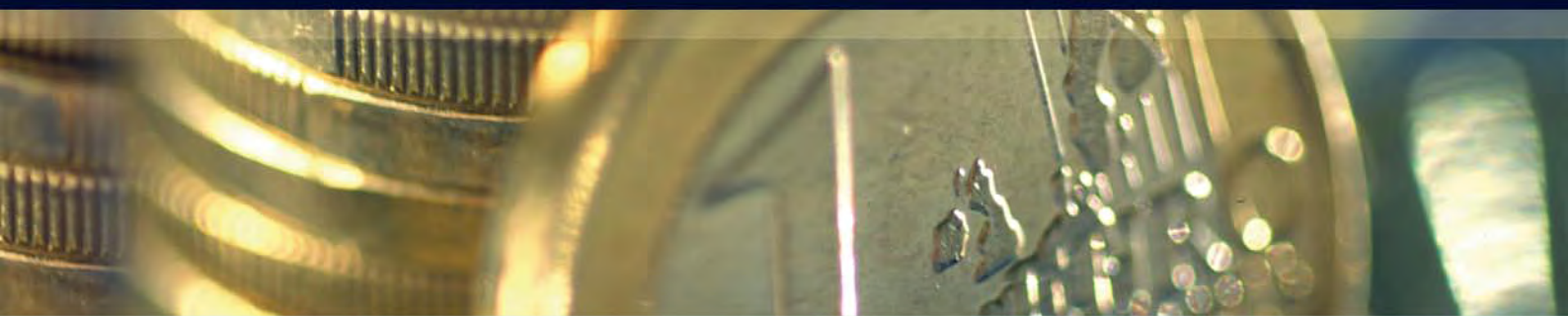


EUROPEAN ECONOMY

Economic Papers 425 | September 2010



Determinants of Capital Flows to the New EU Member States Before and During the Financial Crisis

Anton Jevčák, Ralph Setzer and Massimo Suardi

Economic Papers are written by the Staff of the Directorate-General for Economic and Financial Affairs, or by experts working in association with them. The Papers are intended to increase awareness of the technical work being done by staff and to seek comments and suggestions for further analysis. The views expressed are the author's alone and do not necessarily correspond to those of the European Commission. Comments and enquiries should be addressed to:

European Commission
Directorate-General for Economic and Financial Affairs
Publications
B-1049 Brussels
Belgium
E-mail: Ecfinfo@ec.europa.eu

This paper exists in English only and can be downloaded from the website
ec.europa.eu/economy_finance/publications

A great deal of additional information is available on the Internet. It can be accessed through the Europa server (ec.europa.eu)

KC-AI-10-425-EN-N

ISSN 1725-3187
ISBN 978-92-79-14911-5
doi 10.2765/44034

© European Union, 2010
Reproduction is authorised provided the source is acknowledged.

Determinants of Capital Flows To the New EU Member States Before and During the Financial Crisis

Anton Jevčák, Ralph Setzer, Massimo Suardi¹

Abstract

This paper looks at capital flows to the new EU Member States from Central and Eastern Europe (NMS10) during the last decade. Firstly, it analyses the role of various types of foreign capital flows – direct investment, portfolio investment, financial derivatives and other types of flows (mainly bank loans) – over time and across countries. Secondly, it explores the determinants of capital flows to the NMS10, distinguishing between factors relating to the external economic and financial environment ("push factors") and factors specific to the recipient NMS ("pull factors"). The econometric analysis shows that external determinants have been important in explaining capital flows to the NMS10. In particular, we find a strong role for euro area interest rates, business cycle, and risk sentiment. At the same time, the ability of the NMS10 to attract foreign capital has been also influenced by domestic economic and financial conditions and policies. Risk sentiment appears to be a robust driver for both the common component of aggregate capital flows to NMS10 and flows to individual countries. Overall, these results suggest a need for caution on the part of NMS in borrowing too heavily during periods of favourable external financial conditions. As the financial crisis has shown, this increases their vulnerability to a sudden reversal in the availability of financing, which can be largely driven by factors beyond their control.

JEL: F32, F34, E52

Keywords: capital flows, push and pull factors, NMS10, principal components

¹ European Commission, Economic and Financial Affairs, email: anton.jevcak@ec.europa.eu, ralph.setzer@ec.europa.eu, massimo.suardi@ec.europa.eu. The views expressed in this paper represent exclusively the positions of the authors and do not necessarily correspond to those of the European Commission. We thank Servaas Deroose, Paul Kutos, Alessandro Turrini and participants at the Annual meeting of the Austrian Economic Association, Vienna, May 14-15 for helpful comments, Gerda Symens for excellent data research and Milda Valentinaite and Tatiana Fic for valuable data on house prices.

Contents

- 1. Introduction 3**
- 2. Historical evolution and composition of capital flows to the NMS10..... 5**
- 3. Capital flows during the financial crisis period..... 9**
- 4. Determinants of capital flows..... 12**
 - 4.1 External versus internal determinants 12
 - 4.2 External determinants of capital flows 15
 - 4.3 Country-specific determinants 23
- 5. Conclusion..... 26**
- References 27**
- Annex: Country specific components and data sources 29**

1. Introduction

This paper analyses the characteristics and determinants of international capital flows to the EU New Member States from central and eastern Europe (NMS10). All NMS10 recorded large private capital inflows from the late 1990s until 2007. Even during the period from 2001 to 2003, when financial and economic uncertainty was elevated due to a number of shocks such as the Argentina crisis and the burst of the tech bubble, the flows of foreign capital were not severely affected. The global financial crisis presented a clear turning point. Since the end of 2007 the NMS10 have been experiencing an unwinding of capital flows, a process which was exacerbated when the financial crisis intensified in summer 2008. Foreign capital inflows to the NMS10 even turned negative in Q4-2008 and Q1-2009.

During the boom phase, the large foreign capital inflows were, to a large extent, considered a natural part of the NMS10's catching-up process with the euro area. Large capital inflows into the EU NMS were in line with the neoclassical growth model. In contrast to other world regions, within the EU, capital flew from the advanced to the catching-up economies, attracted by higher returns on capital.² Private and public entities in the converging EU economies borrowed against expected future increases in their income in order to intertemporally smooth out consumption and investment. The prospect of EU accession and, later, actual EU membership and the prospect of euro area membership fostered a rapid integration into the developed EU financial market, including by a substantial presence of foreign-owned banks in the region (Herrmann and Winkler 2008).

Nevertheless, even before the financial crisis, doubts existed regarding the sustainability of such massive foreign capital inflows (Lane and Milesi-Ferretti 2007). Persistent large current account deficits and negative foreign asset positions in some countries appeared increasingly to be associated to domestic consumption and investment imbalances, which made these countries extremely vulnerable to foreign capital flow reversals. Moreover, a large part of foreign-capital-financed investment was directed towards the non-tradable sector, implying a lower contribution to productivity growth and prospective export potential. As net external borrowing by the NMS10 reached double digit figures (in relation to GDP) in 2007, the ability to absorb foreign capital inflows turned into a major policy concern.

These developments raise important questions concerning the composition and determinants of international capital flows. The composition of capital flows is crucial as it influences the degree of reversibility of foreign capital inflows. The literature predominantly identified FDI and portfolio equity as more stable sources of foreign funding. By contrast, portfolio debt and bank lending are generally considered more prone to sudden reversals (Claessens et al. 1995, Levchenko and Mauro 2007). While portfolio debt seems to recover quickly, bank lending flows remain depressed for several years after a crisis (Chuhan et al. 1996).

The evidence of substantial co-movement in capital flows to the NMS10 over time indicates that they are not only driven by country-specific factors but also by global driving forces. Starting from the seminal paper by Calvo, Leiderman and Reinhart (1993), the determinants of capital flows have been extensively analyzed in the literature (see Kribaeva and Razin 2009 for a recent survey). While earlier studies focused on foreign direct investment, attention has shifted more recently also on cross-border international bank lending (see, e.g. Herrmann and Michaljek 2010). A number of studies distinguish between push and pull factors. Push factors are external determinants of capital flows such as interest rates and economic activity in

² E.g., emerging Asia countries have recorded large capital outflows and substantial current account surpluses, partly as a result of underdeveloped financial markets (see e.g., Herrmann and Winkler 2008).

lending economies, which alter the relative attractiveness of investments in borrowing countries. Pull factors are domestic determinants of foreign capital inflows. They include both economic factors - such as domestic interest rates, productivity and the rate of economic growth - as well as institutional factors - e.g. the extent of capital account liberalization, protection of property rights and/or enforcement of law (see Agénor, 1998, for a theoretical framework to assess the role of push and pull factors for capital flows in a small open economy). Empirically, the role of push and pull factors for capital flows has been analyzed mainly with reference to the Asian or Latin American financial crises (Montiel and Reinhart 1999; Mody et al. 2001; Ying and Kim 2001).

The distinction between domestic and global factors has important policy implications. If international capital flows react mainly to global factors, the recipient countries are vulnerable to global shocks, even if domestic policymakers maintain prudent macro-policies. By contrast, if capital flows are predominantly driven by domestic factors, policymakers are better able to affect them.

This paper tries to unite these aspects with a descriptive investigation and an empirical analysis of the recent experience of the NMS10. Specifically, the paper analyzes how the role played by various types of capital flows – direct investment, portfolio investment, financial derivatives and other investments – has varied over time and across countries. In a further step, we separate the common component of capital flows – which, broadly speaking, reflects external conditions or "contagion" – from its country-specific component, which should be related to country's economic fundamentals. The common factor is then regressed on a euro area risk indicator and euro area macroeconomic fundamentals. The country factor is explained by country-specific variables, including domestic economic growth, interest rates, house prices and – as an innovation to the literature - country-specific risk. Throughout the paper, the focus is on net flows on the liability side of the balance of payments as the focus is on determinants of foreign capital inflows and not on domestic residents' decisions to invest abroad.

