolio Theory, we then collect an extensive set of international controls and a number of local risk-return variables that served as transmission channels for the benefits of EU integration and hence, potentially attracted foreign capital. These variables finally enter a panel data model with the Feasible Generalized Least Squares, (FGLS) and linear regression method with panel-corrected standard errors (PCSE) as proposed by Beck and Katz (1995). Our results indicate that convergence towards the EU has had a significant impact on the liability side of international investment positions in NMS. Especially for debt and portfolio equity liabilities, the region's affiliation with the EU has mitigated the negative evaluation of local macroeconomic risk factors by international investors. Nevertheless, also global forces turned out to be important drivers of the recent build-up in external liabilities and show that the region's capital supply still depends on actions taken in other parts of the world.

Keywords: capital flows, push-pull factor approach, EU enlargement, new EU member states

JEL Classification: E31, F15, F21

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1 INTRODUCTION

Over the past five years, ten Central and Eastern European (CEE) countries entered the European Union as new member states (NMS).¹ To fulfil the necessary conditions that allow the candidate countries to enter such a supranational agreement, the countries have to undergo a strong adjustment process in diverse fields. In case of the European Union (EU), the necessary conditions were laid out in the so called *Copenhagen criteria* that were established during the European Council in the Danish capital of Copenhagen in 1993. These criteria require potential member countries to meet a set of broadly defined economic and non-economic conditions. Furthermore, the subgroup of countries intending to enter the European Economic and Monetary Union, has to fulfil the more narrowly defined *Maastricht criteria* in addition, comprising an upper bound for government debt, government's budget deficit, long term interest rates and inflation. Furthermore, a devaluation-free participation in the European Exchange Rate Mechanism II (ERM II) is needed for at least two years. As soon as the candidate countries implement these requirements in their political goals and actions, a positive impact on the macroeconomic variables of candidate countries can be observed. As a central driving force behind this development, the process of political integration increases the quality of national institutions and generates – via imported credibility – a public expectation that candidate countries will stick to their newly defined goals. Hence, it would be interesting to see how international investors evaluated the permanent change in the risk-return profile of the NMS upon their decision to enter the European Union.

Since positive implications of the EU convergence process for NMS have been well documented in recent literature (see *e.g.* Breuss (2009)), we focus on the second part of the argument: The structure and development of macroeconomic risk variables in the CEE region and their impact on the allocation of international capital to NMS. Answering this question will not be straightforward, especially since during the analysed time period, a considerable number of global shocks have occurred that might have facilitated capital inflows to NMS: Weak growth of gross domestic products (GDP) in large parts of the world after 2000, low interest rates in the US and high levels of global liquidity since 2003, and in addition, a high level of global risk appetite until 2007. We try to separate these effects from the implications of the convergence process by applying the so called *push-pull* factor approach in combination with the findings of *Modern Portfolio Theory*. While the former one provides a theoretical framework that divides the determinants of international capital flows in locally determined (*pull*) variables and globally driven (*push*) factors, the latter one specifies the type of factors to include in greater detail. Our data set is a combination of the most recent international investment position figures available via the International Monetary Fund's (IMF) International Financial Statistics (IFS) and data on estimated external positions published in Lane and Milesi-Ferretti (2007). Focusing on stock measures instead of capital flow measures has the advantage to capture not only the quantity dimension of capital movements but also the price dimension that arises from possible valuation changes and hence is more in the interest of international investors. The resulting specifications enter then a linear panel data models that is used to quantify and qualify the relative importance of local risk and return factors for the development of investment positions in NMS by comparing and exploiting timely variation in the previously estimated coefficients. The central questions that we intend to answer this way are the following:

1. Has the relative importance of local risk (and return) factors on international investment positions changed when the EU accession of the countries became more likely?
2. How important were local developments in NMS compared to international forces influencing the allocation and valuation of international investments?
3. Do these effects exist for all types of capital?

In terms of existing literature, our paper combines the two main approaches – the first one is based on the early work of Classens *et al.* (1998) and the second one follows the study of Lane and Milesi-Ferretti

¹The new EU member states (ten countries) we focus at comprise: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovenia, and Slovak Republic. For below stated reasons, we exclude Malta and Cyprus throughout the whole paper and only concentrate on NMS in the CEE region.

(2007). Classens *et al.* (1998) examine different types of capital flows to 21 transition countries with a panel data approach over the years 1992–1996. The authors find that pull factors (*e.g.* creditworthiness) are by far more important for attracting capital flows than push factors. Lane and Milesi-Ferretti (2007) on the other hand, exploit their newly created *External Wealth of Nations Mark II Database* and present a vast amount of descriptive statistics for external asset positions in Eastern Europe with special focus on the relative contribution of different asset classes and their currency composition over the past decade.

Therefore, the main contributions of our paper to the literature are, on the one hand, the construction and use of and up-to date database on external positions dating back until 1993 for the NMS, and on the other hand, the theory guided selection of a rich set of sophisticated global push- and pull factors that allow us to examine the implications of the EU convergence process on international investment positions in a sophisticated way.

The outline of this paper is as follows: After this introduction, section 2 presents the existing literature on capital flows to NMS countries and the so called push-pull factor approach. section 3 then introduces international investment positions as the dependent variables of our empirical model and explains the construction of the underlying data set. section 4 then describes the EU integration process and its impact on the exogenous variables of our model. This is combined with a description of the structure and development of our dependent variable. section 5 is the core of this paper. It contains the empirical model that is used to quantify and qualify the impact on the liability side of investment positions after it became highly likely that CEE countries will enter the EU. Finally, section 6 summarizes and concludes.

2 LITERATURE REVIEW

2.1 *Studies on Capital Flows to and Transition Countries*

The number of studies on determinants of international capital flows to NMS (and hence to NMS countries as well) and transition countries in general is rather limited.² One may ask why these countries have been set aside by researchers for such a long time. One reason may be that there has been a barrier to research on aforementioned issues – paucity of reliable data on capital flows for these regional aggregates. Whereas current account and balance of payments data have been available, estimates of accumulated stocks have not been published until recently. A great deal of work has been done by studies of Lane and Milesi-Ferretti (2007) who generated time-series of estimates of foreign assets and liability positions for developing countries as a whole and for NMS in particular.

In order to explain past developments in the NMS countries theoretically, it is possible to rely on the pecking order theory introduced by A. Razin, see *e.g.* Razin *et al.* (1998)). The model puts great emphasis on the role of information asymmetries (information disadvantages) associated with an investor who assesses an investment abroad. The authors further argue that for developing and transition countries in their early stages of development, foreign direct investment (FDI) is such a kind of investments that corrects for information asymmetry and therefore it is expected to be the main driver of capital flows to these countries. A next step of this kind of analysis was laid in Goldstein and Razin (2006) who highlight the effect of liquidity for international investments and try to distinguish between FDI and portfolio flows under the assumption of existence of liquidity shocks. The main difference here is in the possibility to effectively control a firm abroad (following theory of information asymmetry leading to better information for FDI investments than other kinds of investments). This advantage is however outweighed by the fact that FDI is rather illiquid and therefore more difficult to sell because of the aforementioned information asymmetry. Another extension has been made by a study of Goldstein *et al.* (2008) that includes aggregate liquidity shocks that trigger liquidity shocks to individual investors in this model. In case a shock occurs, an investment has to be sold. However, buyers do not know the exact reason (it may be an effect of liquidity crisis or due to information asymmetry). Based on this model, the authors come to the conclusion that countries with a high probability of aggregate liquidity

²A more detailed description of the studies described here, can be found in the Appendix A.2.

crisis will attract more portfolio investments than FDI. The second implication stemming from this model is related to costs (due to lack of transparency) that have to be borne by direct investors in case of selling their investments. These are higher in an environment (in a country) that is less transparent.³

On the empirical side, Lane and Milesi-Ferretti (2006) postulate that the quality of corporate governance in NMS countries is worse than in developed countries (especially at the beginning of the transformation process). This changes investment decisions of potential investors and may explain biased structure of capital flows to these countries (a large share of FDI and a small share of portfolio flows).

Another and more pragmatic explanation focuses on an abolishment of capital controls in NMS countries. Árvai (2005) distinguish between cautious and fast liberalisers among countries that joined the EU in 2004 (except Cyprus and Malta). The Baltic States, the Czech Republic and Hungary belonged to the first group, while Slovakia, Slovenia, and Poland belonged to the second one. Regarding the liberalisation process, FDI flows were liberalised in all countries before portfolio and other capital flows arrived. In a similar vein, capital inflows into the NMS countries were liberalised before the relaxation of rules for capital outflows took place. An interesting finding of the study is connected with cautious liberalisers – these countries have attracted more portfolio flows than the rapid liberalisers. The author offers an explanation that emphasizes the role of disinflation for achieving macroeconomic stability and a successful process of European integration. Relatively high interest rates and high amounts of outstanding debts result in observing large inflows of short-term portfolio capital in the group of countries with a more prolonged and cautious liberalisation process.

Gibson and Tsakalotos (2004) present a study that is focused on non-FDI flows (both portfolio and other financial flows). It examines the level of financial flows and their determinants, and as a next step, the danger of being exposed to a downward speculative pressure during a financial crisis (hazard function) in the NMS⁴ using panel data (GLS regression for quarterly data in the time period 1991–2001). However, it puts more emphasis on the analysis of effects and problems that may have emerged in this group of countries due to financial turmoil in the end of the 1990s (in Russia, 1998 and in Asia, 1997–1998). The variables used for ‘domestic factors’ are inflation rates, GDP growth rates (growth rates of industrial production), interest rate differentials, growth of money supply and unit labour costs. This empirical exercise shows that the impact of domestic variables is rather weak (GDP growth and inflation rate are significant, unit labour costs and income growth are not significant). Some exchange rate regimes are found to be more credible and attracting large capital flows (a currency board or a currency peg). Dummies for financial crises were ambiguous, while the Russian crisis dummy was significant and negative (a kind of selectivity analysis shows the highest impact on Estonia and Hungary), the dummy for the Asian crisis was not significant. Similar results are obtained for financial flows including FDI flows. The results of their second analysis show that both determinants of a financial crisis are important (domestic factors and contagion), especially due to links between countries in a region and due to classification of these countries as emerging markets.

Furthermore, an IMF study (IMF (2007)) analyses capital flows (FDI, portfolio and other flows) and their volatility for a number of NMS as well. Among the 56 developed and developing countries, there are nine NMS present (Cyprus, Malta and the Slovak Republic are excluded). The study uses three sets of indicators covering: firstly equity market liquidity and depth (market turnover and capitalization), secondly institutional quality (financial openness, corporate governance quality, accounting standards),⁵ and finally, lagged GDP growth (a proxy for domestic growth expectations), real interest rate spreads (a proxy for risk premia and relative liquidity conditions), and global liquidity conditions. The results show that an increase in flows is influenced by equity market liquidity. Furthermore, FDI and portfolio flows increase with more financial openness. In addition, capital volatility is reduced by more financial openness and by higher global liquidity.

When turning to the disaggregation of capital flows, a majority of studies for the CEE region and for transition countries has analysed flows of FDI. Only a small number of studies has paid attention to portfolio or other

³Both predictions were confirmed on a broader set of countries and for data taken from Lane and Milesi-Ferretti (2006).

⁴For former Czechoslovakia (till end-1992) and without Slovenia, Cyprus and Malta.

⁵A broader set of variables (regulatory quality, rule of law, control of corruption, voice and accountability, political stability, and government effectiveness) was not used in the panel analysis due to problems with correlation of coefficients of these variables with the institutional quality indicators (they were only plotted against dependent variables, see IMF (2007)).

flows⁶, and if so, mainly as a part of FDI analysis. The early studies of Brenton (1999) or Bevan and Estrin (2000) focus on some aspects for FDI flows. Buch *et al.* (2001) simulate the EU entry for accession countries and reason out that this particularly changes the attractiveness of these countries for capital flows. The ERM II or the euro adoption have not been studied by many authors so far, an exception is Gibson and Tsakalotos (2004) focusing on speculative attacks during the run-up to the euro adoption. Ferrucci *et al.* (2004) studies determinants of bank lending from developed to developing countries in the period 1986–2003 (semi-annual data).⁷ They use a study by Jeanneau and Micu (2002) and extend the number of transition countries (seven more countries, including Poland and Hungary and due to financial links of the Commonwealth: Hong Kong and Singapore). The authors apply seemingly unrelated regression (SUR) method and use an unbalanced panel due to missing observations. It turns out that pull and push factors are equally important. Furthermore, a sensitivity analysis shows that pull factors (debt/GDP ratio, local equity prices, growth of borrowing countries) have a significant impact on banking flows.

2.2 The Push-Pull-Factor Approach

As a conceptual framework for the selection of exogenous variables, in this paper, the so called ‘push-pull’ factor approach is used.⁸ This strand of literature is concerned with the allocation of determinants of capital flows to either global (push factors) or country specific (pull factors) sources (see *e.g.* Calvo *et al.* (1993); Fernandez-Arias (1996); Taylor and Sarno (1997); Chuhan *et al.* (1998); Montiel and Reinhart (1999); Mody *et al.* (2001); or more recently Culha (2006) or IMF (2007)).⁹

Push factors are factors that cannot be influenced by domestic policies of a single country. This category includes cyclical as well as structural factors that are of global nature and affect all countries. A cyclical push factor might be given by the economic conditions of the investors’ host countries, creating more or less possibilities to invest abroad. As a structural factor, one could think of the demographic changes in the developed world that might have a long run impact on the funds available from these regions.

Pull factors are connected with domestic policies and expected to influence expectations of the trade-off between risks and returns of investments within countries. Here, the cyclical nature seems to be in the centre of the picture but structural factors are possible as well. Examples for cyclical pull factors may be changes of macroeconomic policies and other short-run policies that influence expected rates of return on domestic assets. As an example for a structural factor, the introduction of domestic reforms might be given (Jeanneau and Micu (2002)).

Since our analysis aims at the implications of the EU convergence process for investment positions, we introduce the notion of ‘EU integration factors’ as a third type of factors. These factors are mostly of structural nature and take into account that political integration is not entirely driven by the actions of a single country and hence cannot be entirely allocated to either push or pull factors. Important examples include the introduc-

⁶A large number of studies have analyzed capital flows to countries in Latin America or Asia see for example Ahmed *et al.* (2005), Alfaro *et al.* (2005) or Taylor and Sarno (1997).

⁷The second part of this study focuses on determinants of spreads of sovereign bonds (the JP Morgan EMBI index) in emerging markets and is not discussed here.

⁸Other strands of literature aimed at the identification of determinants of capital flows include: 1) The empirical examination of the hypothesis on capital movements proposed by the neoclassical growth theory. Here, the focus of the studies lies on the reasons why less developed market countries receive too few amounts of capital. Since they are relatively scarce in capital, the marginal product of an additional unit of capital is predicted to be very high. However, as most studies note, the observed amount of capital going in this direction is by far too low. The original contribution was written by Lucas (1990), but a substantial number of articles followed (for example for the CEE region Lipschitz *et al.* (2002)). 2) The so called ‘gravity approach’ that was adapted from trade theory. Here, capital movements are mostly explained by the size (usually approximated by the GDP’s of the participating countries) and trade costs (usually approximated by the distance). This approach is mostly used to explain the geographical distribution of FDI flows. Usually, an augmented model with other factors such trade barriers, relative levels of economic development, common border effects or language barriers is used. Prominent studies are Ghosh and Wolf (2000), Portes and Rey (2001), and Portes and Rey (2005). Furthermore, in the context of NMS countries the study by Buch *et al.* (1999) has to be mentioned, where the authors examine the implications of the EU enlargement on trade and capital flows. 3) The literature on portfolio allocation that focuses on the investor’s perspective. Here, the highest attention is paid to risk and return characteristics of investments and the consequences of adding them to the investor’s portfolio. A widely cited study following this approach is Bohn and Tesar (1996).

⁹In a more recent work, Gourinchas and Jeanne (2008) focus on determinants of capital flows between developed and developing countries. Their model is built on the neoclassical growth theory and emphasises the importance of productivity differentials.

tion of the corresponding political institutions – *e.g.* adaption of EU legislation – into the national framework, but also the liberalization of factor and goods markets as well as the liberalization of financial markets that come along with a full EU membership.¹⁰ Although this category is highly important to our analysis, we acknowledge that large parts of the EU convergence gains are already captured by the improvement in macro economic variables. To solve this problem, we will make use of interaction terms between the macroeconomic variables and the EU integration factors in the empirical model in section 5.

Concerning the relative importance of push and pull factors, the literature seems to have agreed on the fact that both factor groups matter to some extent. However, individual authors differ in their view on the relative importance of each factor group in general and of particular factors in specific. *E.g.* Calvo *et al.* (1996) find that push factors (such as low rates in the industrial countries or a global slowdown) were the most important ones for countries with large capital inflows that were afterwards struck by (financial) crises. Fernandez-Arias (1996) emphasises the creditworthiness of countries as an important factor, but the former one itself is driven by external factors in his model (*e.g.* global interest rates). Lopez-Mejía (1999) points out fundamentals and their role (*e.g.* productivity, successful stabilisation). Given that capital flows are determined by foreign development (*e.g.* a global recession, low interest rates in the industrialised countries), the potential volatility of the capital flows may be relatively high. In a similar vein, Taylor and Sarno (1997) find that the most important factor for US capital flows to emerging markets was the US interest rate.

Generally, studies in the early 1990s showed significant impact of US macroeconomic variables (interest rates and cyclical conditions) on capital flows to emerging markets, whereas recent studies have not confirmed that. Moreover, new studies have put more emphasis on the fact that push and pull factors work rather in a complementary nature. Push factors seem to determine time dimension and volume of flows, pull factors country or regional dimension of these flows (see *e.g.* Montiel and Reinhart (1999)).

A combination of push-pull factor approach and CEE region was already taken out by Classens *et al.* (1998). The authors analyse the determinants of eight different types of capital flows (total capital flows, official flows, all private flows, FDI, commercial debt flows, portfolio bond flows, portfolio equity flows, and short-term flows) for 21 transition countries in an unbalanced panel set-up over the period 1992–1996. The authors find that pull factors are by far more important for attracting capital flows. An extensive study of Culha (2006) supports this fact as well and finds that domestic (pull) factors are dominant drivers of portfolio and other capital flows. Furthermore, a particular question of the study by Culha is related to the effect of EU membership or ERM II entry in case of the NMS countries.

In this paper, we adapt a similar approach as Classens *et al.* (1998) but we supplement the selection of exogenous variables for the push-pull factor framework by making use of the achievements of Modern Portfolio Theory that was proposed by Markowitz (1952) and Tobin (1958). Modern Portfolio Theory states that an investor's investment decision whether to buy an asset or not is dependent on the following factors: The amount of money he or she has available for the investment, the preferences that indicate how he or she evaluates a unit of additional return relative to a unit of additional risk and hence how much of the market portfolio will be bought, the risk-return profile of the risky asset in question, and finally, the risk-return profiles of all other assets comprising of other risky assets and the risk-free rate. Considering the case of a representative, internationally active investor, we can establish a number of similarities: The funds available for investment translate into international liquidity, the individual preferences are replaced by the global risk appetite, and the characteristics of target and alternative investments are now given by the individual country profiles.¹¹ Combining these considerations with the traditional push-pull factor framework, the variables capturing international liquidity and global risk appetite as well as the risk-return profile of all alternative investments are defined as push-factors, while the risk-return trade-off of the target country is considered to contain all pull factors.

In the next section, we will introduce international investment positions as the dependent variable and describe our sample in greater detail.

¹⁰Although this category of factors is not separately mentioned, the importance of structural factors for capital flows, such as trade liberalization or financial market integration, was already taken up in WB (1997). For a new view see WB (2007). However, here, these factors were entirely attributed to the pull side.

¹¹Since this exercise should only serve as a basic illustration for the determinants driving the investor's investment decision on a macro level, we abstract here from correlations across assets.

3 CONSTRUCTION AND CHARACTERISTICS OF THE DATASET ON INTERNATIONAL INVESTMENT POSITIONS

As laid out by several authors in recent years – *e.g.* Lane and Milesi-Ferretti in multiple contributions, Tille and van Winccop (2008) – concentrating on capital flow measures only, and even more so, on net flows, leaves aside important information on the level and the valuation of foreign investments. A capital flow only covers the quantity dimension but not the likewise important price dimension of an international investment. Since a large number of studies examined capital flows in the past, we take up the above cited idea and apply the somewhat under-researched approach of looking at the underlying ‘international investment positions’ or ‘external positions’ – the corresponding value adjusted stock measures. This comes with the advantage that now not only the quantity dimension – as in the case with capital flows – is present but also a price dimension is added so that the measure of investment approximates the outcome of the investor’s decision more closely.

Our data on international investment positions is primarily taken from the IMF’s International Financial Statistics (IFS). The IFS database traditionally provides balance of payments data of almost every country in the world. In addition, since 1997, the international investment positions of a large number of countries have been published as well. As indicated above, stock values here, are not simply accumulations of flows for each year, but also include additional valuation effects related to changes in prices (capital losses and gains, exchange rate fluctuation, etc.). A more detailed description of all variables we use in this study can be found in the appendix.

However, a word of caution in this context is appropriate: Other than in its World Economic Outlook (WEO) Database, the IMF serves in the IFS only as a collector for data from national sources. Hence, underlying calculations are done by statistical offices in the individual countries so that reported figures for capital flows and international investment positions might be subject to minor differences in methodologies used for valuations.¹²

Furthermore, since the reporting of international investment positions is left to the countries, there is no unique starting date for the data. Some positions – especially for larger industrialized countries – are available from 1970 onwards but others, especially those of smaller development countries, are not available before the mid or end 1990s. Since we run in this problem for a number of countries in the beginning of our sample, we replace the missing IFS data with data obtained from the new database on external assets and liabilities set up by Lane and Milesi-Ferretti that is described in Lane and Milesi-Ferretti (2007) article ‘The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004’. Here, the authors use IFS data on capital flows together with various other databases for comparison to extrapolate earlier values of the international investment positions for 140 countries, with some series dating back until 1970. To be able to draw comparisons across countries, the investment positions are scaled by current GDPs. The corresponding GDP and exchange rate series are taken from the IFS as well. Usually, the nominal GDP is obtained in national currency (even for most of the new Euro countries, the series are only available in their former national currencies) and converted to millions of current US dollars by using the official nominal exchange rate. An exception is the 2007 value for Slovenia, where a corresponding exchange rate value of the former currency, Slovenian Tolar, to US dollar is not available any more. Since the Slovenian GDP value in the IFS is still denominated in the old currency, we instead take the value of the 2007 US dollar GDP from the AMECO database of the European Commission.¹³

The sample covers all ten NMS countries that became members of the European Union since 2004. We

¹²There are two main approaches regarding calculations of valuation adjustments (price indices, exchange rate, revisions, etc.), see Kraay *et al.* (2000) and Lane and Milesi-Ferretti (1999), Lane and Milesi-Ferretti (2001). Some countries use detailed information on individual items (*i.e.* for assets’ and liabilities’ classes in the balance of payments); others instead adjust cumulated flows for valuation changes. Both approaches construct estimates of foreign assets and liabilities and their subcomponents for a large number of countries and time spans that are consistent. The main difference between these approaches comes from the price index that is used. Kraay *et al.* (2000) argue that in case of developing countries is not suitable to use prices for assets from financial markets that may be biased and do not reflect the actual value of a firm. They use the price deflator of domestic investment goods (investment deflator) instead. Lane and Milesi-Ferretti (1999), Lane and Milesi-Ferretti (2001) use the end of year value of domestic stock market in US dollars. Then adjustments for changes of exchange rate are applied. A discussion of other points can be found in for example in Lane and Milesi-Ferretti (2001).

¹³We do the same for the 1993 and 1994 values for Lithuania.

exclude Cyprus and Malta that both are new member countries of the European Union as well. The reason driving this decision is that both countries are located outside of continental Eastern Europe and even more important, both countries have a reputation for being money centres that channel funds to other countries. So the determinants of capital flows to these places might be driven by other incentives and hence in case of an inclusion, bias the results of the overall sample.

Our sample ranges from 1993 to 2007. We restrict our sample to a start in 1993 to avoid problems arising from an allocation of the Czechoslovakian figures to its successors, the in 1993 newly created countries: The Czech Republic and the Slovak Republic. Furthermore, the alternative, a sample start at the beginning of the Eastern European transition process, *i.e.* in the year 1990, would most likely not serve our intended purpose as well: On the one hand, the data quality in Central and Eastern Europe is still poor until the mid-1990s, and on the other hand, an extensive use of capital controls in this stage of transition might potentially bias our results. Since we primarily intend to examine the determinants of international investment positions that result from decisions of independent private agents, we can forgo the lost three years back to 1990 without regret. The frequency chosen is annual, since international investment position data is only reported once a year for most countries.

The data on international investment positions has the following structure. Based on the categorization for capital flows in the Balance of Payments Statistics, the corresponding data on external positions is originally divided in five functional categories.¹⁴ However, since we supply the IFS data by figures from Lane and Milesi-Ferretti (2007), we adopt the more aggregated categories present in their database. Hence, in this paper, we divide asset classes in 'Foreign Direct Investment', 'Portfolio Equity Investment', and 'Portfolio Debt Investment', with the latter category comprising the functional IFS categories 'Portfolio Debt Investments' and 'Other Investments'. Since we use the *External Wealth of Nations Mark II Database* figures, only in the very beginning of our sample, we do not have to worry about the treatment of financial derivatives that were negligible in size back then and hence, are not recorded separately before 1997. In the empirical model in section 5 of this paper, we will concentrate on the liability side of external positions to capture capital stocks for the NMS. This gives us the possibility to isolate the investments in NMS from – although rather small – investments by NMS abroad. Hence, the determinants identified in the empirical exercise are more closely related to the economic variables of the CEE region. And extracting the changing influence of these variables on international capital movements and stocks is the primal goal of our analysis. However, in section 4.2., we also describe the net investment position, since this definition comes closest to the financial account balance that is frequently used in the literature. On the disaggregated level, net stocks are given by the difference between assets and liabilities. On the aggregated level, we follow Lane and Milesi-Ferretti's approach and include each country's reserve assets (minus gold) on the asset side as well.

4 EU INTEGRATION, TRANSMISSION CHANNELS, AND CONSEQUENCES FOR INVESTMENT POSITIONS

4.1 *The EU Integration Process and the Resulting Economic Convergence*

The NMS countries of the EU are a heterogeneous group consisting of at least three blocks of countries, the Visegrad group, the Baltic States, Balkan countries (Bulgaria and Romania) and Slovenia.¹⁵ After the fall of the iron curtain, all of these countries started their transformation programmes, although, latter ones differed with respect to realised measures. However, the main goal for this group of countries was a full integration with the rest of European (former Western) countries (where they had belonged to already in the interwar period) and in particular, the accession to the European community (the European Union) that was realised in several steps.

¹⁴The four IFS categories are 'Foreign Direct Investment', 'Portfolio Investment', 'Investments in Financial Derivatives', and 'Other Investments'. Furthermore, 'Portfolio investment' can be subdivided in 'Portfolio Equity Investment' and 'Portfolio Debt Investment'.

¹⁵Given some structural and historical characteristics, it is very difficult to classify Slovenia because it is different both from central European countries and Balkan countries.

A country that wants to join the EU has to fulfil specific criteria and hence, to complete several steps of an integration process. The basic condition to be met is that a potential member country must be a state in Europe and has to respect fundamental principles such as rule of law or principles that are a part of democratic society. Some requirements were formulated as the so called *Copenhagen criteria (1993)* – they set additional requirements that are necessary for a market economy as a condition that has to be fulfilled to force competitive pressures in the EU.

A first, but nevertheless very important step in the process of European integration is connected with the Association agreements that are thought as a first stage of a possible membership. These agreements were signed with the potential NMS countries already during the 1990s and so potential new member states started their integration process.¹⁶ They abolished trade barriers and opened the floor for technical and financial cooperation in exchange for commitment to various reforms pertaining to economical and non-economical environment. Apart from these criteria, others to non-economic and legal conditions.¹⁷

The formal beginning of the future EU enlargement started after the meeting of the EU in Luxembourg in 1997, where documents important for the EU enlargement were signed. The actual beginning of the negotiations started in 1998 and in 2000.¹⁸ The EU meeting in Copenhagen in 2002 confirmed that ten European countries would join the EU and then ten countries including eight NMS countries became part of the EU in Mai 2004 (the sixth wave of EU enlargement).¹⁹ Due to some problems with the Copenhagen criteria and the *acquis communautaire* Bulgaria and Romania entered the EU in January 2007.

Table 4.1: Macroeconomic Indicators I.

	Growth Rate of Real GDP		CPI Inflation Rate		Deposit Rate	
	1993–2000	2001–2007	1993–2000	2001–2007	1993–2000	2001–2007
Bulgaria	-1.1	5.6	180.3	6.1	32.6	3.1
Czech Republic	3.7	4.5	9.3	2.4	6.4	1.6
Estonia	5.5	8.2	26.9	4.1	6.9	3.0
Hungary	3.3	3.9	18.2	5.9	16.5	7.9
Latvia	2.5	9.2	25.7	5.3	14.2	3.9
Lithuania	0.4	8.1	70.3	2.0	24.2	2.6
Poland	7.4	4.1	20.3	2.5	22.5	5.1
Romania	1.1	6.1	96.0	14.9	44.4	12.4
Slovak Republic	5.4	6.3	11.2	5.2	11.0	4.6
Slovenia	4.9	4.5	13.4	4.8	16.6	5.3

Source: IFS IMF (2009), own calculations.