Our analysis derives five main findings: First, there seems to be no clear correlation between the balance in the aggregate international investment position (IIP) and the composition of gross foreign liabilities. Second, during the recent financial market turbulences foreign capital outflows from the NMS10 were initially driven by portfolio investment and financial derivatives, with 'other investment' outflows (including interbank lending) materialising at a later stage. However, in the two countries receiving international financial assistance - Latvia and Romania – as well as in Lithuania and Slovenia, other investment flows represented the dominant channel of net foreign capital outflows throughout the whole crisis period. Third, external factors play a large role in explaining foreign capital flows, although the responsiveness of capital flows to global factors varies across recipient countries. External factors are particularly important in case of other investment flows. Fourth, euro area macroeconomic and financial conditions have a significant impact on capital flows to the NMS10. Lower interest rates and higher economic activity in the euro area seem to stimulate capital flows to the NMS10 while higher risk sentiment depresses capital flows. Fifth, risk aversion in particular seems to be a robust driver of capital flows. Investment flows to the NMS10 react significantly not only to risk sentiment in the euro area but also to country-specific risk. At the same time, the ability of the NMS10 to attract foreign capital has been influenced also by other domestic economic and financial conditions and policies, represented in the estimation by short-term interest rates, GDP and house price growth.

The remainder of the paper is organised as follows. Section 2 presents some stylised facts about the evolution of foreign capital inflows and net foreign liabilities since 1999. Section 3 has a closer look at capital flows during the crisis period. Section 4 provides a quantitative

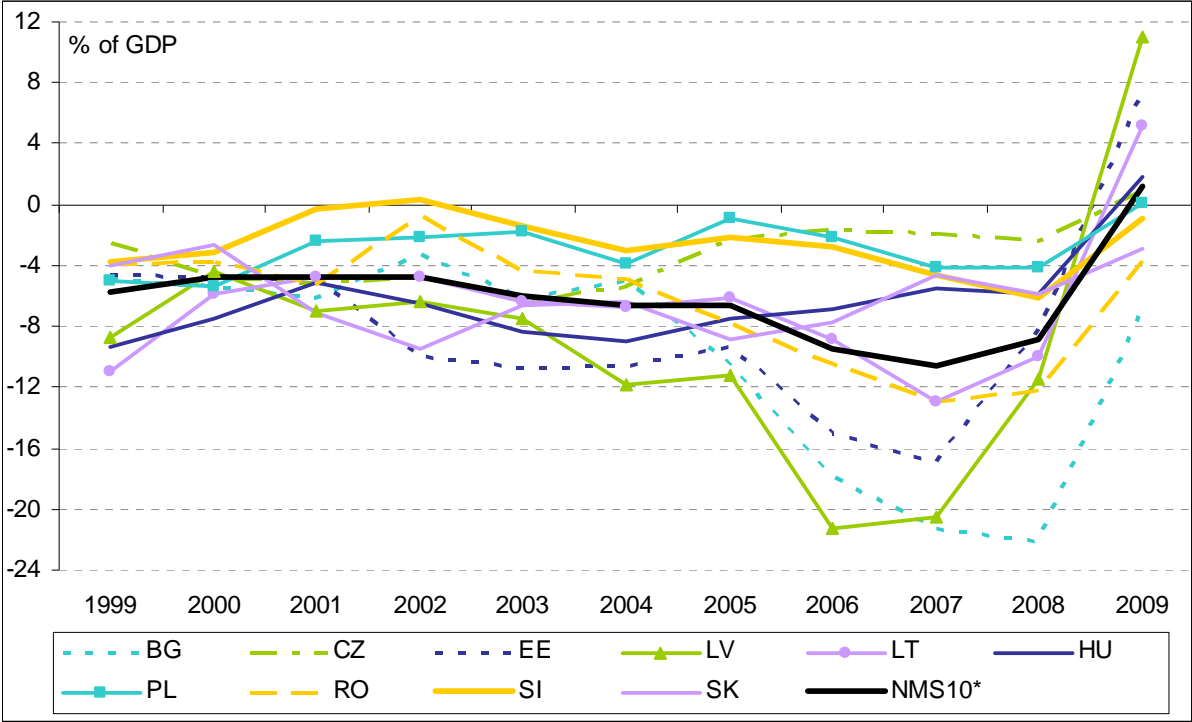
assessment of the role of external and internal factors for capital inflows to the NMS countries. In this section we also try to identify factors that are relevant for the different types of capital flows, i.e. foreign direct investment, portfolio investment or other investment (bank loans). Section 5 concludes.

2. Historical evolution and composition of capital flows to the NMS10

All NMS10, with the exception of Slovenia in 2002, were in a net external borrower position vis-à-vis the rest of the world throughout the whole period from 1999 until 2008 (Figure 1). The (un-weighted) average annual external borrowing of the NMS10 remained broadly stable in the pre-enlargement period marginally increasing from 5.8% of GDP in 1999 to 6.0% of GDP in 2003. Following the 2004 enlargement, average external borrowing increased sharply from 6.7% of GDP in 2005 to 10.6% of GDP in 2007 with half of the NMS10 (the three Baltic and the two Balkan countries) recording double digit external deficits.

In 2008, external borrowing started to decrease in the Baltic countries and in Romania. The intensification of the financial crisis since September 2008 resulted in an even stronger and more widespread contraction of external deficits. The average external balance for the NMS10 increased from a deficit of almost 9% of GDP in 2008 to a surplus of more than 1% of GDP in 2009, improving in all NMS10 countries. The correction was the most severe in the Baltics where the net external balance vis-à-vis the rest of the world swung from a deficit of some 10% of GDP in 2008 to a surplus of around 8% of GDP in 2009, and in Bulgaria where external borrowing dropped from above 22% of GDP to below 7% of GDP (Figure 1).

Figure 1: Net external balance vis-à-vis the rest-of-the-world, 1999-2009, annual data

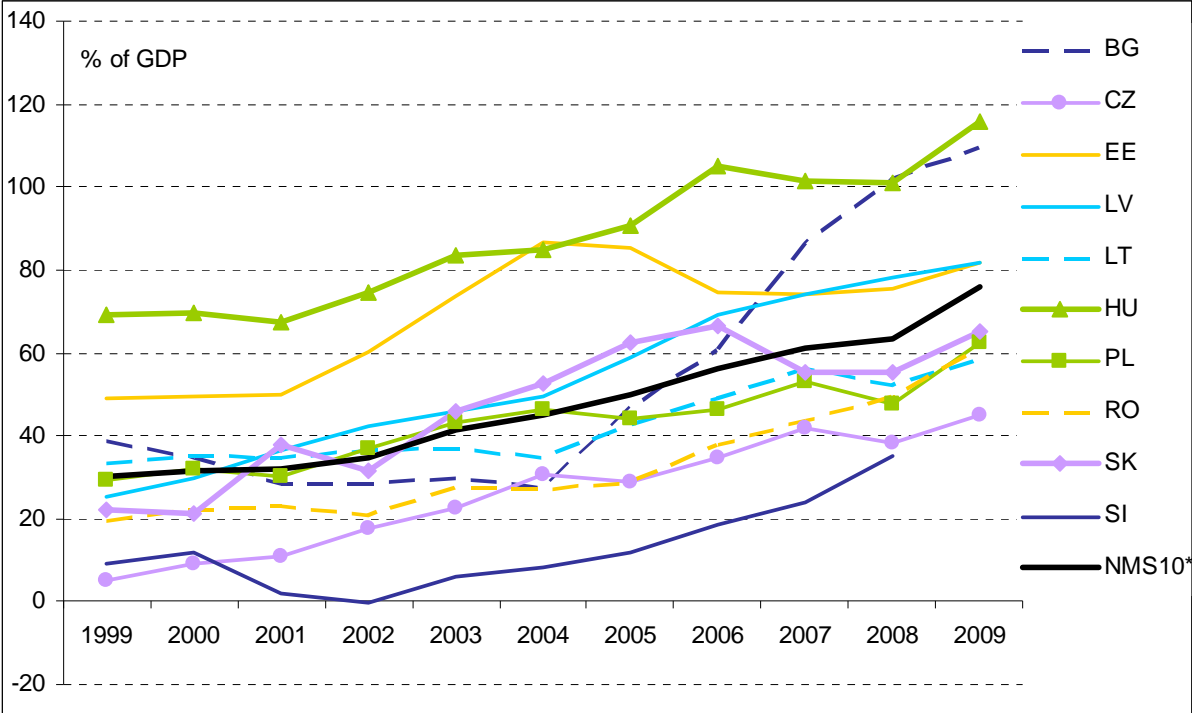


Source: Ameco

Note: *Unweighted average.

The average net international investment position (IIP) of the NMS10 deteriorated gradually from -30% of GDP in 1999 to -42% of GDP in 2003 before dropping by more than 20 percentage points to -63% of GDP in 2008 (Figure 2). The acceleration in the built-up of net foreign liabilities since 2003 is generally attributed to the upcoming EU accession, which implied further economic and financial (especially banking) sector liberalisation, a higher attractiveness for FDI including greenfield investment, as well as an overall lower risk perception. In 2008 the stock of net foreign liabilities exceeded 70% of GDP in Hungary, Bulgaria, Latvia and Estonia, while it remained below 40% of GDP in Slovenia and the Czech Republic. The further deterioration in the IIP of the NMS10 in 2009 was induced by unfavourable valuation and GDP (denominator) effects, even though the average external balance switched into surplus (Figure 1).

Figure 2: Evolution of Net Foreign Liabilities from 1999 to 2009



Source: IFS, IMF

Note: * Un-weighted average; for Slovenia, the latest available data are for 2008.

Apart from the overall level of net foreign liabilities, the composition of gross foreign liabilities also differed significantly across the NMS10. Liabilities from direct investment represented more than 50% of total liabilities in Bulgaria, Hungary and the Czech Republic in 2009, while they amounted to less than 30% in Latvia and Slovenia. On the other hand, the share of liabilities from 'other investment' (which in the NMS10 account for most of the foreign debt) exceeded 50% in the three Baltic countries, Slovenia and Romania in 2009, but it was below 30% in the Czech Republic and Hungary. Finally, liabilities from portfolio investment played a significant role in Poland, Lithuania, the Czech Republic and Hungary (likely due to more developed and liquid equity and bond markets³) where their share

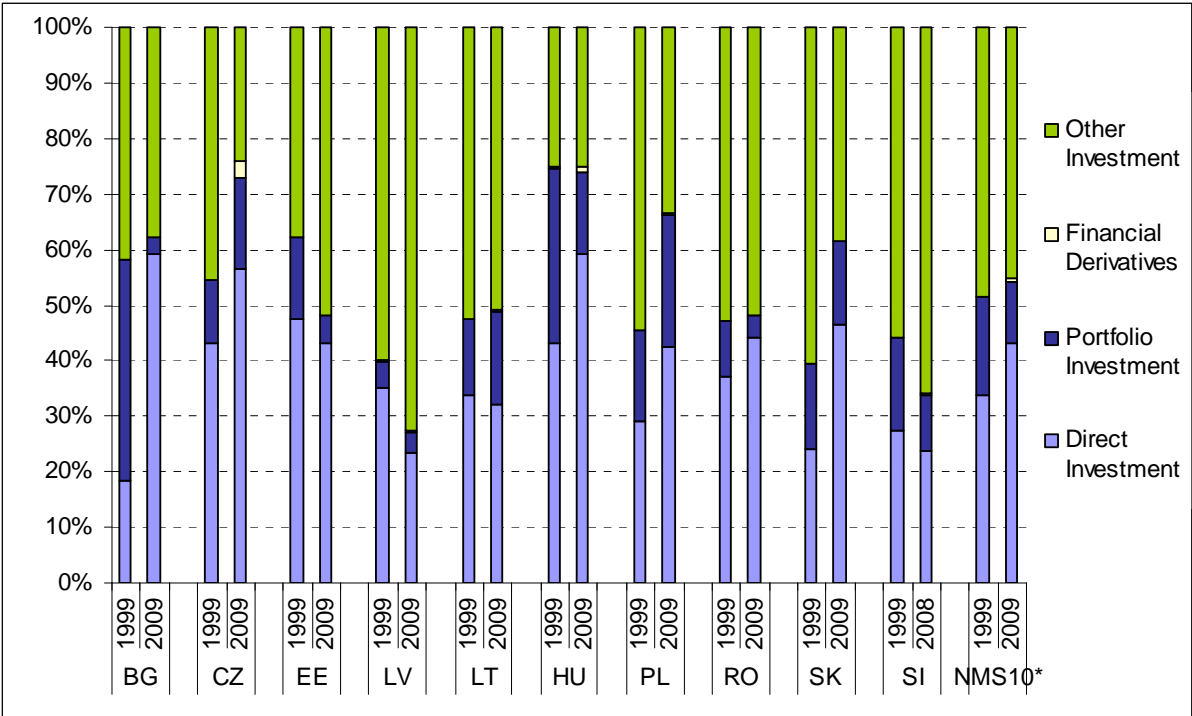
³ This would be in line with the results in Daude and Fratzscher (2006), who find that portfolio investment is substantially more sensitive to the degree of financial market development and the quality of host country institutions.

exceeded 15% and only a minor role in Bulgaria, Latvia, Romania and Estonia where their share was below 5% (Figure 3).

Overall, there seems to be no clear correlation between the balance in the IIP and the composition of gross foreign liabilities. Among the NMS10 with relatively high net foreign liabilities, direct investment was the dominant foreign funding source in Hungary and Bulgaria, while Latvia and to a lesser extent also Estonia relied primarily on other investment. At the same time, among the countries with more favourable IIP balances, direct investment was the main foreign funding channel in the Czech Republic but in Slovenia other investment accounted for the larger share of gross foreign liabilities.

For the NMS10 as a whole, the average share of direct investment in total foreign liabilities increased from around 34% in 1999 to some 43% in 2009, with the role played by direct investment increasing substantially in Bulgaria and Slovakia. As a result, the shares of other investment and portfolio investment decreased from almost 49% to around 45% and from above 17% to 11%, respectively. The role of financial derivatives remained marginal.

Figure 3: Composition of Gross Foreign Liabilities in 1999 and in 2009

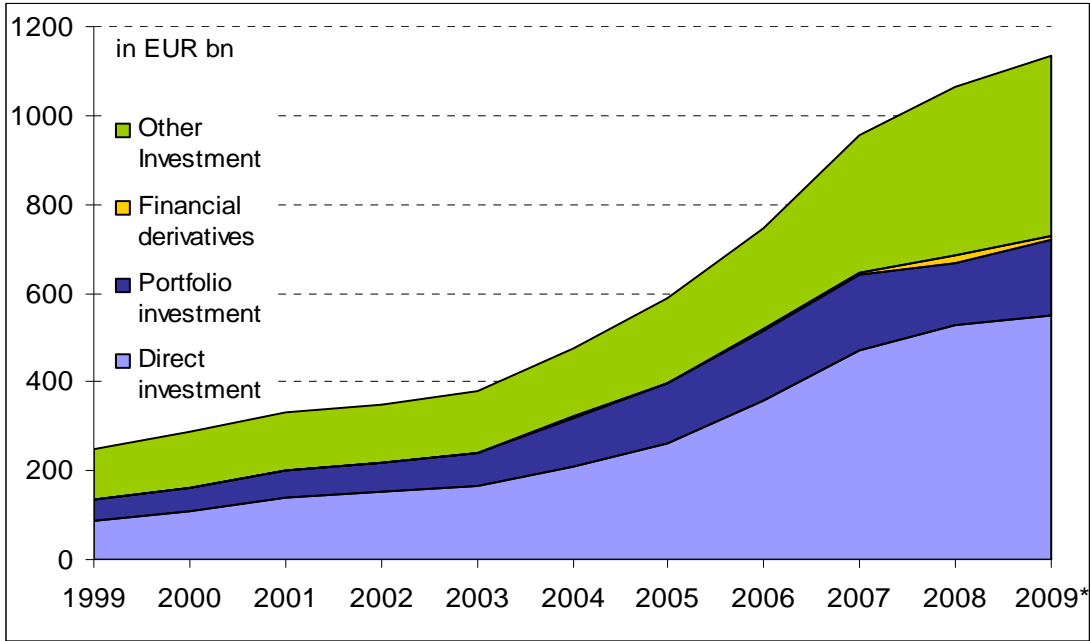


Source: IFS, IMF

Note: *Unweighted average; for Slovenia, the latest available data are for 2008.

In nominal terms, gross foreign liabilities of the NMS10 increased from some EUR 250bn in 1999 to above EUR 1,100bn in 2009. Direct investment rose from EUR 85bn to around EUR 550bn, portfolio investment from some EUR 50bn to around EUR 170bn and other investment liabilities from some EUR 115bn to above EUR 400bn. Liabilities from financial derivatives peaked at EUR 15bn in 2008 before falling again below EUR 10bn in 2009 (Figure 4).

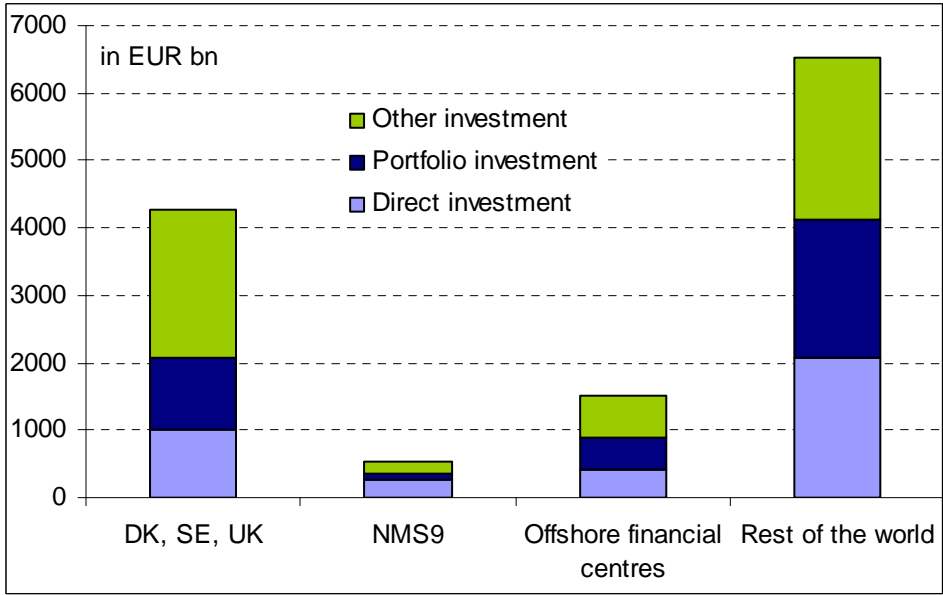
Figure 4: Nominal Gross Foreign Liabilities of NMS10



Source: IFS, IMF
 Note: *For Slovenia, the latest available data are for 2008 (a constant level of liabilities was assumed for 2009).