The EU accession process had a significant impact on macroeconomic variables. Table 4.1 and Table 4.2 depict averages of selected macroeconomic variables for each of the ten NMS over period 1993–2007.

All of today's NMS countries underwent a transformation recession at the beginning of 1990s with the sharpest declines of GDP observed in 1991 and/or in 1992. Afterwards GDP levelled out and began to rise (*e.g.* see EBRD (1999)).²⁰ Regarding the GDP growth, during the first half of the 1990s the NMS countries

¹⁶Hungary and Poland applied in 1994, Estonia, Lithuania, Latvia, Slovakia and Romania in 1995, the Czech Republic and Slovenia in 1996 (see Ullrich and Rudloff (2004)).

¹⁷For example, the so-called *Acquis Communautaire* consisted of 2683 directives and around 100 000 pages of the Official Journal of the EU at that time had to be implemented in the NMS countries (see EC (2006)).

¹⁸The Czech Republic, Estonia, Hungary, Poland, Slovenia and Cyprus entered the negotiations in 1998. Bulgaria, Lithuania, Latvia, Romania, Slovak Republic and Malta entered the negotiations in 2000 (see Ullrich and Rudloff (2004)).

¹⁹If the reunification of Germany is not understood as an EU enlargement, then this wave is the 5th in the row (*comp.* EC (2006)). Some authors do not distinguish between the EU enlargement in 2004 and in 2007 and take them as one action done in two steps (see *e.g.* Breuss (2009)).

²⁰In most of the NMS countries starting levels of GDP were surpassed in 1999 or 2000. This seems to be a main reason to start

Table 4.2: Macroeconomic Indicators II.

	General Government Balance		General Government Debt		Nominal Effective Exchange Rate	
	(in % of GDP)		(in % of GDP)			
	1993–2000	2001–2007	1993–2000	2001–2007	1993–2000	2001–2007
Bulgaria	-3.9	1.6	140.9	39.1	694.6	98.5
Czech Republic	-8.5	-4.3	15.0	29.0	78.0	96.3
Estonia	-0.4	1.8	6.5	4.8	86.1	97.9
Hungary	-6.0	-7.0	72.4	59.8	114.8	96.5
Latvia	-1.6	-1.1	12.5	12.8	89.6	106.6
Lithuania	-4.5	-1.5	19.6	20.0	62.4	97.7
Poland	-3.6	-4.6	51.7	44.6	106.0	99.2
Romania	-3.2	-1.8	21.6	18.9	651.4	105.7
Slovak Republic	-4.7	-4.0	34.0	38.6	90.0	97.5
Slovenia	-0.6	-1.9	21.8	26.7	127.2	101.6

Note: NEER year 2005 = 100. *Source:* IFS IMF (2009), EBRD (2008), own calculations.

experienced a period of transformation crisis and relatively high growth reflected lower starting levels that enabled them to surpass values observed at the onset of the transformation period in the late 1990s (catching up process took place). However, this positive process was disrupted by second crisis in some states (Bulgaria, the Czech Republic, and Romania) in the second half of the 1990s. Apart from that, the Baltic States experienced high and stable growth rates over the entire period after having surpassed a deep economic drop. So, high growth rates may have been caused by very low initial levels (see *e.g.* EBRD (1999); UNECE (2000); von Pallok (2004)) and by the fact that these countries taken together shortly before the EU-entry reached an economic level corresponding to that achieved within the former USSR. However, average growth rates over 1993–2000 for these states were low compared to other countries of the group, only Bulgaria showed negative growth rate.²¹ Slower growth rates in some countries (the Czech Republic or Slovenia) may have been attributed to higher level of economic development (GDP per capita) or may have been caused by pursued unsustainable policies resulting in internal and external imbalances (Hungary). Development of the NMS countries was completely different during the period 2001–2007 compared with the 1990s. The economies of the NMS countries surpassed their initial starting levels of GDP, the process of convergence (catching-up) accelerated (only Poland and Slovenia that showed a little deceleration). There have been many factors that may have influenced this change, ranging from new institutional settings and finished process of transformation that started having influence on inflows of foreign investors and therefore capital inflows, export expansion mainly due to production restructuring, generally more favourable macroeconomic environment to the process of the EU enlargement. The spike in growth rates of GDP has been more pronounced after the actual enlargement in 2004 (even in comparison with the period 1999–2003, see Breuss (2009)) and approaching to average EU levels (EU-12 or EU-15) took place at very fast pace (see EC (2006)).²²

Relatively high inflation rates that were substantially over the EU average during the transformation period and were gradually decreased. This can be seen in the third column of Table 4.1. Only the Czech Republic had inflation lower than 10 percent on average, followed by Slovak Republic and Slovenia. At the beginning of the new decade, the Czech Republic and Lithuania were an exception to the rule, with their inflation rates

an empirical analysis around mid-1990s. For example Fabrizio *et al.* (2009) start their analysis in 1995 when the NMS countries surpassed their lowest output point following completion of the transformation recession ('the turmoil' in words of this study).

²¹Due to a second recession associated with a financial crisis in the second half of 1990s.

²²In some countries a significant shift in growth rates can be seen and the period from 2004 to 2007 (2008) is regarded as the most successful in the recent history of some of the NMS countries, (*e.g.* the Czech Republic, Slovakia, Bulgaria, Romania, see for example Grigorov, Richter *et al.* (2007) or Havlik, Holzner *et al.* (2008).)

lower than the eurozone or even the EU average. At the beginning of the current decade, high inflation rates were observed in Bulgaria, Hungary, Slovakia and Slovenia. As a part of preparations for the euro adoption, the inflation rate in Slovenia dropped in 2006, similar process could be observed in Slovakia preparing for the euro adoption.²³ This development is reflected by average inflation rates – for some countries centered around 2 percent (Lithuania, the Czech Republic and Poland), for others within a band from 4.1% to 6.1%. The only exception was Romania that showed inflation rate of 14.9% (this country experienced double or even three digit inflation rates in the late 1990s, however rapid convergence has been observed since then). The latest figures for 2007 and 2008 were around the average value for all NMS countries.

Reduced inflation rates, higher level of macroeconomic stability and better general economic conditions lead to lower interest rates (both short term and long term rates). While in the 1990s there were double digit rates (apart from the Czech Republic and Estonia), they have declined substantially since then (for example deposit rates). One reason may be linked up to financial integration that has started to take place (increases of stock exchanges, lowering interest rate spreads, etc. see EC (2006)) and also supported credit booms in these countries.

Development of public finances in the NMS countries has been one of the main problems in these states. Public budget deficit (measured in the ESA 1995 methodology) were relatively high in the 1990s reflecting deep (structural) changes, the transformation process and necessary structural adjustments. Large deficits have been reduced in many NMS countries since 2001; some countries have showed even balanced or positive numbers (surpluses). This was not the case of public finances in Hungary and for some time in the Czech Republic and Slovakia which can be seen by looking at average figures in Table 4.2 in second column. The actual development differed in the second period. Some countries showed surpluses (Estonia and Bulgaria), some even higher deficits (Hungary and Poland).

A very similar picture could have been observed in case of the corresponding stock value – public debt levels. Some NMS have succeeded in reducing their levels of public debt (Bulgaria, Slovakia or Romania), a further group of countries has stabilized its debt levels, but others have increased their public debt (Hungary, Poland or the Czech Republic). This development may have been influenced by the existence of binding rules for fiscal policy (The Stability and Growth Pact with some modifications for countries with the euro currency) that became effective after joining the EU. Public finances are still the main obstacle in meeting the Maastricht convergence criteria and are one of the reasons why international investors may be aware of taking more risks (by purchasing for example domestic stocks) in some countries.

Exchange rates in NMS countries have been influenced by many factors. At the onset of transition there were some changes of exchange rates such as large devaluations, changes of currency baskets, etc. that were aimed at restoring competitiveness of enterprises and giving them a cushion that should have been used for catching up with western firms. Some other changes were realised during 1990s reflecting higher inflation rates in NMS countries compared to the EU countries. Despite these changes, appreciation of national currencies has been driven by productivity differentials.

4.2 *Development and Structure of International Investment Positions for NMS*

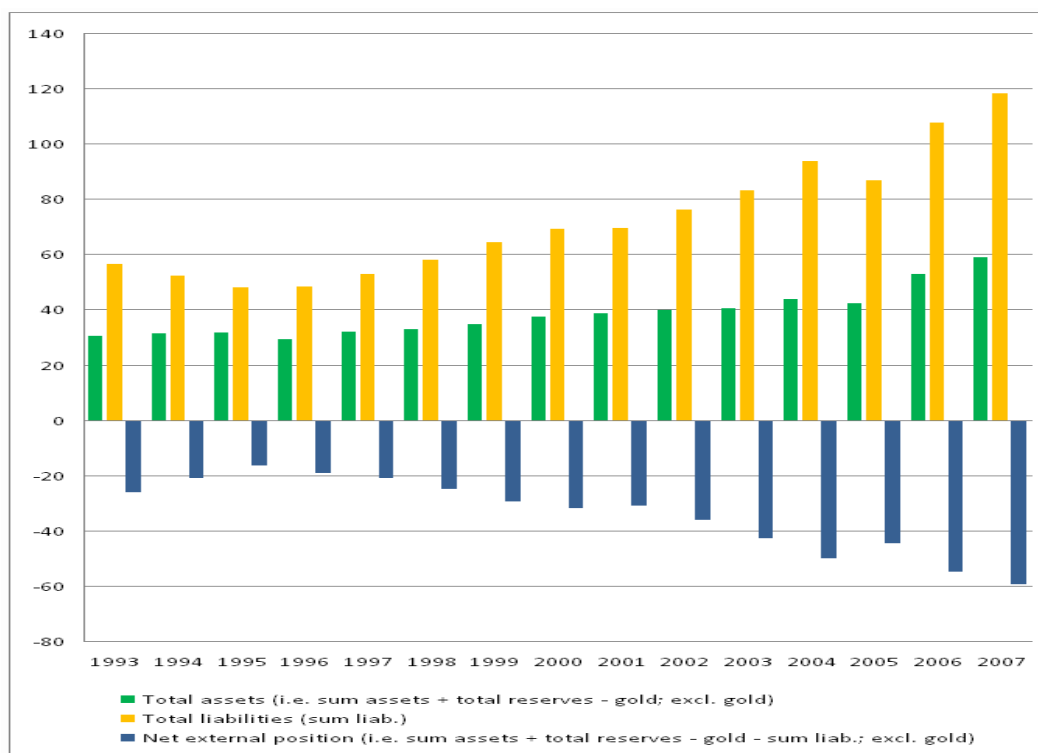
Before turning to the empirical model, we use the comprehensive data set to describe some recent trends and stylized facts that emerge from a careful examination of the available data on international investment positions. Hereby, we focus on the region as a whole. Two different perspectives are taken on: In a first step, the net position and the aggregated liabilities are analyzed over time and in a second step, both are disaggregated into capital types and their structure is examined in greater detail.

Figure 4.1 describes the development of the regional investment position – *i.e.* the sum of the net investment positions of all ten Central and Eastern European countries that are covered by our sample – in relative terms.

²³Lithuania, a formerly low-inflation country, presents a specific example. Due to a delay in deregulation, the inflation grew. This tendency was a reason for the country to be refused the access to the ERM II exchange rate mechanism, even though the Maastricht criterion was exceeded only negligibly. Were similar tendency was in Estonia or Latvia. In general, the Baltic States have showed high volatility of inflation rates due to their exchange rate arrangements or their openness.

In 2007, the net investment position of the sample countries amounted to negative 683.9 billion US dollars. When this value is set in perspective to the region's GDP, the net investment position amounts to a negative 59.4 percent of the sample countries' GDP. This net value is the result of subtracting liabilities at a value of 1362.8 billion US dollars (or 118.3 percent of the region's GDP) from assets and reserves at a value of 678.9 billion US dollars (or 58.9 percent of the region's GDP). These figures clearly indicate that the Central and Eastern European sample countries were debtors to the rest of the world in 2007.

Figure 4.1: International Investment Position: Total Stocks in the CEE Region



Note: Composition of flows – for explanation see text. Source: IFS IMF (2009), Lane and Milesi-Ferretti (2007), own calculations.

This situation is the result of a long lasting trend in the region's investment pattern: After a few years of narrowing net positions, and a value of negative 16.5 percent of the region's GDP in 1995, the net investment position of Central and Eastern Europe continuously deteriorated to its negative 59.4 percent of GDP value in 2007. The driving forces over time can be identified as well. While in absolute terms, both assets and liabilities have increased in the light of an advancing financial integration, the relative term assessment delivers a clearer picture: When scale by nominal GDP, it turns out that the region's asset holdings were for a long time locked in a corridor between 30 and slightly over 40 percent of GDP, starting with 30.5 percent of GDP in 1993 and breaking out of the corridor not before 2005, when the asset stock summed up to 42.1 percent of GDP. Since 2006, the asset side continued that upswing and indicated increasing values. However, the dynamics on the liability side are even stronger. Starting at a level of 50 percent of GDP in the mid of the last decade (the 1995 value was 48 percent of GDP) the ratio of liabilities increased to 86.7 percent of GDP in 2005 and skyrocket in the years 2006 and 2007 to a value of nearly 120 percent of GDP. As indicated above, this clearly outperforms the even strong dynamics on the asset side.

In the next step, the region's external finance structure – again, the net investment position and external liabilities – are broken down in different capital types. Traditionally, debt was the most important source of external finance for Central and Eastern Europe (see Figure A.1). Since 1993, debt liabilities ranged relatively stable in a corridor between 34.7 and 54.4 percent of GDP. From 2001 onwards (37.5 percent of GDP in 2001) a slight increase to 54.4 percent of GDP took place. Since the asset side of debt stocks is, although on a lower level, relatively constant as well – stocks range here from a value of 14.7 in 1996 to a value of 22.5 in 2007 – the net debt stocks of the region are rather constant as well – exhibiting a slight downward trend in recent

years. In 2007, the corresponding net debt stock reached a negative 32.0 percent of region's GDP.

Nevertheless, in recent times, the value of FDI stocks outperformed external debt by a significant margin (see Figure A.3). Being in a small single digit range in 1993, FDI liabilities and net stocks increased steadily from year to year, and reached a value of 56.8 (liabilities) respectively a negative 43.4 percent of GDP (net FDI stocks). This development changed the structure of the Central and Eastern European net investment position significantly, since today more than half of its value is driven by FDI stocks. Such a strong deterioration is mainly attributed to nearly non-existent outward FDI stocks, only showing in the years of 2006 and 2007 a considerable increase to 7.9 and 13.4 percent of GDP after 3.1 (in 2005) being the highest value since the beginning of the sample.