A geographical breakdown of the euro area international investment position suggests that roughly half of NMS10 gross foreign liabilities is held by euro-area residents as their gross claims (excluding financial derivatives) on the NMS9⁴ amounted to some EUR 540bn at the end of 2008 with direct investment accounting for EUR 260bn and 'other investment' for EUR 200bn (Figure 5).

Figure 5: Geographical breakdown of the euro area gross foreign assets at the end of 2008

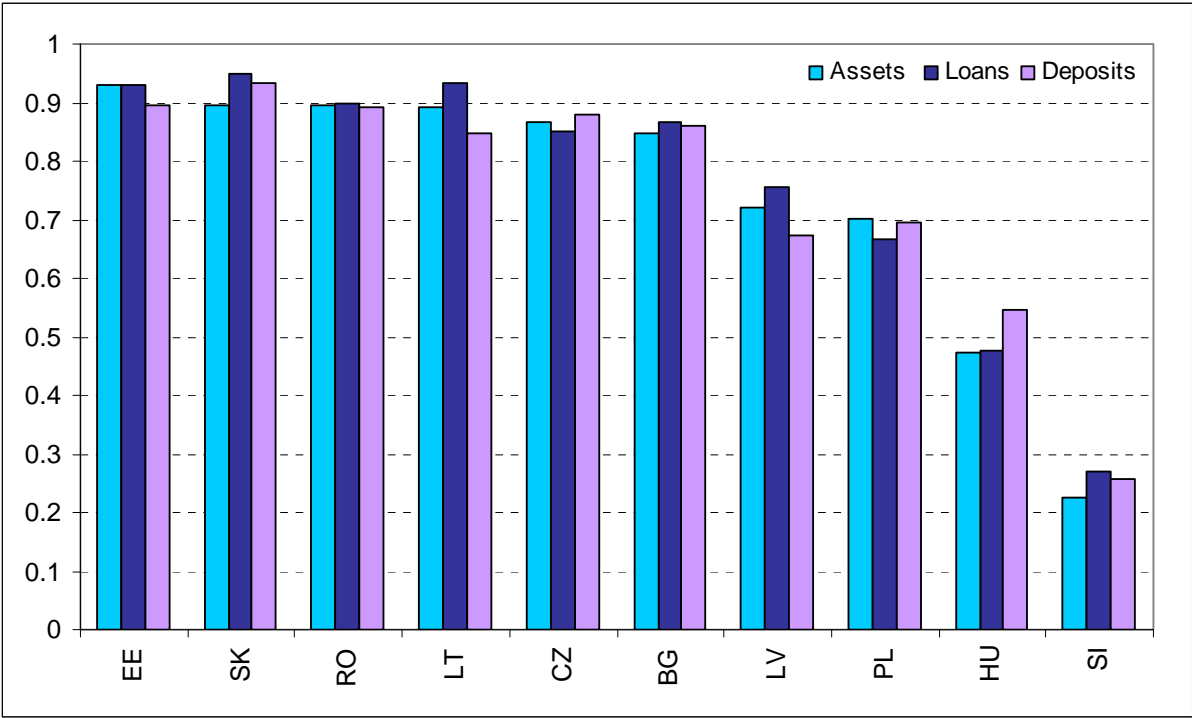


Source: ECB

⁴ NMS10 excluding Slovenia which was already part of the euro area in 2008.

A specific feature of the NMS10 is the high foreign ownership of their banking sectors. The share of foreign-owned banking assets exceeded 80% in six of the NMS10 by 2007, remaining below 50% only in Hungary and Slovenia, with parent banks predominantly located in the old EU Member States (Figure 6). The large foreign ownership of the banking sector facilitated absorption of foreign funds by providing access to more liquid international money and capital markets and by channelling foreign funds into domestic credit growth.⁵ At the same time, the resulting substantial cross-border exposures in the banking sector implied large scope for contagion and also a potential channel for rapid foreign capital outflows in the case of financial market stress.

Figure 6: Foreign Ownership of Banking Assets, Loans and Deposits (as share of total)



Source: Bankscope

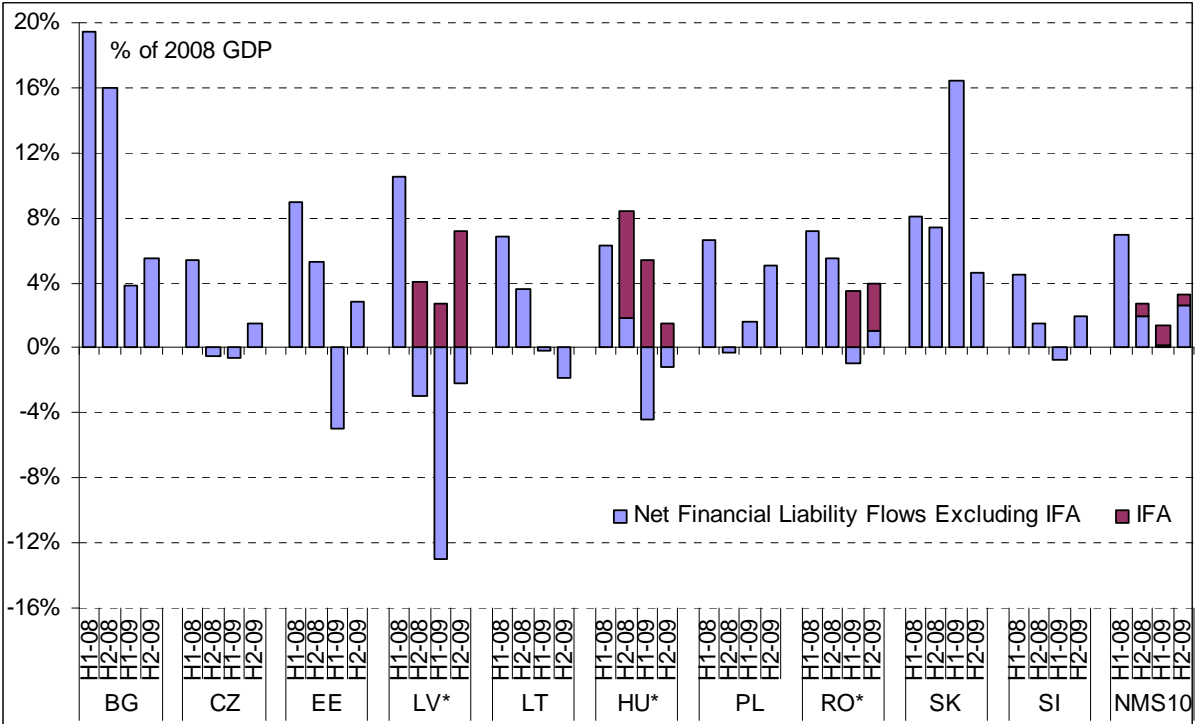
3. Capital flows during the financial crisis period

The financial crisis has had a significant impact on the balance of payments of the NMS10. The consequences were particularly severe for Hungary, Latvia and Romania, which were forced to seek official international financial assistance (IFA) following a sudden decline in foreign capital inflows. Balance of payments (BoP) data excluding IFA indicate that net foreign capital inflows (measured by net financial liability flows) into the NMS10 declined from 7% of GDP in H1-2008 to 1.9% of GDP in H2-2008 and then practically halted in H1-2009, before recovering somewhat to 2.5% of GDP in H2-2009. IFA extended to Hungary, Latvia and Romania, amounting to some 0.8%, 1.2% and 0.8% of 2008 NMS10 GDP in H2-2008, H1-2009 and H2-2009 respectively, dampened the overall decline in foreign capital inflows. Nevertheless, total foreign capital inflows still declined by some 80% between H1-2008 and H1-2009 (Figure 7).

⁵ According to BIS statistics, EU banks held 96% of BIS reporting banks' consolidated international claims on the NMS10 at the end of 2009 (EUR 460bn).

Excluding IFA, all NMS10 apart from Bulgaria, Poland and Slovakia experienced net foreign capital outflows (negative net financial liability flows) in H1-2009, three NMS10 countries - the Czech Republic, Latvia and Poland - suffered net foreign capital outflows already in H2-2008 and three – Latvia, Lithuania and Hungary - also in H2-2009. Latvia faced the largest net foreign capital outflows, cumulatively amounting to some 18% of its 2008 GDP between H2-2008 and H2-2009, while the outflow from Hungary was around 4% of its 2008 GDP in this period. All other NMS10 countries recorded cumulative foreign capital inflows from H2-2008 to H2-2009. Moreover, IFA more than fully outweighed private foreign capital outflows from Hungary and to a large extent also compensated capital outflows from Latvia.

Figure 7: Net Foreign Capital Inflows (Financial Liability Flows) from H1-08 to H2-09



Sources: Reuters EcoWin, National Central Banks

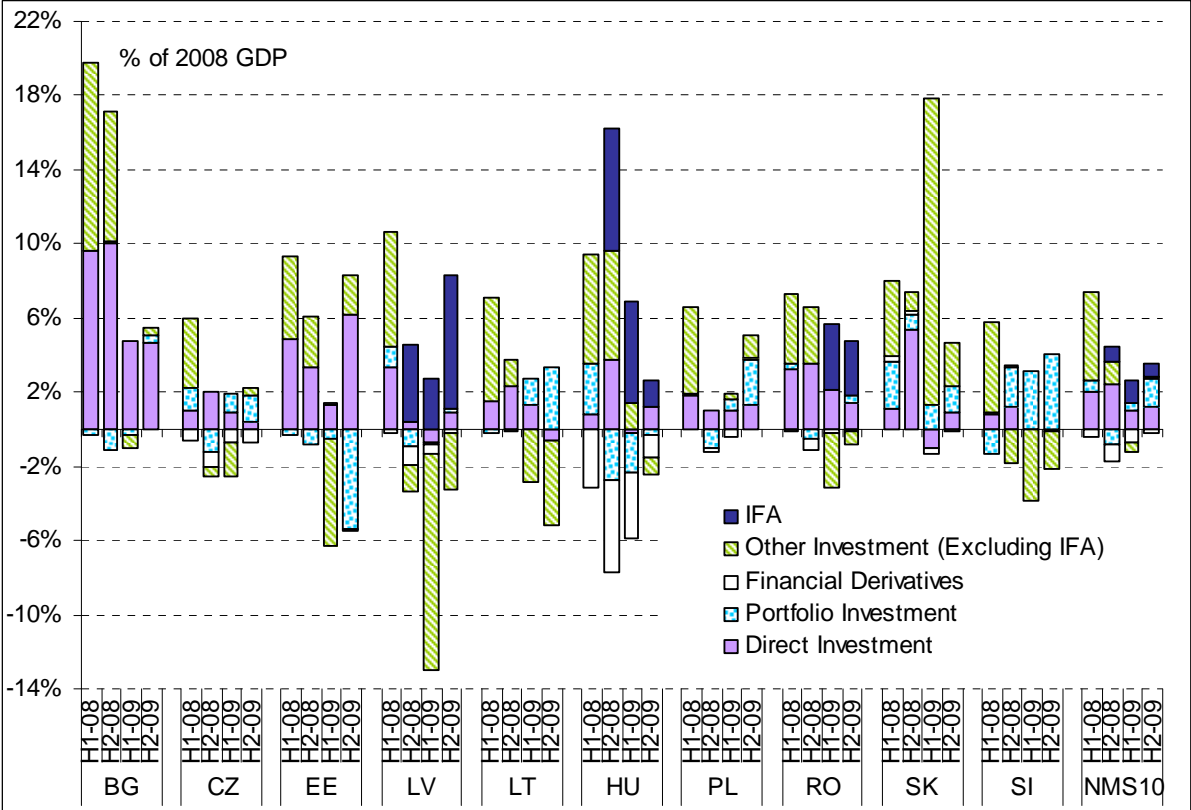
Notes: * IFA amounted for HU in H2-2008 to 6.6%, in H1-2009 to 5.5% and in H2-2009 to 1.5% of its 2008 GDP, for LV in H2-2008 to 4.1%, in H1-2009 to 2.8% and in H2-2009 to 7.2% of its 2008 GDP and for RO in H1-2009 to 3.5% and in H2-2009 to 2.9% of its 2008 GDP.

** IFA provided to LV, HU and RO amounted in H2-08 to 0.8%, in H1-2009 to 1.2% and in H2-2009 to 0.8% of the NMS10 2008 GDP.

Capital outflows from the NMS10 in 2008 materialised through portfolio investment and financial derivatives, which are the most liquid and volatile types of investment (Figure 8). Subsequently, flows of ‘other investment’ (excluding IFA) also became negative in 2009. On the other hand, direct investment remained a source of capital for the region. This was, however, mainly a different type of FDI than the "fire-sale" FDI first indentified by Krugman (2000) for some Latin American countries during previous financial crises. As most large corporations in the NMS10 are already foreign owned, they are usually not forced into fire-sales by constrained access to external financing. The continued FDI inflows are thus likely to be predominantly constituted by finalisations of the projects launched before the start of the global financial crisis, as well as some new green-field investments that continue to be attracted by lower factor costs and in some cases lower exchange rates.

While other investment liability flows excluding IFA were still positive in H2-2008 and then turned positive again in H2-2009 for the NMS10 as a whole, they clearly represented the major channel for net foreign capital outflows from Latvia and Romania, two of the countries receiving IFA, as well as for Lithuania and Slovenia throughout the whole crisis period. This occurred in spite of the European Banking Group Coordination Initiative whereby foreign banks committed to maintain their exposure in the countries receiving IFA.

Figure 8: Composition of Net Foreign Capital Inflows from H1-2008 to H2-2009

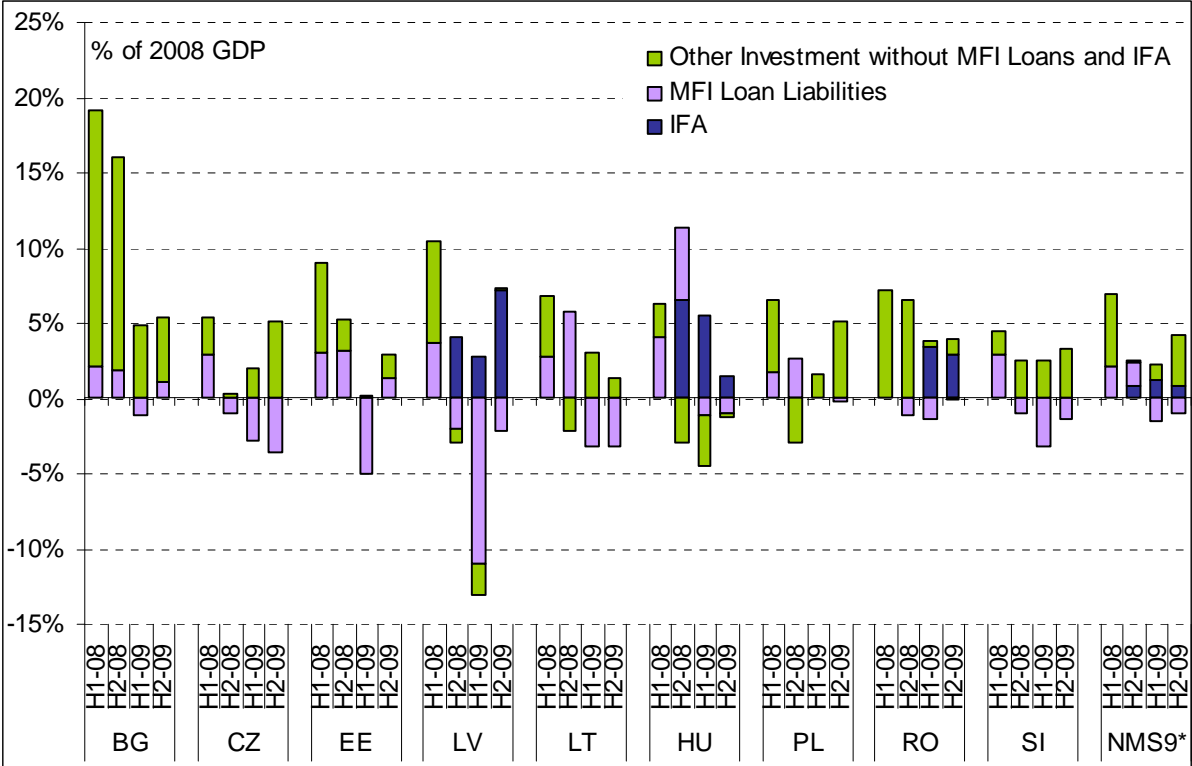


Sources: Reuters EcoWin, National Central Banks

Furthermore, data on the sectoral composition of other investment net liability flows (Figure 9) show that net foreign loans by monetary and financial institutions (MFI) remained a source of foreign capital inflows into NMS10 (MFI data are not available for Slovakia) in H2-2008 but then turned into a channel for foreign capital outflows throughout 2009 (although in the Czech Republic, Latvia, Romania and Slovenia MFI loan liability flows were already negative in H2-2008). In spite of the difficulties experienced by the broader EU banking sector in this period, the foreign capital outflow from the banking sector in the later stage of the crisis probably to a larger extent reflects the falling demand for bank lending resulting from the decline in the economic activity rather than supply factors. This would confirm that by establishing easier access to more liquid international financial markets high foreign ownership of the banking sector can help ensuring continued inflows of indispensable foreign exchange liquidity during bouts of financial market turmoil (otherwise characterised by other investment outflows) as it seems to have been the case in Lithuania, Hungary and Poland in H2-2008 (such conclusion is also consistent with the result in Berglöf et al. (2009) that the share of foreign bank ownership had a positive impact on cross-border bank lending flows in Q4-2008). At the same time, cross-border banking groups can also more easily reallocate

capital across countries towards those recovering earlier and with better investment opportunities in the aftermath of the crisis.

Figure 9: MFI Loans and IFA in Other Investment Net Liability Flows from H1-08 to H2-09



Source: National Central Banks

Notes: *Data on MFI loan liabilities not available for Slovakia

4. Determinants of capital flows

4.1 External versus internal determinants

This section analyzes the role of the external and internal economic and financial environment in net capital inflows to the NMS10 in the period 1995 to 2009. The analysis is performed on quarterly data. We start by decomposing total capital flows to the NMS10 into a "common factor" and a "country-specific factor". The common factor captures "push factors". It is driven by external (global) shocks, which are the same for all NMS10. The country-specific factor reflects "pull factors", as it is driven by each country's economic fundamentals (or, more precisely, investors' perceptions about them). Overall net capital inflows to each country are the sum of the common and the country-specific factor:

$$(1) \quad CFLOW_TOTAL_{it} = CFLOW_GLOBAL_t + CFLOW_COUNTRY_{it} = \alpha_i(L)y_t + \delta_{i,t},$$

where $CFLOW_TOTAL_{it}$ are a country's net capital inflows (in percent of GDP), $CFLOW_GLOBAL_t$ is the common component, and $CFLOW_COUNTRY_{it}$ is the country-specific component.