With FDI stocks becoming the most important source of external financing for Central and Eastern Europe, portfolio equity flows gain an increasingly higher attention as well (see Figure A.2). Although, the evolution of portfolio equity stocks has a largely similar structure as FDI stocks, the value of former ones amounts only to approximately one tenth during the sample period (with equity portfolio liabilities of 6.3 and net stocks of negative 2.3 percent of GDP in 2007). However, since 2006, a significant increase on the asset side of portfolio equity stocks is observed and results in a clearly improved net position. Furthermore, it can be seen that portfolio equity stocks are more volatile than FDI stocks: Two considerable rebounds can be identified from the data. During 1999 to 2003 and in 2007, the stock of portfolio equity is reduced significantly, primarily representing the most significant stock market downturns of the recent decade.

Since 1997, financial derivatives are recorded as well in a separate category (see Figure A.4). Although this capital class has a fairly small share of the overall stocks (assets and liabilities are still below 1 percent of region's GDP), both sides of the balance sheet grow rapidly in similar terms. Hence, financial derivatives is the only capital class, where net stocks are rather balanced and in recent years, assets even slightly outperformed liabilities.

5 THE MODEL

5.1 Theoretical Background and Estimation Procedure

There have been different empirical estimation approaches of financial flows, depending on the strands of literature. In this paper, we follow a panel data approach by creating a panel of countries. Panel data methods have an important advantage because they allow controlling for different problems that may emerge with real data (for example heteroscedasticity between countries or autocorrelation). Given the fact that there are two main dimensions in panel data models (cross-section and time dimension), it means that there is more information available. This kind of analysis is also expected to lead to a reduction of (multi)collinearity problems (due to higher/more variability of variables). In addition, estimated parameters should be more reliable due to an increase in degrees of freedom and more efficient.

A majority of studies has used a static approach and employed ordinary least squares methods (OLS) or methods such as Fixed Effects or Random Effects. Potential bias and inconsistency that may emerge in case of using lagged dependent variable (see *e.g.* Ahmed *et al.* (2005)) may be solved applying a kind of general method of movements (GMM), *i.e.* dynamic methods such as the Arellano-Bond estimator (Arellano and Bond (1991)), the Blundell-Bond estimator (Blundell and Bond (2006)) or the Bruno estimator (Bruno (2004)). All these dynamic methods are fixed-effect-type estimators with correction for asymptotic bias. In the case of using the lagged dependent variable this may capture a kind of effect that is in the FDI literature called the agglomeration effect.²⁴ This expresses the dependence of investments in a year on past investments (see Kinoshita and Campos (2003)).²⁵

²⁴Despite differences between FDI and other flows, it may be the case that at least portfolio investments are attracted in the same vein as the FDI, *i.e.* positive/negative experience spreads very quickly among investors.

²⁵A problem with this coefficient may be that in case of omitted variable (the estimated model is not specified correctly), the estimated coefficient (its values) will consist not only of the agglomeration effect, but also of the effect stemming from the omitted variable bias.

The main problem of the empirical analysis in a study like this is that there is only a relatively small number of observations in time dimension (T) that may influence estimated parameters in equation (1) (see below), for discussion see *e.g.* Wooldridge (2002). Dynamic methods can help to deal with heteroscedasticity, autocorrelations and endogeneity issues. Both use first differences and lagged values of the endogenous variable as instruments (but their internal estimations' procedures differ). As has been shown the AB estimator may result in a weak instruments problem due to the fact that lagged levels are usually not correlated with their differenced counterparts (see Prasad, Rajan and Subramanian (2007)).

Since the data used in this study relies on observations for ten countries over the period 1993 to 2007,²⁶ the underlying panel consist of a relatively small number of cross sections ($N = 10$ countries) and time dimension ($T = 15$ years) and the number of observations in the complete panel would be 150 ($10 * 15$). Beck and Katz (1995) termed this kind of data structure as *time-series cross-section data* (henceforth BK method). As our dataset is made up of countries that have shown different developments in the past and since individual capital flows differ as well, heteroscedasticity will probably be an issue here. An analysis of this particular type of data must take this fact into consideration, *i.e.* the standard OLS approach might not be appropriate²⁷ and an alternative method seems to be necessary.

One potential candidate may be the generalised least squares estimator (GLS) that is equipped for dealing with issues such as autocorrelation or heteroscedasticity across panels. Beck and Katz (1995) pointed out that this method in case of dataset with small N (number of cross sections) in comparison with T (time dimension) results in underestimation of standard errors (overconfidence) since they did Monte Carlo experiments for this particular setting. Unfortunately, it can be found in most of the social science research.²⁸ They propose their own method for this kind of analysis. Chen *et al.* (2006) analyse both cases and their results confirm problems with GLS estimator. However, when discussing BK method and GLS estimator, they show that the former is better for testing hypotheses, the latter produce estimates that are more reliable.

The following equation (1) provides a compact description of how the variables may be related (t denotes time and i denotes country). Several modifications of this equation are not shown.

$$CF_{i,t} = \alpha_i + \sum_j \beta_j X_t + \sum_k \delta_k Y_{i,t} + D_{s,t} \cdot Y_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t}, \quad (1)$$

where $CF_{i,t}$ is the capital flow (FDI, portfolio), X_t represents a vector of global (push) variables, $Y_{i,t}$ represents a vector of local (pull) variables, $D_{s,t} \cdot Y_{i,t}$ stands for interaction terms of domestic variables and selected events (s), μ_i stands for dummies for country effects, λ_t stands for dummies for time effects and $\varepsilon_{i,t}$ is an error term.

This panel data setting allows more systematic analysis of a role of individual (country-specific or time-specific) factors. An approach based on using non-overlapping five-year averages of the data for each country cannot be used due to yearly data and short sample period.

The estimations of the aforementioned model and its modifications were done with the statistical package Stata. We applied two linear methods for panel data analysis that were described above, *i.e.* the Feasible Generalized Least Squares method (FGLS) and for robustness check the linear regression method with panel-corrected standard errors (PCSE) as proposed by Beck and Katz (1995) having in mind some advantages and disadvantages of both methods mentioned above. At first, we tested hypotheses related to our sample: homogeneity, non-existence of serial correlation and any presence of autocorrelation. Rejection of any of these hypotheses would lead to biased results and therefore the applied procedure for estimations has to be adjusted for it. Then we proceeded with estimations.

²⁶Even though transformation process started at the end of 1989 or at the beginning of 1990, there are some issues mentioned in previous text associated with the early transformation process that may potentially bias our results (for example a transition effect, see Hermann and Winkler (2009)). Therefore we start our analysis in 1993.

²⁷It may be the case if there is heteroscedasticity across panel – error terms show autocorrelation and units are not homogeneous. In such an environment, the OLS approach (method) is not efficient and computed standard errors (and therefore t-statistics) are biased.

²⁸However, there are some cases when the GLS method is applicable and its results are not so much biased in terms of overconfidence, especially when the fraction of T and N is much bigger than three and efficiency depends on the degree of contemporaneous correlation in the error terms (the lower, the more efficient the GLS estimator is). For additional discussion see Beck and Katz (2004).

Heteroscedasticity was checked by using the Wald test for groupwise heteroscedasticity. As results showed there were problems with the existence of heteroscedasticity and therefore methods correcting for this were applied in our estimations.²⁹ Verification of the hypothesis regarding serial correlation of residuals was done with help of a test proposed by Wooldridge (2002) and an application of this test in the panel data models of Stata software can be found for example in Drukker (2003). Null hypotheses of non-existence of autocorrelation were rejected for our models. In order to solve this problem, the method of common autoregressive process – AR(1) – for all panel models was applied. This correction is supported by Beck and Katz (1995) who point that another method (individual autoregressive processes) would result in possible underestimation of standard errors and therefore leading to some other problems. Moreover, this procedure would lead to the necessity to estimate individual parameters for time-series that are not so long.

The last test was focused on the issue of contemporaneous autocorrelation. The Breusch Pagan (LM) test was applied and confirmed the hypothesis that the non-existence of autocorrelation could not be rejected at usual levels of significance and corrections for this should be employed. Unfortunately, the FGLS method for unbalanced panels does not offer the possibility of correcting for cross sectional autocorrelation.

5.2 Specifications and Results

5.2.1 The Impact of Potential EU Accession on Total Liabilities: The Role of Pull Factors

The primal goal of our empirical analysis is to uncover and quantify the impact that the EU integration and convergence process had on the international capital supply of the NMS. First of all, we run a baseline regression with the percentage change in total liabilities of international investment positions in the NMS as the variable on the left-hand side over the full sample range from 1994 to 2007.³⁰ As indicated in section 2.2., we intend to base the decision about what variables to include at the right-hand side on a combination of push-pull factor approach and Modern Portfolio Theory. As a first step, we explicitly model the pull factors of the specification by introducing proxies for local return and risk factors. Due to endogeneity concerns, all pull factors enter the equation with a lag of one year. Since the Copenhagen criteria do not specify the macroeconomic variables specifically, we instead use the macroeconomic measures cited in the Maastricht criteria – especially to capture all relevant sources of potential macroeconomic risk. On the return side, we include real GDP growth (DGDPR) as a proxy for returns in local markets. Since according to the theory, higher returns attract more foreign capital, we expect the corresponding coefficient to have a positive sign. On the risk side, we make use of the four Maastricht criteria as measures for associated local risk. These criteria include CPI inflation (DCPI) government budget deficit (DGOVBD), total government debt (DDEBT), and short-term interest rates (DDEPO).³¹ All of these risk factors are expected to have a negative influence on the total liabilities of the NMS when they increase and hence, their anticipated signs are negative.

Although the Maastricht criteria are only required for countries that intend to enter the EMS and not to enter the EU, these criteria still might draw a good picture of what quantitative macro targets the EU expects NMS to meet if they want to enter the union and especially if they intend to continue on the road of European integration towards the Euro. Therefore, we also provide an augmented baseline specification, where we include a measure of exchange nominal rate volatility (DSDEUR) as a proxy for the requirement that local currencies should not exhibit valuation changes beyond ± 2.25 per cent towards the Euro which was set out by the ERM I and is continued by its successor agreement, the ERM II. We calculate the exchange rate volatility measure as the standard deviation divided by the average of the nominal bilateral exchange rate between local currency and the Euro over a three years rolling window, including the previous and the following year to minimize the loss of observations in the sample. Since a more volatile exchange rate implies higher uncertainty

²⁹This problem may have been caused by the selected sample of countries of different levels of economic development and structural characteristics or due to sample period that covered various phases of transformation process in the NMS countries.

³⁰One year (1993) is lost due to calculating differences for endogenous variables.

³¹The Maastricht criteria actually focus on long-term interest rates instead of those for the short-term. However, since most NMS were not able to borrow over the long term until very recently, we prefer to include the more complete short-term interest rate variable.

for international investors, an increase in this measure is expected to have a negative effect on total liabilities of the NMS. In this baseline specification, we do not explicitly model the push factor side and hence include time dummies instead. By making use of time fixed effects, we take out all influences that are of international nature and affect all countries to the same extent.

To capture the influence of the EU convergence process on the liability side of international investment positions of NMS, we exploit the timely variation in the sample and interact all country-specific variables with a dummy variable that takes on the value of one in the year, the EU association agreement of the respective country was signed.³² The number of official accession steps that can be expected to have caused sufficient attention among international investors is rather limited. As a valid alternative, the final EU accessions of the NMS in 2004 and 2007 could have also been used. However, we are strongly convinced that these accession benefits were already anticipated well ahead so that interacting risk variable with a official accession dummy would not capture the EU accession benefits to its full extent. As a prior, we would expect local risk variables to become less important for the investment decision of an international investor when it becomes very likely that the country will enter the EU in the near future.³³

Possible channels that can serve as transmission mechanism for stability from the EU core to the periphery include more prudent government policies in potential new member states to meet the requirements for entering the EU, a possible adoption of the Euro in future, and the availability for subsidies from the EU framework in the short term.

The results turn out as follows (Table 5.3). In the baseline specification, in column (1), the coefficients for government debt and local interest rates are significant and have the anticipated negative signs. In the augmented baseline specification, located in column (2), also the exchange rate volatility measure has the correct sign; however, its coefficient and the one on local interest rates lose their significance. Significant, but with unexpected signs, the following coefficients emerge from the regression. The coefficients on inflation and government's budget deficit are both positive implying a *ceteris paribus* increase in these risk factors results in higher external liabilities in the external positions of the NMS.³⁴ A possible reason for the unexpected sign in the case of inflation might lie in a high covariance of inflation and certain return measures, such as interest rates. Hence, the coefficient on inflation could measure this effect as well and return a coefficient on inflation that is positive.³⁵ Regarding the positive influence of the budget deficit on total liabilities of international investment positions, it seems likely that the financing needs for public spending and investment during the transition process are not only satisfied by local creditors but also by investors from abroad. And even in countries where this is not explicitly the case, a crowding-out effect by government actions in the domestic capital market might have required local borrowers to acquire their financing abroad.

Turning to the return side, at the first glance it is somewhat surprising that real GDP growth also has a negative sign. A feasible explanation might be the fact that a good growth performance in the previous quarter might not be sufficient to attract foreign funds immediately. This is supported by the finding that increasing the number of lags to two and three returns a positive coefficient on local GDP growth. However, since we would like to be consistent across all variables and are mainly interested in the risk side of the international investments, we only allow for a single lag and leave the coefficient as it is.

Focusing on the interaction terms, it turns out that in three of the five cases the interaction between risk variables and the EU association agreement have the anticipated positive signs. A positive sign implies that the overall effect for risk factors on foreign capital supply is smaller during the EU accession period than before. This in turn supports the interpretation that international investors pay less attention to local risk factors as soon as they expect the destination country of their investments to enter the EU in near future. Being more

³²Bulgaria (1995), the Czech Republic (1995), Estonia (1998), Hungary (1994), Latvia (1998), Lithuania (1998), Poland (1994), Romania (1995), Slovakia (1995) and Slovenia (1999).

³³We also tried a dummy variable taking on the value of one in the year, the countries finally entered the EU and a similar variable indicating the undersigning of the EU accession agreements two year ahead, however, in both cases, it is highly likely that the possible accession gains were already anticipated by investors and hence the results with these dummies appear to be somewhat less significant.

³⁴When all interaction terms are excluded from the regression, the coefficient on inflation is clearly negative and indicates that an increase of inflation leads to a reduction in international capital supply – supporting its interpretation as a risk factor.

³⁵However, the fact that short term interest rates are included in the specification should mitigate this problem.

Table 5.3: *Baseline Specifications and International Extension*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DTL	DTL	DTL	DTL	DTL	DTL	DTL	DTL
L.DGDPR	-0.0127* (0.007)	-0.0120** (0.005)	-0.0210** (0.008)	-0.0143*** (0.005)	-0.0120 (0.008)	-0.00529 (0.005)	-0.0119 (0.008)	-0.00938* (0.006)
L.DCPI	0.0101** (0.005)	0.0109*** (0.004)	0.0102** (0.005)	0.0135*** (0.003)	0.0122*** (0.004)	0.0146*** (0.004)	0.0108** (0.004)	0.0116*** (0.003)
L.DGOVBD	0.0117*** (0.005)	0.0116** (0.005)	0.0117** (0.005)	0.0129** (0.005)	0.0104** (0.005)	0.0121** (0.005)	0.0109** (0.005)	0.0113** (0.005)
L.DDEBT	-0.00396*** (0.001)	-0.00432*** (0.001)	-0.00405*** (0.001)	-0.00483*** (0.001)	-0.00416*** (0.001)	-0.00483*** (0.001)	-0.00372*** (0.001)	-0.00403*** (0.001)
L.DSDEUR	-0.00665 (0.014)		-0.0224 (0.014)		-0.0217 (0.013)		-0.00904 (0.014)	
L.DDEPO	-0.00625 (0.004)	-0.00681* (0.003)	-0.00473 (0.004)	-0.00638* (0.003)	-0.00705* (0.004)	-0.00801** (0.004)	-0.00776* (0.004)	-0.00783** (0.003)
INTASSOC_GDP1	0.00869 (0.008)	0.00807 (0.005)	0.0178** (0.009)	0.0107* (0.006)	0.00979 (0.008)	0.00273 (0.005)	0.00672 (0.008)	0.00429 (0.005)
INTASSOC_INFL1	-0.0119*** (0.005)	-0.0128*** (0.004)	-0.0123*** (0.005)	-0.0157*** (0.003)	-0.0141*** (0.004)	-0.0166*** (0.004)	-0.0127*** (0.004)	-0.0135*** (0.003)
INTASSOC_BDEF1	-0.00345 (0.006)	-0.00420 (0.006)	-0.00325 (0.006)	-0.00564 (0.006)	0.000177 (0.007)	-0.00321 (0.006)	-0.000665 (0.006)	-0.00197 (0.006)
INTASSOC_DEBT1	0.00318*** (0.001)	0.00336*** (0.001)	0.00295*** (0.001)	0.00366*** (0.001)	0.00296*** (0.001)	0.00356*** (0.001)	0.00267*** (0.001)	0.00294*** (0.001)
INTASSOC_IRSR1	0.00820* (0.004)	0.00897** (0.004)	0.00855* (0.004)	0.0101*** (0.004)	0.0114*** (0.004)	0.0124*** (0.004)	0.0106** (0.004)	0.0107*** (0.004)
INTASSOC_ERVX1	0.00194 (0.014)		0.0194 (0.014)		0.0190 (0.014)		0.00699 (0.014)	
DEMBI			-0.0798*** (0.018)	-0.0814*** (0.016)	-0.0644*** (0.017)	-0.0637*** (0.016)	-0.0132 (0.022)	-0.0162 (0.021)
DGRUS			0.0242*** (0.008)	0.0245*** (0.008)				
DM2US			1.323** (0.604)	1.196** (0.593)				
DCPIUS			-0.0274* (0.014)	-0.0338** (0.014)				
DM2EU					-0.0337 (0.109)	-0.0216 (0.105)		
DGREU					0.0152 (0.014)	0.0134 (0.013)		
DCPIEU					-0.0382 (0.024)	-0.0368 (0.024)		
DMTW							4.448*** (1.142)	4.207*** (1.126)
DGDPW							0.0187* (0.011)	0.0175 (0.011)
DCPIW							0.00254 (0.014)	0.00284 (0.014)
Constant	0.0973 (0.062)	0.125** (0.055)	0.557*** (0.144)	0.617*** (0.126)	0.565*** (0.149)	0.586*** (0.142)	-0.265 (0.232)	-0.208 (0.221)
Country dummies	yes	yes	yes	yes	yes	yes	yes	yes
Time dummies	yes	yes	no	no	no	no	no	no
Observations	118	125	118	125	118	125	118	125
chi2	186.5	200.7	104.9	109.5	107.8	106.1	129.0	127.7

Note: Robust standard errors in parentheses. *DTL* – Total liabilities. ***, ** and * denote significance at the 1, 5 and 10% levels respectively. All computations done using commands for Stata/SE 10.1. Source: Own calculations.

specific, this is the case for the interaction terms of government debt, local interest rates, and exchange rate volatility measure – with latter one, however, not being significant at the 10 per cent level.

Also insignificant are the interaction terms of real growth and government’s budget deficit, indicating that the effect on total liabilities stays the same during the entire period. Again somewhat puzzling is the strong significance of a positive interaction term on inflation which implies that a higher level of inflation after the EU accession becomes reachable has a negative impact on foreign capital supply for the region. To complete the picture, it can be stated that the interaction term of the real GDP growth variable is positive but insignificant and in absolute terms smaller than the negative level effect.

Overall, our results are in line with those of the literature: For example with Classens *et al.* (1998) who also find that countries that most likely will access the EU, exhibit higher total private capital flows holding other factors constant. Furthermore, these authors encounter a similar problem with the coefficient on government’s budget deficit as we do, since in their study, the coefficient becomes insignificant in the case of total private capital flows.

5.2.2 Accounting for International Developments: Modelling Push Factors

Since we also intend to identify the influence of the most important international factors on total liabilities, we now drop the assumption of fixed time effects and include a full set of international variables instead to proxy for push factors. As indicated in section 2.2., we base the decision on what variables to include on a combination of push-pull factor approach and Modern Portfolio Theory and therefore include measures for global risk appetite, international liquidity, as well as proxies for international risk and return characteristics.

Furthermore, it is part of our approach to find out the regional aggregate that serves as the best representation for international developments from the perspective of NMS. While for the Latin American case, usually US measures serve as a benchmark in the literature, the Eastern European region might be more dependent on investors based in Western Europe or Asia. However, especially in the case of Western Europe (EU-15), we have to be careful in interpreting our results as independent push factors. An increase in real GDP growth in Western Europe for example might also be perceived as an increase in size of the final goods market for Eastern European companies – especially for those companies that shifted production to Eastern Europe for cost reasons – and now appear in FDI statistics. This way, the return of the investment opportunity in the NMS and the return of potential alternative investments in ‘other regions’ are measured by the same coefficient, which could lead to insignificance or an unexpected sign of this coefficient. To overcome this problem, we also include the world as a third international aggregate in addition to the US and the EU-15 specification.³⁶

We include the following push variables. As a proxy for global risk appetite, we use a combination of the Emerging Market Bond Index (EMBI) and its successor the Emerging Market Bond Index Plus (EMBI+) that are published by JP Morgan. An increase in this index is expected to indicate a higher level of risk aversion among international investors and hence is associated with a negative sign in the regression results. We keep this variable throughout all specifications. Furthermore, we take an international M2 variable as a measure for international liquidity. We prefer a broader aggregate here, since even a high share of illiquid investments can come along with the availability of funds that can be invested globally. We expect the money supply to have a positive impact on total liabilities in NMS, since when more funds are available, investments in alternative instruments and regions, such as in emerging markets for example, become more likely. The other push factors we include refer to return and risk of potential alternative investments. To approximate the return, we use an international real GDP variable that is expected to be negatively associated with total liabilities, since higher alternative returns elsewhere reduce the attractiveness of investments in the NMS. However, it is well documented in the literature – *e.g.* (Classens *et al.* , 1998, p. 17) – that the international GDP variable also serves as a proxy for profits and household savings that in turn might be used for investments abroad. Finally, the risk is represented by international CPI inflation variable which is expected to enter with a negative sign.

³⁶The set of world proxy variables consist of PPP-weighted growth rates of the macroeconomic variables of 47 countries and was obtained from the Kiel Institute for the World Economy. The US data is obtained from the IFS and the EU data from the AMECO database of the European Commission.

We prefer the inflation variable to an intentional international interest rate variable to keep the segregation between return and risk factors clear, since interest rates also contain a risk premium, they can be interpreted as both types of factors at the same time. Again we use two specifications for each regional aggregate – one including and one excluding the measure for exchange rate volatility.

The regression results for all local variables are very close to the baseline specifications with time fixed effects (see Table 5.3 for the following specifications: US 3&4; EU 5&6; WORLD 7&8). In very most cases, significance, sign, and size of the coefficients are the same throughout all regional aggregates. However, there are two minor changes that might nevertheless be noteworthy to mention. The first observation is that especially in the EU specification, the negative effect on real growth and the corresponding interaction become insignificant – contradicting less strongly the intuition that growth is a good proxy for investment returns (and hence expected to enter with a positive sign). The second observation is that across all three regional specifications the negative coefficient of interest rates and the associated interaction term become more pronounced and gain more significance, which reinforces the interpretation that investors pay less attention to risk measures when they expect a country to enter the EU.

Focusing on the push factors, it turns out that the results are very mixed. When the US is considered as regional aggregate, the coefficients of EMBI and M2 have the anticipated signs and are highly significant. This is not the case for real US GDP growth rate and US inflation. Both coefficients have the opposite sign to be interpreted as risk and return factors. However, as noted above, it is highly likely that the GDP coefficient measures private US savings as well so that the positive sign is not too unexpected. The EU specification does very poorly and shows only a single significant coefficient (the one on EMBI) with other coefficients having mostly the wrong sign. However, this could be reasoned out by the above mentioned ‘perverse’ effects due to the close proximity to the CEE region. Finally, the world specification shows the highest number of correct signs but some of them are not significant again. While the global M2 variable enters correctly with a clearly positive and significant effect on total liabilities, the EMBI and the global inflation variable at least have the right sign. The global real GDP growth variable finally has again the opposite sign and is significant only in the exchange rate volatility specification. Combining theoretical reasoning and the above depicted results, the world aggregate seems to be the most adequate one and hence, we use it as our benchmark in the remainder of the paper.

Our methodology does not allow us to draw a full fledged comparison between the relative importances of push and pull factors so that we are forced to base our judgment on the significance of both variable groups. With the exception of the EU specification, it turns out that not only local factors have been responsible for the recent build-up in total liabilities of NMS international investment positions but also global forces have a stake in this development. Our results indicate that especially the risk-appetite of international investors and the (excessive) funds they have at hand played an important role in the process. This observation is to some extent consistent with the findings of Gibson and Tsakalotos (2004) who state that domestic factors played a rather limited role as determinants of capital flows to Eastern Europe and a larger share of this development should be credited to international contagion effects.

5.2.3 Disaggregation of Total Liabilities in Different Capital Types

The final exercise we carry out is a disaggregation of total liabilities in its three components: FDI liabilities, debt liabilities, and equity liabilities. All three disaggregated capital types enter the left-hand side in the same way as total liabilities – in logged differences. Our prior here would be that portfolio stocks, such debt liabilities and portfolio equity liabilities with a rather short-term horizon, are more likely to show the expected pattern – *i.e.* that risk factors in potential EU member states become less important for foreign investors. However, we are agnostic about the fact whether the same effect can be identified for FDI flows as well, since they usually exhibit a longer investment horizon. The results can be found in the Table 5.4 and the Table 5.5. We present for each type of capital the baseline specification and the augmented baseline specification alongside with two corresponding non-fixed time effects specifications that take the world aggregate as the benchmark region for

push factors.³⁷ Furthermore, we repeat the total liability specification from Table 5.3 to have the coefficients for aggregated flows at hand.

Table 5.4: Disaggregated Investment Positions by Capital Type I: Total Liabilities and FDI Liabilities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DTL	DTL	DTL	DTL	DFDL	DFDL	DFDL	DFDL
L.DGDPR	-0.0127* (0.007)	-0.0120** (0.005)	-0.0120 (0.008)	-0.00529 (0.005)	0.000761 (0.012)	0.00493 (0.007)	-0.000299 (0.011)	-0.00122 (0.008)
L.DCPI	0.0101** (0.005)	0.0109*** (0.004)	0.0122*** (0.004)	0.0146*** (0.004)	0.00931 (0.007)	0.00868* (0.005)	0.00665 (0.007)	0.00429 (0.005)
L.DGOVBD	0.0117*** (0.005)	0.0116** (0.005)	0.0104** (0.005)	0.0121** (0.005)	0.0120 (0.007)	0.0126* (0.007)	0.0144** (0.007)	0.0137** (0.007)
L.DDEBT	-0.00396*** (0.001)	-0.00432*** (0.001)	-0.00416*** (0.001)	-0.00483*** (0.001)	-0.00612*** (0.001)	-0.00608*** (0.001)	-0.00553*** (0.001)	-0.00505*** (0.001)
L.DSDEUR	-0.00665 (0.014)		-0.0217 (0.013)		-0.00858 (0.023)		0.0109 (0.022)	
L.DDEPO	-0.00625 (0.004)	-0.00681* (0.003)	-0.00705* (0.004)	-0.00801** (0.004)	0.000902 (0.007)	0.00201 (0.005)	0.00150 (0.006)	0.00317 (0.005)
INTASSOC_GDP1	0.00869 (0.008)	0.00807 (0.005)	0.00979 (0.008)	0.00273 (0.005)	-0.00465 (0.012)	-0.00914 (0.008)	-0.00780 (0.011)	-0.00629 (0.008)
INTASSOC_INFL1	-0.0119*** (0.005)	-0.0128*** (0.004)	-0.0141*** (0.004)	-0.0166*** (0.004)	-0.0117* (0.007)	-0.0110** (0.005)	-0.00896 (0.007)	-0.00651 (0.005)
INTASSOC_BDEF1	-0.00345 (0.006)	-0.00420 (0.006)	0.000177 (0.007)	-0.00321 (0.006)	-0.00976 (0.010)	-0.0106 (0.009)	-0.0137 (0.009)	-0.0119 (0.009)
INTASSOC_DEBT1	0.00318*** (0.001)	0.00336*** (0.001)	0.00296*** (0.001)	0.00356*** (0.001)	0.00400*** (0.002)	0.00412*** (0.001)	0.00376** (0.001)	0.00339*** (0.001)
INTASSOC_IRSR1	0.00820* (0.004)	0.00897** (0.004)	0.0114*** (0.004)	0.0124*** (0.004)	0.0135** (0.007)	0.0120** (0.006)	0.00986 (0.007)	0.00809 (0.006)
INTASSOC_ERVX1	0.00194 (0.014)		0.0190 (0.014)		0.0115 (0.023)		-0.00846 (0.023)	
DEMBI			-0.0644*** (0.017)	-0.0637*** (0.016)	-0.0306 (0.024)	-0.0177 (0.022)	0.00283 (0.033)	0.0124 (0.031)
DM2EU			-0.0337 (0.109)	-0.0216 (0.105)	0.163 (0.163)	0.151 (0.156)		
DGREU			0.0152 (0.014)	0.0134 (0.013)	0.0294 (0.020)	0.0235 (0.019)		
DCPIEU			-0.0382 (0.024)	-0.0368 (0.024)	-0.0397 (0.034)	-0.0444 (0.033)		
DMTW							4.521*** (1.690)	4.210** (1.662)
DGDPW							0.00850 (0.017)	0.00810 (0.016)
DCPIW							0.0125 (0.022)	0.00846 (0.022)
Constant	0.0973 (0.062)	0.125** (0.055)	0.565*** (0.149)	0.586*** (0.142)	0.275 (0.220)	0.206 (0.205)	-0.391 (0.344)	-0.433 (0.328)
Country dummies	yes	yes	yes	yes	yes	yes	yes	yes
Time dummies	yes	yes	no	no	no	no	no	no
Observations	118	125	118	125	118	125	118	125
chi2	186.5	200.7	107.8	106.1	139.0	136.1	147.3	142.8

Note: Robust standard errors in parentheses. *DTL* – Total liabilities, *DFDL* – Foreign Direct Investment (liabilities).