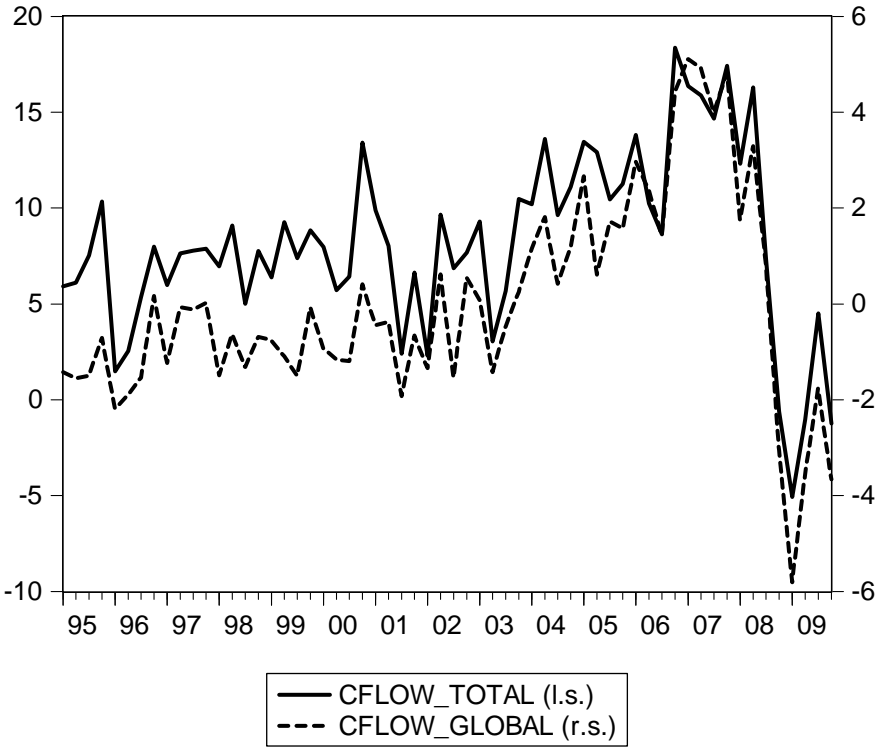
The common and country-specific components are identified via factor analysis. For example, among others, Stock and Watson (1988) find factor models useful in disentangling a common

shock that is behind the covariation of macroeconomic time series. The main idea underlying factor analysis is that a large set of variables can be explained by a small number of latent variables, the ‘factors’, which are responsible for all the relevant dynamics. This is done by extracting one (or several) orthogonal common shock(s) that maximize(s) the explained variation in the underlying time series.

Our first common factor, $CFLOW_GLOBAL_t$, explains 43 percent of the total variation in the correlation matrix (46 percent if the sample is restricted to the period from 1999 to 2009). It can be interpreted as a "parallel shift factor" in the capital flows to the NMS and thus reflects determinants which are common to the whole region. The factor loadings are all positive and – with the exceptions of the Czech Republic and Slovakia where they are somewhat lower – within a small range, meaning that the NMS10 react to common shocks in a similar way. Figure 9 plots the global capital flow component together with total capital flows to the NMS10 in percent of GDP ($CFLOW_TOTAL_{it}$). It illustrates the close co-movement of the series suggesting that capital flows to the NMS10 have followed a common trend. This becomes also visible in the latest sharp reversal in capital flows after autumn 2008.

The country-specific portions of capital flows are displayed in the Annex. They are calculated as the residuals of regressions of each country's capital inflows $CFLOW_TOTAL_{it}$ on $CFLOW_GLOBAL_t$. As the residuals of these regressions are orthogonal to the global factor, this procedure eliminates any global impact on capital flows and ensures that $CFLOW_COUNTRY_{it}$ is formed purely by the idiosyncratic part of capital inflows.

Figure 10: Capital inflows to NMS10 in percent of GDP ($CFLOW_TOTAL_t$) and common component $CFLOW_GLOBAL_t$

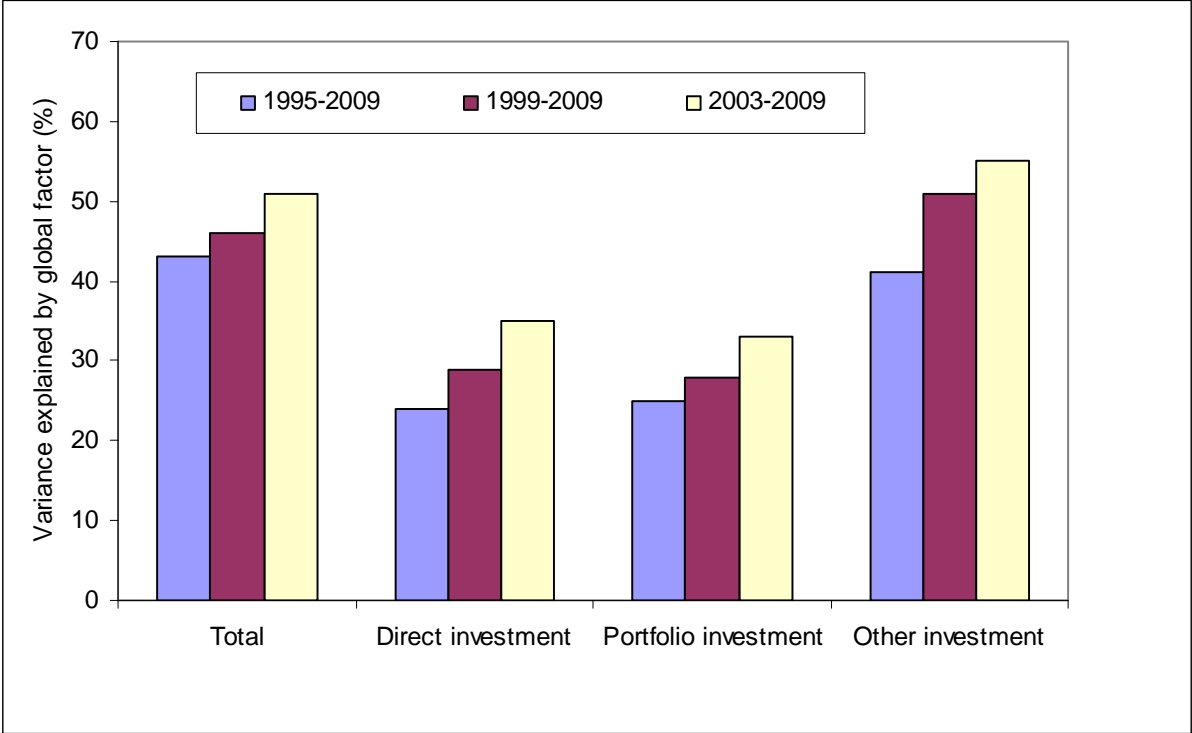


The separation into global and country-specific factors can also be pursued for the investment subcategories, i.e. direct investment (DI), portfolio investment (PI) and other investment (OI). Financial derivatives are excluded since they have played a minor role during the observation period. This results in the substitution of $CFLOW_GLOBAL_t$ in equation (2) by the first principal components of a) direct investment flows (DI_GLOBAL_t), b) portfolio flows (PI_GLOBAL_t) and c) other investment flows (OI_GLOBAL_t) to the NMS10. It turns out that other investment flows have the highest share of common variance (Figure 10). The first principal component explains 41 percent of total variation in the correlation matrix, while the corresponding values for portfolio investment and direct investment flows are very similar, 24 percent and 25 percent, respectively.

Shortening the sample to the period from 1999 and, alternatively, 2003 onwards shows that the global factor has become more important in recent years. For other investment flows the contribution of global factors has become more important than that of the national factors. This may reflect the deepening financial integration with other regions in the world, in particular the EU, which has become visible (among others) in a high share of foreign bank ownership.

Interestingly, the contribution of the common component for total capital flows is clearly higher than the (weighted) average of the subcategories over the whole 1995-2009 period. This suggests that a regional or global shock has a comparable impact on total capital flows in all NMS10, but that the shock exerts his impact through different types of capital flows. In other words, there is evidence for some substitution between foreign investment subcategories.

Figure 11: Average variance of capital flows explained by common factor



4.2 External determinants of capital flows

This section and the next one analyze the global and country-specific determinants of capital flows. In this section we analyse causality relationships as well as impulse responses between the external economic and financial environment and capital flows to the NMS10. External factors are those deemed to be outside the control of the NMS. Trade and financial integration of these countries has mainly taken the form of integration with the EU and in particular the euro area (see Figures 4 and 5). Euro area macroeconomic and financial conditions are thus appropriate proxies for the external (global) environment, and ultimately for the opportunity costs of foreign investment in these countries. Specifically, we examine the role of euro area interest rates, the business cycle and risk sentiment for the global component of capital flows to the NMS10.