***, ** and * denote significance at the 1, 5 and 10% levels respectively. All computations done using commands for Stata/SE 10.1. Source: Own calculations.

When looking at the regressions, the following can be stated (see Table 5.4 and the Table 5.5). Across all specifications where they are modeled explicitly, the coefficients of push factors are largely similar in terms of significance, signs, and size to those of the total liability case. With respect to pull factors, the results of total liabilities are most closely replicated by the ones of debt liabilities. Here, two variables seem to show results that are even more in support of our argumentation. First, the coefficient on the exchange rate volatility measure become clearly negatively significant and even more important, the corresponding interaction term in the fixed effect specification becomes much larger and significant. Second, although somewhat less impressive,

³⁷The decision to choose the world aggregate as the benchmark region is based on grounds of the results from the previous section. However, the results for the other regional aggregated are very similar and available on request.

the coefficient on budget deficit becomes insignificant in three of four specifications and hence does not clearly contradict our priors any more. Also the associated interaction term takes on the expected positive sign in two cases. Furthermore, all interaction terms for local real GDP growth turn out to be significant and positive. Together with the negative – but in absolute terms – smaller level effect for the pre-EU period, the overall effect of growth on liabilities during the EU accession period and afterwards is positive for debt stocks.

Table 5.5: Disaggregated Investment Positions by Capital Type II: Debt Liabilities and Equity Liabilities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DDL	DDL	DDL	DDL	DEQL	DEQL	DEQL	DEQL
L.DGDPR	-0.0198** (0.008)	-0.0115* (0.006)	-0.0152* (0.009)	-0.00848 (0.007)	0.0278 (0.049)	0.0148 (0.042)	0.0386 (0.049)	0.0137 (0.041)
L.DCPI	0.0104** (0.005)	0.0114*** (0.004)	0.0124** (0.005)	0.0134*** (0.004)	-0.0235 (0.040)	0.0515** (0.025)	-0.0133 (0.039)	0.0507** (0.024)
L.DGOVBD	0.00800 (0.006)	0.0119** (0.005)	0.00542 (0.006)	0.00893 (0.005)	-0.0269 (0.032)	-0.00534 (0.030)	-0.0301 (0.032)	-0.00393 (0.029)
L.DDEBT	-0.00271** (0.001)	-0.00314*** (0.001)	-0.00269** (0.001)	-0.00319*** (0.001)	-0.0581* (0.030)	-0.00146 (0.019)	-0.0638** (0.030)	-0.00797 (0.017)
L.DSDEUR	-0.0272* (0.014)		-0.0257* (0.015)		-0.392** (0.157)		-0.362** (0.160)	
L.DDEPO	-0.00861** (0.004)	-0.00930** (0.004)	-0.0119*** (0.004)	-0.0112*** (0.004)	0.0161 (0.036)	-0.0357 (0.027)	0.00846 (0.035)	-0.0363 (0.025)
INTASSOC_GDP1	0.0227** (0.009)	0.0129** (0.006)	0.0171* (0.009)	0.01000* (0.006)	-0.0234 (0.050)	-0.00755 (0.043)	-0.0357 (0.049)	-0.0102 (0.041)
INTASSOC_INFL1	-0.0118** (0.005)	-0.0127*** (0.004)	-0.0138*** (0.005)	-0.0148*** (0.004)	0.0208 (0.040)	-0.0543** (0.025)	0.0114 (0.039)	-0.0526** (0.024)
INTASSOC_BDEF1	6.39e-05 (0.007)	-0.00510 (0.006)	0.00538 (0.007)	-0.000167 (0.006)	0.0279 (0.037)	0.00523 (0.035)	0.0348 (0.037)	0.00799 (0.034)
INTASSOC_DEBT1	0.00258** (0.001)	0.00294*** (0.001)	0.00228* (0.001)	0.00280*** (0.001)	0.0574* (0.030)	0.00110 (0.019)	0.0642** (0.030)	0.00869 (0.017)
INTASSOC_IRSR1	0.00935** (0.005)	0.00959** (0.004)	0.0131*** (0.005)	0.0123*** (0.004)	-0.00322 (0.037)	0.0489* (0.028)	-0.00156 (0.035)	0.0430* (0.026)
INTASSOC_ERVX1	0.0252* (0.014)		0.0242 (0.015)		0.392** (0.159)		0.363** (0.163)	
DEMBI			-0.0143 (0.026)	-0.0103 (0.024)	-0.208** (0.091)	-0.191** (0.084)	0.0543 (0.108)	0.0559 (0.102)
DMTW			3.308*** (1.217)	3.401*** (1.200)			11.76** (5.080)	11.36** (5.086)
DGDPW			0.0284** (0.012)	0.0286** (0.012)			0.104** (0.049)	0.0993** (0.049)
DCPIW			0.0113 (0.016)	0.0113 (0.016)			0.00640 (0.064)	0.0154 (0.063)
DM2EU					-0.771 (0.556)	-0.601 (0.549)		
DGREU					-0.0549 (0.070)	-0.0414 (0.068)		
DCPIEU					-0.0727 (0.115)	-0.0930 (0.114)		
Constant	0.0500 (0.069)	0.109* (0.060)	-0.236 (0.268)	-0.250 (0.252)	1.776** (0.798)	1.665** (0.733)	-1.649 (1.101)	-1.632 (1.050)
Country dummies	yes	yes	yes	yes	yes	yes	yes	yes
Time dummies	yes	yes	no	no	no	no	no	no
Observations	118	125	118	125	113	120	113	120
chi2	193.3	204.4	133.0	128.9	23.07	20.29	31.72	30.44

Note: Robust standard errors in parentheses. *DDL* – Total liabilities, *DEQL* – Equity Flows (liabilities). ***, ** and * denote significance at the 1, 5 and 10% levels respectively. All computations done using commands for Stata/SE 10.1. Source: Own calculations.

Although being insignificant quite a number of cases, coefficients in the equity liability specification show a pattern that is highly consistent with the fact that foreign investors in NMS have paid less attention to macroeconomic risk measures as soon as it became very likely that these countries would enter the EU. With total government debt and the exchange rate volatility measure being highly significant and showing the anticipated signs in levels (negative) and interaction terms (positive) this line of arguments is well supported. Although

without significance and with the exception of short term interest rates and inflation in two specifications each, all other pull factors have the expected sign for their interaction terms and level effects.

Finally, when turning to FDI stocks, it becomes obvious that most signs are different then in the previous cases and only very few coefficients are significant with a similar sign as previously expected. Basically only the coefficients on government debt are significant throughout all specifications and behave in way that was expected before. This might suggest that FDI stocks are of different nature also with respect to macroeconomic risk characteristic – which in turn could have the following two implications. Firstly, international FDI investors in NMS consider macroeconomic risk factors to a much lower extent then international portfolio investors do. Secondly, and this is the flip side of the coin, an advanced stage in the EU accession process does not reduce the investor’s perception of macroeconomic risk with the only exception of the risks arising from high levels of government debt.

5.3 Robustness Check

Above, some problems associated with the econometrical methods used for our empirical analysis were mentioned. Therefore we have decided to employ as a robustness check the PCSE method (OLS with panel corrected standard errors as a response to the Beck and Katz (1995) critique) in two steps: the PCSE method without the correction (Appendix, Table A.1) and the PCSE method with the contemporaneous correlation correction (Appendix, Table A.2).³⁸

The results of both methods for the main specification (total liabilities flows) are very similar and differences do not seem to be of any systematic nature. All variables are treated in the same way as for the FGLS method, all the domestic variables are lagged (one period) in order to deal with the endogeneity problem. Interactions terms were included and three specifications for external factors are chosen – the EU, the USA and a proxy for the entire world.

To start with, signs of domestic variables remain unchanged, however due to recalculation of standard errors, some variables are somewhat more significant in FGLS specifications (for example the variable government deficit), some remain unchanged (volatility of exchange rate) some are slightly more significant (deposit interest rates – the variable *DDEPO*). Regarding interactions terms, the interaction for GDP is in both cases insignificant across specifications (there is only one exception in Table A.2 and the global US variables), also interactions with budget deficits and exchange rate remain insignificant, inflation is highly significant and with negative signs, interaction with government debt is also significant and with positive sign, interaction with interest rates are more significant compared to FGLS result.

Regarding proxies for external factors, for the US specification the variable M2 has become insignificant at all (Appendix, Table A.1) or significant if the variable for exchange rate volatility is used (Appendix, Table A.2). For the EU specification, significance of the variable CPI has changed and for the World specification a minor change in the world economic growth variable has occurred.

To summarise, differences are rather negligible and can be attributed to the fact that the FGLS method produces slightly smaller standard errors). The contemporaneous correlation correction changes the estimated standard errors which are lower and for some variables, their magnitude has changed.³⁹

6 CONCLUSION

This paper has examined how international investors evaluate the change in the risk-return profile of ten Central and Eastern European countries that recently entered the European Union. By supplementing the

³⁸In the case of low contemporaneous autocorrelation of errors and restricted sample size (unbalanced panel), the PCSE method should be preferred in strict interpretation of Beck and Katz (1995) view. This would be also supported by problems with normality assumption for the FGLS method if some variables are not log-linearised due to negative values. Unfortunately, this problem did not occur in this study.

³⁹Another possibility may be using a dynamic model (IV estimator, GMM, the Arellano-Bond method or the Blundell-Bond method). However, there are potential disadvantages of these methods due to lower efficiency compared to the static estimation due to the limited amount of observation (Hermann and Winkler (2009)). In our case the problem may be even more severe (after differencing less than 135 observations).

stock data on international investment positions provided by IMF's International Financial Statistics with data obtained from Lane and Milesi-Ferretti's External Wealth of Nations Mark II Database, we create a unified data set of external assets and liabilities for new EU member states ranging from 1993 to 2007. We apply a panel data approach with FGLS and PCSE methods proposed by Beck and Katz (1995). As left-hand variable, we choose total liabilities in per cent of GDP. Drawing from a combination of the so called 'Push-Pull' factor approach and the achievements of Modern Portfolio Theory, we then collect a comprehensive set of right-hand side variables which enter the regressions. Since our interest focuses mainly on an increase in macroeconomic stability that might have resulted from the proximity to the EU and hence, potentially facilitated the inflow of foreign capital, we select five characteristic local risk variables that we interact with a dummy variable indicating countries' future EU accession. By supplementing these specifications with a comprehensive number of international controls, we set the results in perspective to international developments present in the sample period. Finally, we disaggregate the total liabilities in different types of capital to examine whether this effect is consistent across different liability classes.

The results indicate that the liability sides of international investment positions in potential NMS have expanded due to a perception of increased macroeconomic stability among international investors that arises from the newly gained proximity to the EU. Although not all macroeconomic risk variables exhibit this effect, government debt levels, short-term interest rates, and bilateral exchange rate volatility towards the Euro show it. All of these variables seem to be significantly less important in recent years when international investors were considering an investment in NMS than prior to the EU accession process. Nevertheless, our results suggest that the EU accession is not the only driving force at work – also global factors, such as high levels of international risk appetite and ample liquidity in other parts of the world explain a significant share in the build-up of external liabilities in NMS. This implies that notwithstanding of a country's effort to improve the quality of its local institutions and the enforcement of prudent macroeconomic policies, its capital supply will still be dependent on the global environment and the actions taken in other parts of the world. Finally, a disaggregation of total liabilities in FDI, debt, and portfolio equity flows, suggests that the observed effect of macroeconomic stability gains is largely associated with debt and portfolio flows and less with long-term FDI flows that might be subject to other determinants.

An extension of our research could lie in a more direct focus on the results of the EU integration process such as an increase in the quality of local institution and the adaption of EU policies. Instead of the de jure measures of accession treaties signed, one could use de facto measures that indicate representative policy changes. Hence, on the operative level, it could be interesting to see how an interaction term between local risk variables and an index of institutional quality or competition policy would perform. Furthermore, extending the country sample to other transition countries would increase the variation in the variables and most likely benefiting the significance of the results.

A APPENDIX

Table A.1: *Robustness Check I: PCSE Method (comparable results)*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DTL	DTL	DTL	DTL	DTL	DTL	DTL	DTL
L.DGDPR	-0.0128 (0.009)	-0.0138** (0.007)	-0.0184* (0.010)	-0.0128** (0.006)	-0.0101 (0.009)	-0.00502 (0.006)	-0.00890 (0.009)	-0.00893 (0.007)
L.DCPI	0.0120* (0.006)	0.0110** (0.004)	0.0122** (0.006)	0.0139*** (0.004)	0.0130** (0.005)	0.0140*** (0.004)	0.0124** (0.006)	0.0115*** (0.004)
L.DGOVBD	0.0104* (0.005)	0.0110** (0.005)	0.00929* (0.006)	0.0110** (0.005)	0.00946* (0.006)	0.0112** (0.005)	0.00928* (0.005)	0.0103** (0.005)
L.DDEBT	-0.00381*** (0.001)	-0.00386*** (0.001)	-0.00408*** (0.001)	-0.00464*** (0.001)	-0.00406*** (0.001)	-0.00458*** (0.001)	-0.00366*** (0.001)	-0.00373*** (0.001)
L.DSDEUR	-0.00791 (0.014)		-0.0204 (0.014)		-0.0204 (0.014)		-0.00496 (0.014)	
L.DDEPO	-0.00939* (0.005)	-0.00849** (0.004)	-0.00734 (0.005)	-0.00763** (0.004)	-0.00808* (0.005)	-0.00777** (0.004)	-0.0102** (0.005)	-0.00889** (0.004)
INTASSOC_GDP1	0.00714 (0.009)	0.00789 (0.006)	0.0140 (0.010)	0.00818 (0.006)	0.00667 (0.010)	0.00117 (0.006)	0.00132 (0.009)	0.00179 (0.006)
INTASSOC_INFL1	-0.0137** (0.006)	-0.0129*** (0.004)	-0.0144** (0.006)	-0.0160*** (0.004)	-0.0149*** (0.005)	-0.0160*** (0.004)	-0.0143*** (0.006)	-0.0135*** (0.004)
INTASSOC_BDEF1	6.93e-06 (0.007)	-0.00212 (0.006)	-0.000313 (0.007)	-0.00300 (0.007)	0.000566 (0.007)	-0.00289 (0.007)	0.00162 (0.007)	-0.000694 (0.006)
INTASSOC_DEBT1	0.00283** (0.001)	0.00278*** (0.001)	0.00294** (0.001)	0.00349*** (0.001)	0.00289** (0.001)	0.00338*** (0.001)	0.00264** (0.001)	0.00267*** (0.001)
INTASSOC_IRSR1	0.0108** (0.005)	0.00997** (0.004)	0.0109** (0.005)	0.0111*** (0.004)	0.0121** (0.005)	0.0119*** (0.004)	0.0122** (0.005)	0.0112*** (0.004)
INTASSOC_ERVX1	0.00395 (0.014)		0.0188 (0.015)		0.0182 (0.014)		0.00271 (0.014)	
DEMBI			-0.0874*** (0.020)	-0.0841*** (0.018)	-0.0779*** (0.019)	-0.0736*** (0.018)	-0.0199 (0.025)	-0.0205 (0.024)
DGRUS			0.0274*** (0.009)	0.0261*** (0.009)				
DM2US			1.063 (0.673)	0.874 (0.663)				
DCPIUS			-0.0291* (0.016)	-0.0372** (0.016)				
DM2EU					-0.0907 (0.127)	-0.0573 (0.123)		
DGREU					0.00593 (0.016)	0.00267 (0.015)		
DCPIEU					-0.0478* (0.027)	-0.0500* (0.027)		
DMTW							4.586*** (1.328)	4.298*** (1.317)
DGDPW							0.0159 (0.013)	0.0138 (0.013)
DCPIW							0.00806 (0.016)	0.00286 (0.016)
Constant	0.0984 (0.066)	0.124** (0.060)	0.628*** (0.161)	0.662*** (0.138)	0.701*** (0.172)	0.705*** (0.162)	-0.228 (0.265)	-0.165 (0.257)
Country dummies	yes	yes	yes	yes	yes	yes	yes	yes
Time dummies	yes	yes	no	no	no	no	no	no
Observations	118	125	118	125	118	125	118	125
R ²	0.585	0.563	0.471	0.451	0.468	0.433	0.509	0.470
chi2	161.4	157.2	95.18	97.92	96.37	91.35	118.9	107.5

Note: Robust standard errors in parentheses. *DTL* – Total liabilities. ***, ** and * denote significance at the 1, 5 and 10% levels respectively. All computations done using commands for Stata/SE 10.1. Source: Own calculations.