Financing conditions in the euro area may be relevant for capital flows to the NMS10 for a number of reasons. First, lower interest rates in the euro area encourage international investors, particularly those with shorter investment horizons, to search for higher yields elsewhere. Second, as the NMS10 are net debtors, low international interest rates reduce their servicing costs and indirectly improve their creditworthiness. Third, low interest rates in the euro area encourage borrowers in NMS10 to borrow in euro rather than in their own domestic currency (BIS 2009).

The euro area business cycle is another likely relevant factor. The relationship with capital flows is, however, theoretically uncertain. On the one hand, Calvo, Leiderman and Reinhart (1996) argue that the economic downturns in most industrial countries during the early 1990s made investment opportunities in emerging markets more profitable and encouraged flows into them. This established a negative substitution effect between economic growth in creditor countries and capital flows to recipient economies. On the other hand, the more recent literature finds positive wealth effects of economic growth in creditor economies on international capital flows. This is for instance because stronger growth boosts the profitability of firms, which will in turn increase investment abroad (see, e.g., Ferrucci et al. 2004).

In addition, global risk sentiment may influence international capital flows. In an environment of perceived low global risks, as during the Great Moderation period, funds flowed towards investment in higher-returns but generally riskier catching-up economies, like the NMS10; in times of high risk aversion investors typically rebalance their portfolio toward safer and more liquid securities. Moreover, when asset price volatility becomes high, as during the recent financial crisis, uncertainty about how to value assets contributes to increasing risk aversion and discourages new investments. When financial stress in the source regions is elevated, concerns about counterparty risk may lead to funding pressures on banking groups and reduce cross-border capital flows. We use quarterly time series from 1995Q1 to 2009Q4 of the 3-month Euribor (EA_IS_t), the euro area output gap (EA_OGAP_t) and the euro area risk sentiment (EA_RISK_t). The latter is a composite indicator of stock market volatility, exchange rate volatility and corporate bonds spreads.

We use the VSTOXX as our measure of stock market volatility (Vola-Dax before 1999), the implied volatility of currency options for the euro-USD and euro-JPY exchange rate, and the spread between corporate bonds (AAA) and government bonds as an indicator of credit default probabilities in the corporate sector. The composite indicator is calculated on a weekly basis as the first principal component of the different time series and then averaged to quarterly data. This results in the extraction of one principal component which explains 89 percent of the variance in the full data set, illustrating that our risk indicators are highly correlated. It is also interesting that all four risk indicators contribute to the common factor to

a similar extent, as indicated by comparable factor loadings. The common factor can thus be taken as a good overall risk sentiment measure.

To assess the time series properties of the data, we first examine the degree of integration of the variables. Both the Augmented Dicky-Fuller and the Phillips-Perron test indicate that all our series are stationary.⁶ We then pursue Granger-causality tests, which can roughly be described as a way to determine time-dependence of one variable on another. Although this concept does not account for true causality, it can give some hints with respect to the quality and potential interpretations of the relationship.

Lag length was set using the usual information and lag selection criteria, with the Schwarz criterion serving as benchmark. Table 1 shows the probability values of the Granger causality tests. Overall, a common pattern emerges from the specifications. Capital flows to the NMS are Granger-caused by the euro area interest rate, output gap and the risk environment. Not surprisingly, capital flows to the NMS have no impact on euro area macroeconomic fundamentals. Reducing the sample size or changing the lag length does not change these results.

Table 1: Granger causality tests

$Y \setminus X$	CFLOW_GLOBAL	EA_IS	EA_OGAP	EA_RISK
CFLOW_GLOBAL	-	0.04	0.02	0.01
EA_IS	0.58	-	0.00	0.00
EA_OGAP	0.31	0.06	-	0.00
EA_RISK	0.32	0.01	0.08	-

p-values for H_0 : Y (in rows) is not Granger-caused by X (in columns).

p-values supporting Granger-causality in bold faces.

Lag length chosen by BIC.

Sample: 1995Q1-2009Q4.

To investigate causality more in-depth, we employ a vector autoregressive model (VAR), which allows modelling the impact of euro area shocks on capital flows while taking account of the feedback between the variables, as all of them are treated as endogenous. Our benchmark specification is given by the following vector of endogenous variables (along with the corresponding Cholesky ordering):

$$(2) \quad x_t = (CFLOW_GLOBAL_t, EA_OGAP_t, EA_IS_t, EA_RISK_t)$$

The Cholesky ordering of the basic specification is based on the assumption that the risk indicator, which is comprised of financial market variables, can react contemporaneously to all other variables. Further, monetary policy can react contemporaneously to economic activity while the latter reacts on interest rates and changes in risk sentiment only with a lag. Block exogeneity for the capital flow variable is assumed. The VAR model is estimated with

⁶ Results are available upon request.

two lags, which proved sufficient to avoid serial correlation and non-normality of the residuals.

The impulse responses to shocks in the interest rate, output gap and risk climate are presented together with their 95% confidence bands in Figures 12a to 12c for a horizon of 20 quarters. As regards the euro area interest rate shock, the response of capital flows is negative and significant from the third to the seventh quarter (Figure 12a). Thus, an easing of ECB monetary policy increases capital flows to the NMS. The remaining impulse responses on the interest rate shock are also in line with theoretical considerations. Higher interest rates lead to higher risk, as posited by the risk-taking channel of monetary policy (see, e.g., Gambacorta 2009).

The reaction of capital flows to the NMS to a euro area output shock is positively and statistically significant (Figure 12b). This implies that higher growth in the euro area encourages lenders to increase cross-border exposure, suggesting that the wealth effects of higher economic growth in the lending countries dominates the opposing substitution effect. The effect is significant from the second to fourth quarter. Our model specification does not allow disentangling supply from demand shocks. However, since interest rates react positively to the output shock, the impulse-response analysis provides some evidence that the output gap shock can mainly be interpreted as a demand shock.

Finally, an increase in the general level of risk exerts an immediate contracting impact on capital flows, significant for around three quarters (Figure 12c). The economic impact seems to be somewhat small, but still non-negligible. Given that the increase in the risk variable from 2007Q2 to 2008Q4 was more than five standard deviations, the increase in risk aversion during the financial crisis had a sizeable estimated impact on capital flows. In line with theoretical considerations, an increase in the risk level further reduces economic activity and leads to a decrease in interest rates.

To check for the sensitivity of our results, we estimated several alternative versions of our model. All the results are very robust to changes in the specification such as sample size, different Cholesky orderings and lag length. The most notable change occurred when reducing the sample size to the period from 1999 onwards. In this case, the role of euro area variables becomes even stronger. Moreover, our results also hold if the financial crisis period is excluded, i.e. if we estimate our model from 1995 to 2007. This suggests that the general risk sentiment was already an important driver of capital flows in the pre-crisis period.⁷

⁷ We also estimated our model replacing euro area variables by US macro factors using the US output gap, the 3-month US money market rate and a US risk aversion measure constructed in a corresponding way as the euro areas risk indicator. Again, all variables have the theoretically expected sign. The impact of US macro-variables on capital flows to the NMS10 was, however, not statistically significant. By contrast, we found strong evidence for an impact of US risk sentiment on capital flows. This corroborates the view that the global risk environment plays an important role for capital flows to the NMS10. (The euro area and the US risk indicator have a correlation of 0.90.)

Figure 12a: Impulse responses to a one-standard deviation euro area interest rate shock