Table A.2: Robustness Check II: PCSE Method (not comparable results)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DTL	DTL	DTL	DTL	DTL	DTL	DTL	DTL
L.DGDPR	-0.0128 (0.009)	-0.0138** (0.006)	-0.0184** (0.008)	-0.0128*** (0.005)	-0.0101 (0.008)	-0.00502 (0.005)	-0.00890 (0.008)	-0.00893 (0.006)
L.DCPI	0.0120*** (0.004)	0.0110*** (0.004)	0.0122*** (0.003)	0.0139*** (0.003)	0.0130*** (0.003)	0.0140*** (0.004)	0.0124*** (0.003)	0.0115*** (0.004)
L.DGOVBD	0.0104* (0.006)	0.0110** (0.005)	0.00929* (0.006)	0.0110** (0.005)	0.00946* (0.005)	0.0112** (0.005)	0.00928* (0.006)	0.0103** (0.005)
L.DDEBT	-0.00381*** (0.001)	-0.00386*** (0.001)	-0.00408*** (0.001)	-0.00464*** (0.001)	-0.00406*** (0.001)	-0.00458*** (0.001)	-0.00366*** (0.001)	-0.00373*** (0.001)
L.DSDEUR	-0.00791 (0.015)		-0.0204 (0.014)		-0.0204 (0.013)		-0.00496 (0.013)	
L.DDEPO	-0.00939*** (0.003)	-0.00849*** (0.003)	-0.00734** (0.003)	-0.00763** (0.003)	-0.00808*** (0.003)	-0.00777** (0.003)	-0.0102*** (0.003)	-0.00889*** (0.003)
INTASSOC_GDP1	0.00714 (0.010)	0.00789 (0.005)	0.0140 (0.009)	0.00818* (0.005)	0.00667 (0.009)	0.00117 (0.005)	0.00132 (0.008)	0.00179 (0.005)
INTASSOC_INFL1	-0.0137*** (0.004)	-0.0129*** (0.004)	-0.0144*** (0.003)	-0.0160*** (0.003)	-0.0149*** (0.003)	-0.0160*** (0.004)	-0.0143*** (0.003)	-0.0135*** (0.004)
INTASSOC_BDEF1	6.93e-06 (0.006)	-0.00212 (0.006)	-0.000313 (0.006)	-0.00300 (0.006)	0.000566 (0.006)	-0.00289 (0.006)	0.00162 (0.006)	-0.000694 (0.006)
INTASSOC_DEBT1	0.00283*** (0.001)	0.00278*** (0.001)	0.00294*** (0.001)	0.00349*** (0.001)	0.00289*** (0.001)	0.00338*** (0.001)	0.00264*** (0.001)	0.00267*** (0.001)
INTASSOC_IRSR1	0.0108*** (0.004)	0.00997*** (0.004)	0.0109*** (0.003)	0.0111*** (0.003)	0.0121*** (0.003)	0.0119*** (0.003)	0.0122*** (0.003)	0.0112*** (0.004)
INTASSOC_ERVX1	0.00395 (0.015)		0.0188 (0.014)		0.0182 (0.013)		0.00271 (0.013)	
DEMBI			-0.0874*** (0.011)	-0.0841*** (0.024)	-0.0779*** (0.010)	-0.0736*** (0.025)	-0.0199 (0.017)	-0.0205 (0.034)
DGRUS			0.0274*** (0.006)	0.0261** (0.012)				
DM2US			1.063*** (0.399)	0.874 (0.920)				
DCPIUS			-0.0291*** (0.011)	-0.0372 (0.023)				
DM2EU					-0.0907 (0.056)	-0.0573 (0.185)		
DGREU					0.00593 (0.007)	0.00267 (0.023)		
DCPIEU					-0.0478*** (0.014)	-0.0500 (0.036)		
DMTW							4.586*** (0.750)	4.298** (1.923)
DGDPW							0.0159** (0.007)	0.0138 (0.019)
DCPIW							0.00806 (0.011)	0.00286 (0.022)
Constant	0.0984** (0.047)	0.124** (0.050)	0.628*** (0.111)	0.662*** (0.182)	0.701*** (0.094)	0.705*** (0.222)	-0.228 (0.172)	-0.165 (0.364)
Country dummies	yes	yes	yes	yes	yes	yes	yes	yes
Time dummies	yes	yes	no	no	no	no	no	no
Observations	118	125	118	125	118	125	118	125
R ²	0.585	0.563	0.471	0.451	0.468	0.433	0.509	0.470
chi2	3.333e+09	1.565e+09	4191	2352	292239	944.1	40014	779.1

Note: Robust standard errors in parentheses. *DTL* – Total liabilities. ***, ** and * denote significance at the 1, 5 and 10% levels respectively. All computations done using commands for Stata/SE 10.1. Source: Own calculations.

A.1 Definition of Capital Flows

To obtain a better understanding which asset classes are included in the different functional categories, we provide here the official definition from the IMF, laid down in the (preliminary) Sixth Edition of the Balance of Payment Manual (BOPM), see IMF (2008):

1. **Foreign direct investment:** *‘Direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise that is resident in another economy.’* According to the BOPM definition, there are two types of direct investment relationships: An immediate one that occurs, when a direct investor owns equity that guarantees him a voting power in the direct investment enterprise of 10 percent or higher. And an indirect relationship that arises via the direct investment in another enterprise which itself owns voting power and hence, puts the investor in the position to exercise control over the targeted enterprise.⁴⁰
2. **Portfolio Investments:** *‘Portfolio investment is defined as cross-border transactions and positions involving debt or equity securities, other than those included in direct investment or reserve assets.’*The special characteristics of securities that they inhabit the *‘feature of negotiability’*. This means that they are designed at is, as readily capable of being transferred from one unit to another unit by delivery or endorsement. Securities are usually traded over the counter.⁴¹
3. **Financial Derivatives** (Officially: Financial Derivatives and Employee Stock Options (other than Reserves)): *‘A financial derivative contract is a financial instrument that is linked to another specific financial instrument or indicator or commodity and through which specific financial risks (such as interest rate risk, foreign exchange risk, equity and commodity price risks, credit risk, etc.) can be traded in their own right in financial markets.* Prominent examples for financial derivatives are stock are stock options, forward-type contracts, and employee stock options.⁴²
4. **Other Investments:** *‘Other investment is a residual category that includes positions and transactions other than those included in direct investment, portfolio investment, financial derivatives and employee stock options, and reserve assets.’* Most prominent asset classes included here are: Currency holdings and deposits, loans (including use of credit and loans from the IMF), and trade credits.⁴³

The IMF classification includes as well Reserves as a fifth functional category of capital flows and stocks. The BOPM defines reserve assets as *‘Reserve assets are those external assets that are readily available to and controlled by monetary authorities for meeting balance of payments financing needs, for intervention in exchange markets to affect the currency exchange rate, and for other related purposes (such as maintaining confidence in the currency and the economy, and serving as a basis for foreign borrowing)’*.⁴⁴ However, gold reserves are excluded from these calculations.

⁴⁰BOPM, p. 145ff.

⁴¹BOPM, p. 114 and 158f.

⁴²BOPM, p. 123 and 159.

⁴³BOPM, p. 160f.

⁴⁴BOPM, p. 160f.

A.2 Literature review

Study	Countries	Time period	Method	Dependent variable	Explanatory variables	Main findings
Ahmed <i>et al.</i> (2005)	81 developing countries	1975–2002	Dynamic panel GMM	FDI and portfolio flows (PF)	Macroeconomic performance, quality of institutions, investment environment (openness), volatility (exchange rate and inflation), capital controls, infrastructure and resources, financial development, global factors	Better institutions and foreign rates affect FDI and PF; volatility of exchange rate deters FDI, no effect on PF;
Alfaro <i>et al.</i> (2005)	47 developed and developing countries	1970–2000	Panel OLS	FDI and PF, volatility	Bank credit, capital controls, corporate taxes, distance, GDP per capita, human capital, legal origin, CPI, CPI volatility, range of institutional factors	Significant: Institutions, human capital, distance; insignificant: CPI volatility, controls, bank credit sovereign risk and credit;
Buch and Piazzolo (2001)	10 reporting and 10 host countries	1999	Cross section OLS (gravity model)	FDI, PF	Market size, GDP per capita, institutional restrictions, EU dummy, M2, distance, foreign trade links (import/GDP), financial center	Positive effects from EU membership
Claessens <i>et al.</i> (1998)	21 transition economies (NMS and CIS countries)	1992–1996	OLS	FDI and PF	Pull-push approach: reform index, EU accession, lagged variables (reserves, fiscal balance, private savings, official flows), domestic credit, LIBOR, OECD growth rates	Fundamental reforms and creditworthiness most important. effect of EU accession on FDI, LIBOR and OECD growth rates not significant
Culha (2006)	Turkey	1992–2005 (quarterly data)	SVAR	PF and short-term flows	Push: US 3 month T-bill rate, US industrial production index, pull: real IR on Turkish T-bills, Istanbul stock exchange price index, budget balance, CA balance	Pull factors are dominant

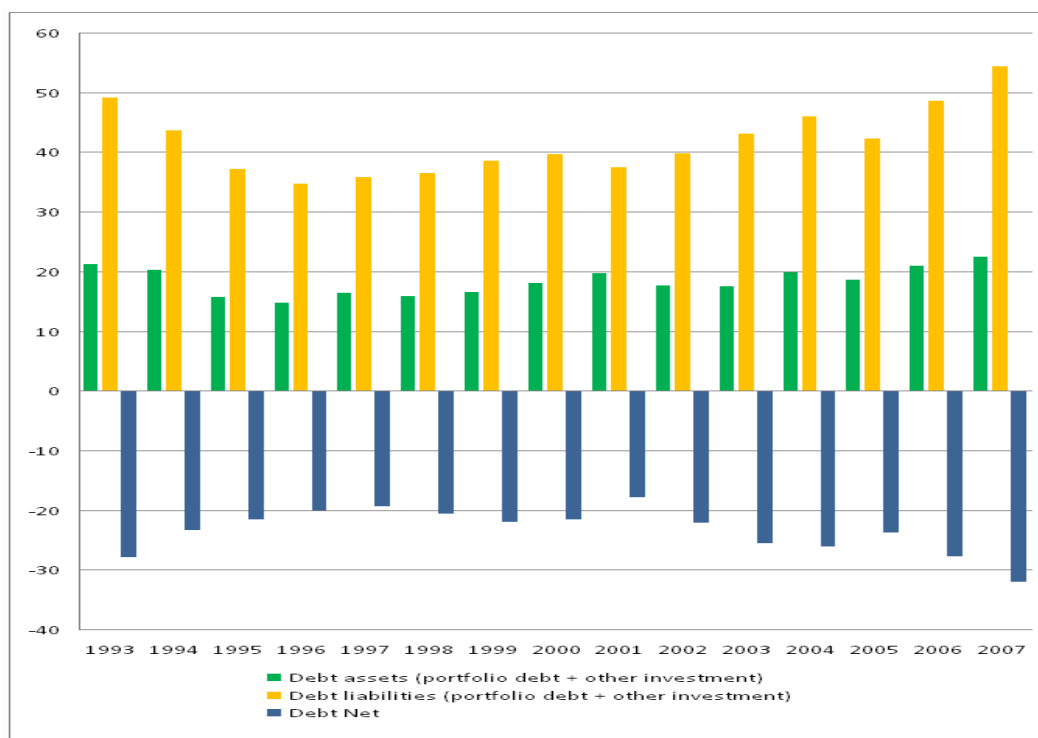
Study	Countries	Time period	Method	Dependent variable	Explanatory variables	Main findings
Fernandez-Arias (1996)	13 middle income countries	1990–1993 (quarterly data)	Panel OLS	PF/GNP	Prices, interest rates, country creditworthiness	Push factors are dominant
Garibaldi <i>et al.</i> (2002)	26 transition economies (NMS and CIS countries)	1990–1999	Dynamic panel	FDI, PF	<i>FDI</i> : competitiveness, trade liberalization, restrictions to FDI, methods of privatization, <i>PF</i> : development of security market, restrictions on PF, treasury bill rates, <i>General</i> : inflation, fiscal balance, growth, liberalization, privatization, institutions, initial conditions, country risk, US 3 months T-bills rate (opportunity costs)	FDI driven by a set of standard economic fundamentals, difficulties with PF (financial market infrastructure and protection of property rights work)
Gibson and Tsakalotos (2004)	new EU Member States (excluding Cyprus, Malta and Slovenia)	1991–2001 (quarterly data)	Unbalanced panel OLS, FGLS, hazard analysis	Private flows excluding FDI	‘domestic factors’ are inflation rates, GDP growth rates (growth rates of industrial production), interest rate differentials, growth of money supply and unit labour costs, dummies for exchange rate regime and financial contagion (Asian financial crisis and Russian financial crisis)	impact of domestic variables is rather weak (GDP growth and inflation rate significant; unit labour costs and income growth not significant). Some exchange rate regimes more credible for attracting large capital flows (a currency board or a currency peg). Dummies: the dummy for the Russian crisis significant and negative (the highest impact on Estonia and Hungary), the coefficient for Asian crisis not significant. Similar results found for financial flows including FDI flows.

Study	Countries	Time period	Method	Dependent variable	Explanatory variables	Main findings
						Estimates of hazard function – both determinants of a financial crisis are important (domestic factors and contagion), especially due to links between countries in a region and due to classification of these countries as emerging markets.
IMF (2007)	15 developed and 41 emerging countries (12 from Asia, 20 from Europe, Middle East and Africa, nine from Latin America)	1977–2006 (sub-samples: full time span and reduced time span 1998–2006)	Unbalanced panel OLS (FE), GMM	FDI, PF and other flows, volatility of capital inflows	<i>Equity market liquidity and depth</i> (market turnover and capitalization), <i>institutional quality</i> (financial openness, corporate governance quality, accounting standards), <i>lagged GDP growth</i> (a proxy for domestic growth expectations), <i>real interest rate spread</i> (a proxy for risk premia and relative liquidity conditions: domestic one year T-Bill rate and the world rate calculated as real GDP-weighted average of country's one-year rate), <i>global liquidity conditions</i> (changes in the sum of money supply (M1) and official reserves of the Euro area, Japan and the US)	In general: increase in flows is influenced by equity market liquidity; FDI and PF also increase with more financial openness; Capital volatility reduced by more financial openness and by increased global liquidity;

Study	Countries	Time period	Method	Dependent variable	Explanatory variables	Main findings
Portes and Rey (2005)	14 developed countries	1989–1996	Panel OLS (gravity model)	PF	Market capitalization, distance, call traffic, trading hours overlap, degree of insider trading, sophistication of financial markets, covariance of stock market returns	Market size, efficiency of transaction technology and distance
Ralhan (2006)	Australia, Indonesia, India, Lat. Am. Countries (Argentina, Brazil, Chile, Colombia and Mexico)	1970–1995	Non-linear SUR	Capital flows	LIBOR, CPI, total external debt, GDP, gross fiscal deficit, gross foreign exchange reserves, degree of openness (EX + IM / GDP)	Economic fundamentals (GDP, foreign reserves)
Taylor and Sarno (1997)	US flows to Latin America and Asia	1988–1992	PF	SUR	Pull: repatriation of dividends and capital, rates of return, credit ratings and secondary market prices of sovereign debt; push: interest rates and growth abroad	US rates affect bond inflows

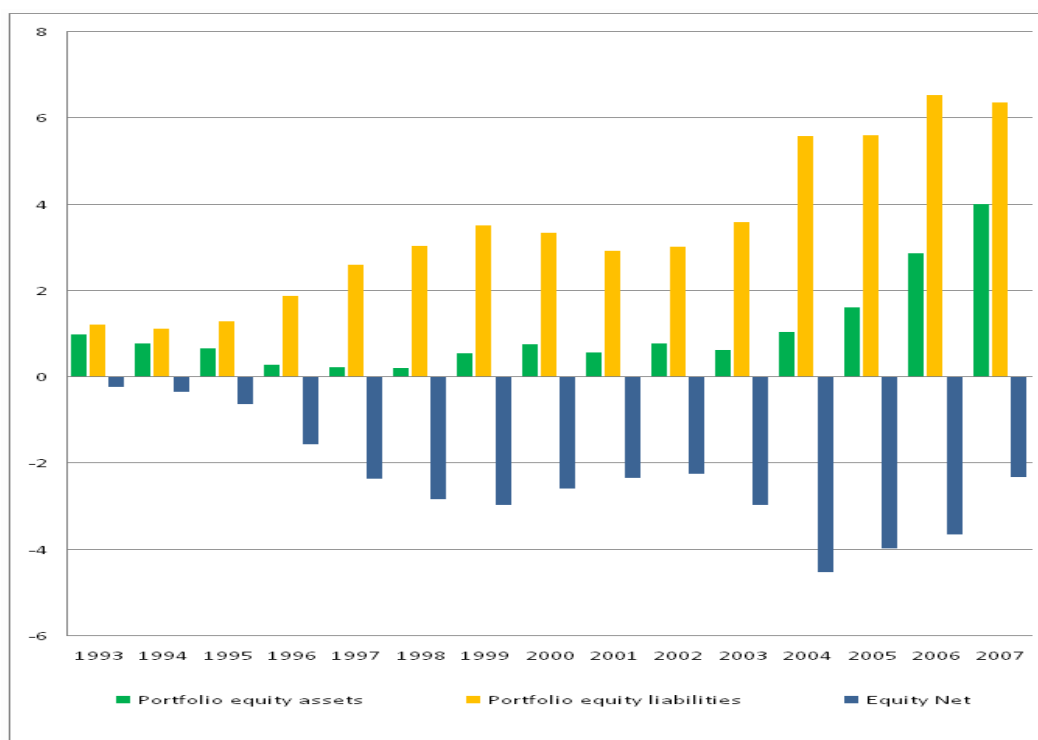
A.3 Financial stocks – figures

Figure A.1: Capital stocks in the CEE region – debt

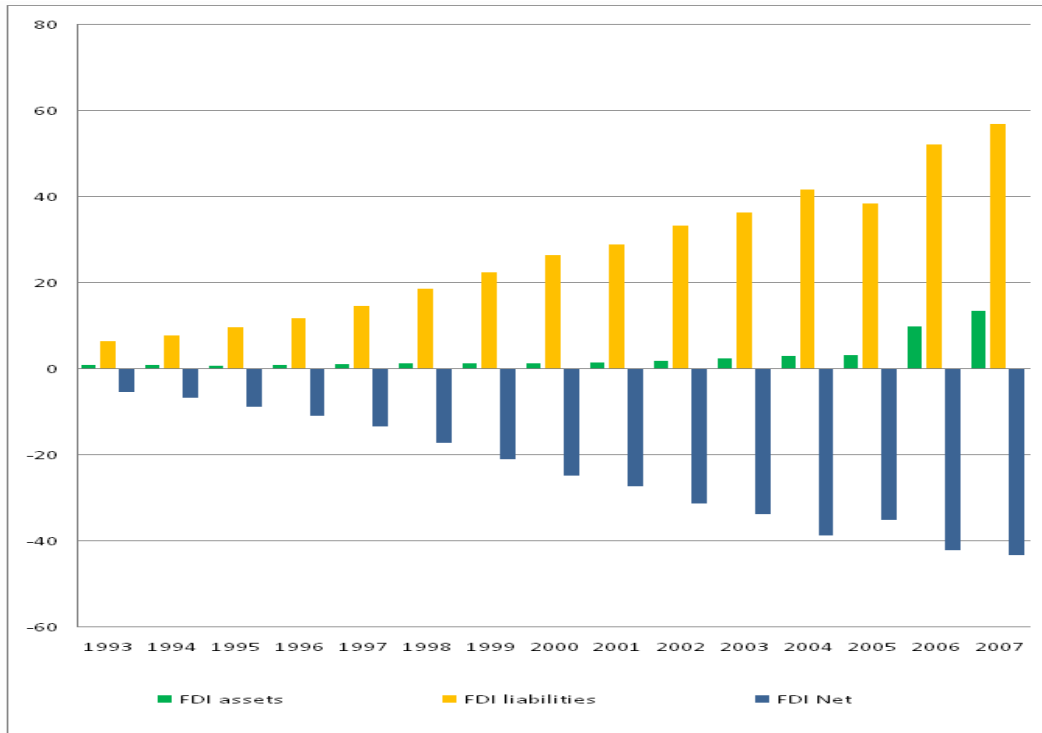


Note: Composition of flows – see text. Source: IFS IMF (2009), Lane and Milesi-Ferretti (2007), own calculations.

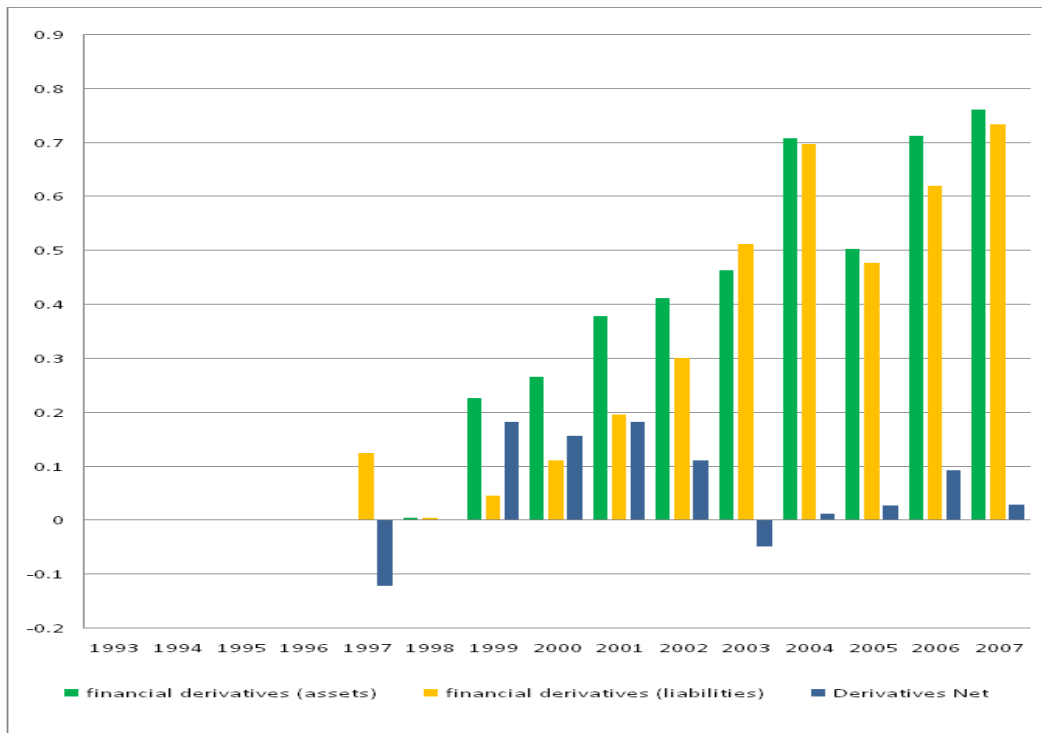
Figure A.2: Capital stocks in the CEE region – equity



Note: Composition of flows – see text. Source: IFS IMF (2009), Lane and Milesi-Ferretti (2007), own calculations.

Figure A.3: *Capital stocks in the CEE region – FDI*

Note: Composition of flows – see text. Source: IFS IMF (2009), Lane and Milesi-Ferretti (2007), own calculations.

Figure A.4: *Capital stocks in the CEE region financial derivatives)*

Note: Composition of flows – see text. Source: IFS IMF (2009), Lane and Milesi-Ferretti (2007), own calculations.

A.4 Data sources

Variable	Transformation	Description Unit	Construction	Source	
DFDA	log diff.	FDI Assets	Percent of GDP	IFS data, LMF 2007, own calc.	IFS/LMF
DFDL	log diff.	FDI Liabilities	Percent of GDP	IFS data, LMF 2007, own calc.	IFS/LMF
DFDN	saldo	FDI Net Stocks	Percent of GDP	Diff. of (1) and (2)	own calc.
DEQA	log diff.	Portfolio Equity Assets	Percent of GDP	IFS data, LMF 2007, own calc.	IFS
DEQL	log diff.	Portfolio Equity Liabilities	Percent of GDP	IFS data, LMF 2007, own calc.	IFS
DEQN	saldo	Portfolio Equity Net Stocks	Percent of GDP	Diff. of (4) and (5)	own calc.
ifsdebta		Debt Assets after IFS defin.	Mio. of USD	preliminary variable	IFS
ifsdebtl		Debt Liabilities after IFS defin.	Mio. of USD	preliminary variable	IFS
ifsothera		Other Assets after IFS defin.	Mio. of USD	preliminary variable	IFS
ifsotherl		Other Liabilities after IFS defin.	Mio. of USD	preliminary variable	IFS
DDA	log diff.	Debt Assets	Percent of GDP	'sum of IFS category' 'debt' and 'other', own calc.'	own calc.
DDL	log diff.	Debt Liabilities	Percent of GDP	'sum of IFS category' 'debt' and 'other', own calc.'	own calc.
DDN	saldo	Debt Stocks	Percent of GDP	diff. of (11) and (12), own. calc.	IFS
DTA	log diff.	Total Assets	Percent of GDP	sum of (1), (4), (11) + total reserves – gold, own. calc.	IFS
DTL	log diff.	Total Liabilities	Percent of GDP	sum of (2), (5), (12), own. calc.	IFS
DTN	saldo	Total Net Stocks	Percent of GDP	diff. of (14) and (15), own. calc.	IFS
DEMBI	log	Emerging Market Bond Index Global	Index	annual average, own. calc.	JP Morgan
DCPIW	log diff.	PPP-weighted world price index	Index	PPP weighted growth rate index for 47 countries	IFW
DGDPW	log diff.	PPP-weighted world GDP index	Index	PPP weighted growth rate index for 47 countries	IFW
DMTW	log diff.	PPP-weighted world M2 index	Index	PPP weighted growth rate index for 47 countries	IFW
DM2US	log diff.	US-Money Aggregate M2	Million USD	converted in Mio.	IFS
DCPIUS	log diff.	CPI Level USA	Index	no treatment	IFS
DGRUS	log diff.	Real US-GDP	Index	no treatment	IFS
DSREU	-	Short Term Interest Rates of EU 15	Percent	no treatment	AMECO
DCPIEU	log diff.	CPI in Levels of EU 15	Index	no treatment	AMECO
DGREU	log diff.	Real GDP of EU 15	Index	no treatment	AMECO
gdpnom_eu		Nominal GDP of EU 15	Mio. Euro	no treatment	AMECO
DM2EU15	log diff.	Euro Area Money Supply M2 + UK(M4), SW(M3), DK(M2)	Million USD	own calc.	IFS
DDEPO	-	Deposit interest rates	Percent	no treatment	IFS
DCPI	log	CPI level data	Index	no treatment	IFS
DERUSD	log	Bilateral Exchange rates: NCU for 1 USD	NCU	'basis for all local' % of GDP values'	IFS
gdpnomusd_loc		Nominal GDP	NCU	'basis for all local' % of GDP values'	IFS
DGDPR	log diff.	Real GDP	Index	no treatment	IFS
DGOVB	-	Government Budget Balance	Percent of GDP	no treatment	EBRD
DDEBT	-	Government Debt	Percent of GDP	no treatment	EBRD

Source: AMECO – AMECO database of the European Commission, BIS – Bank of International Settlements, EBRD – European Bank for Reconstruction and Development, IFS – International Financial Statistics, IMF, IFW – Kiel Institute for the World Economy

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