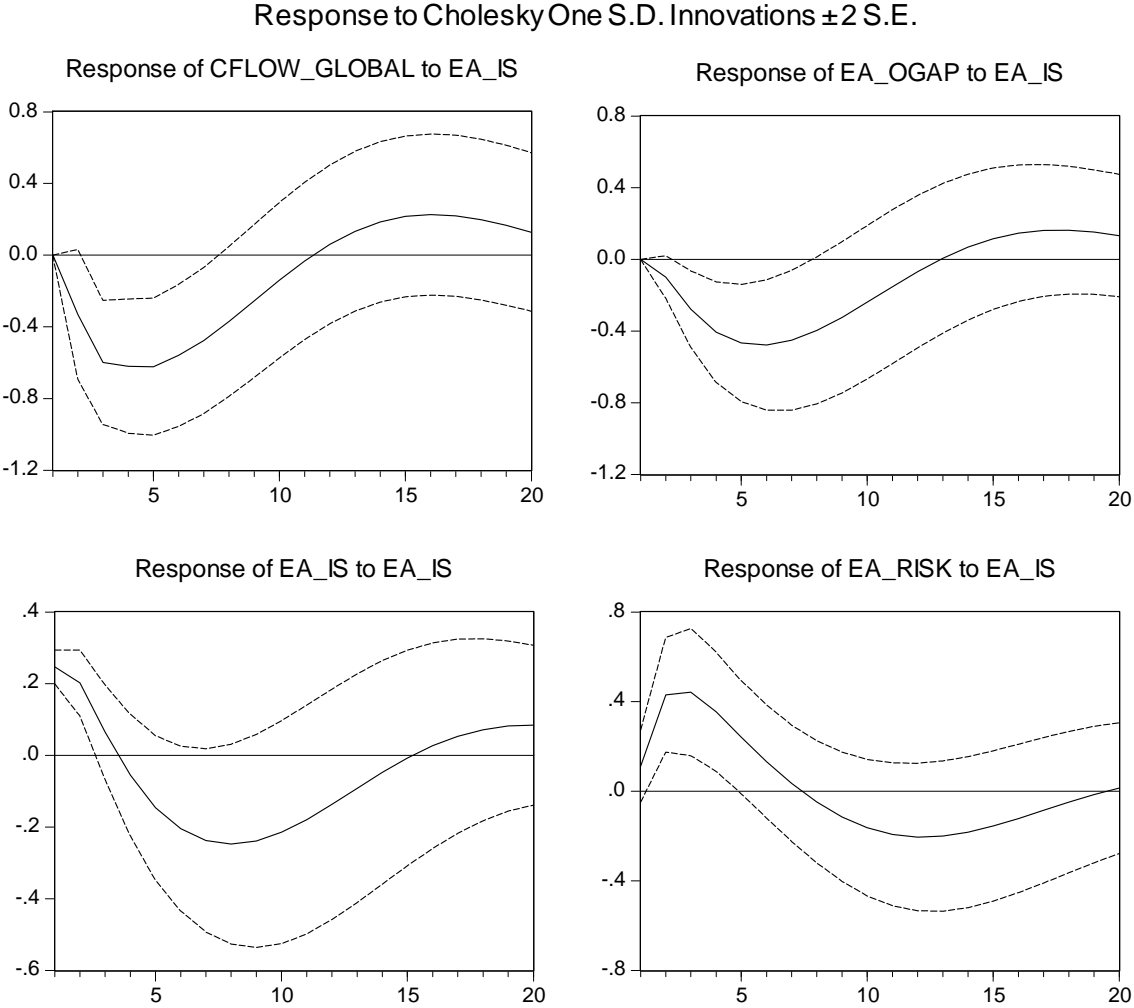


Figure 12b: Impulse responses to a one-standard deviation euro area output gap shock

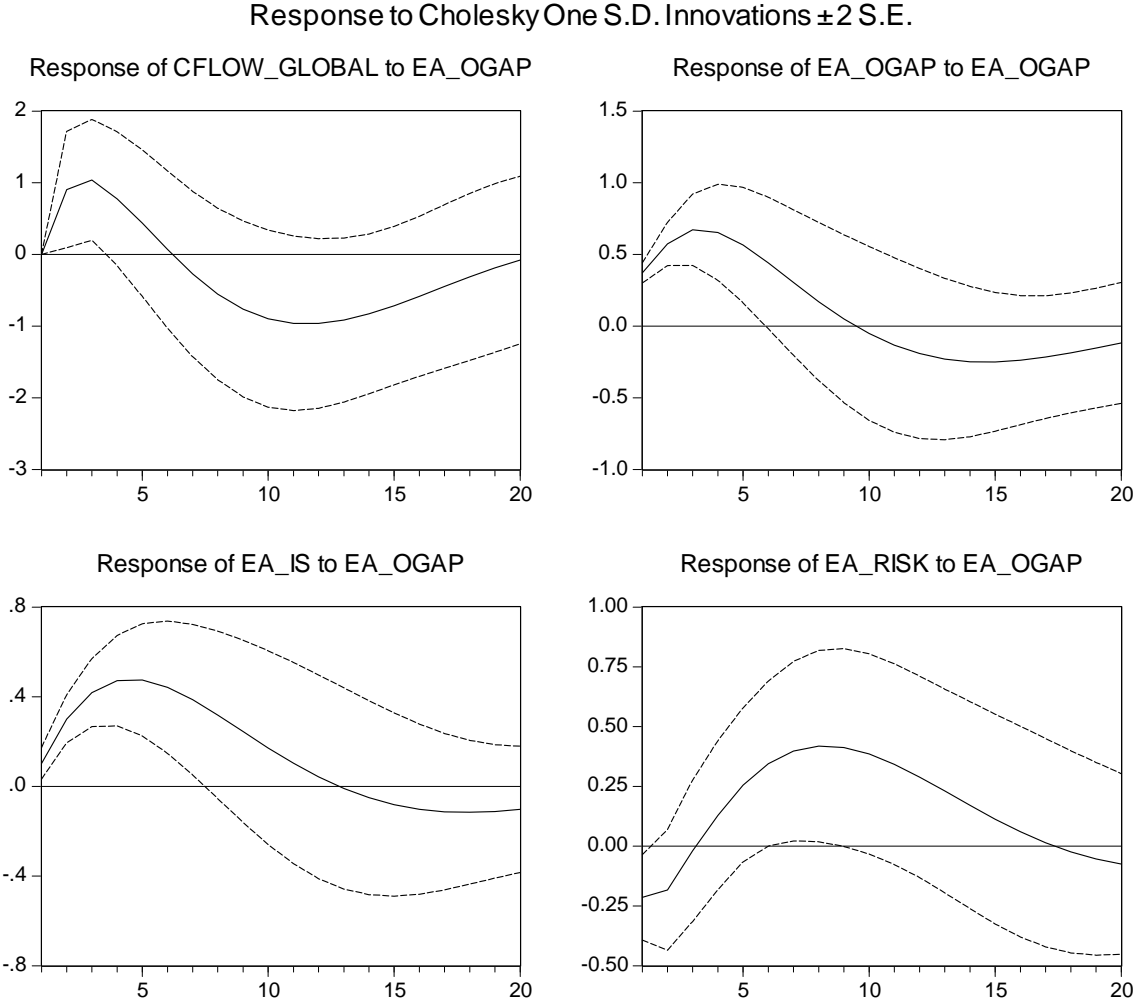
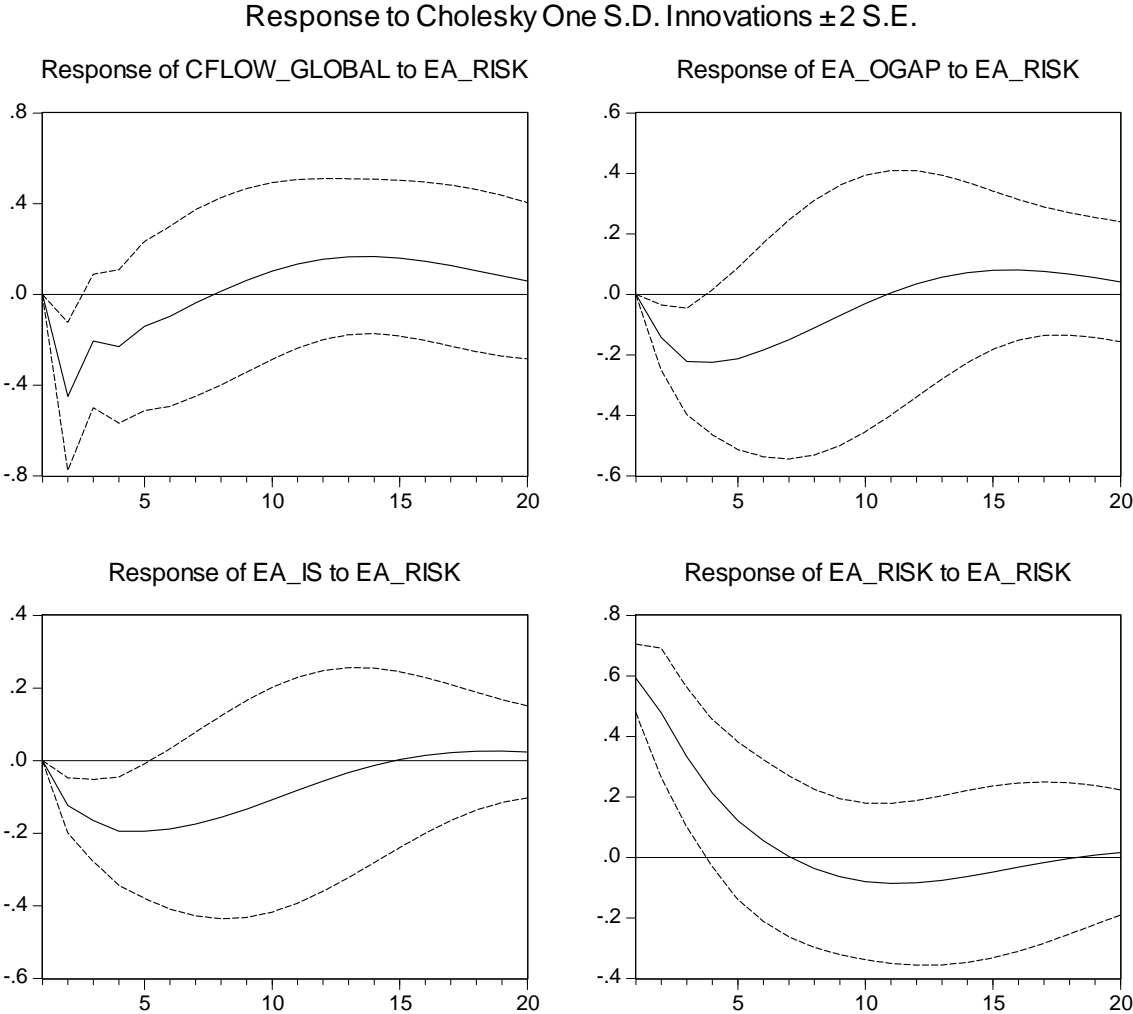


Figure 12c: Impulse responses to a one-standard deviation euro area risk shock



To assess the relative importance of different shocks, Table 2 shows the percentage of the forecast error variance due to each variable in the VAR model over a 12 quarter horizon. It is based on the Cholesky decomposition of the covariance matrix in equation (2). The impact of the two euro area macro variables on the global factor of capital flows to NMS is substantial and increases over time. After two years, more than one third of the forecast errors in capital flows are determined by euro area interest rates. The euro area business cycle explains up to a fifth of the forecast errors of capital flows in the long run. The general risk sentiment entails the highest contribution in the short-term but does not seem to have considerable explanatory power over longer horizons.

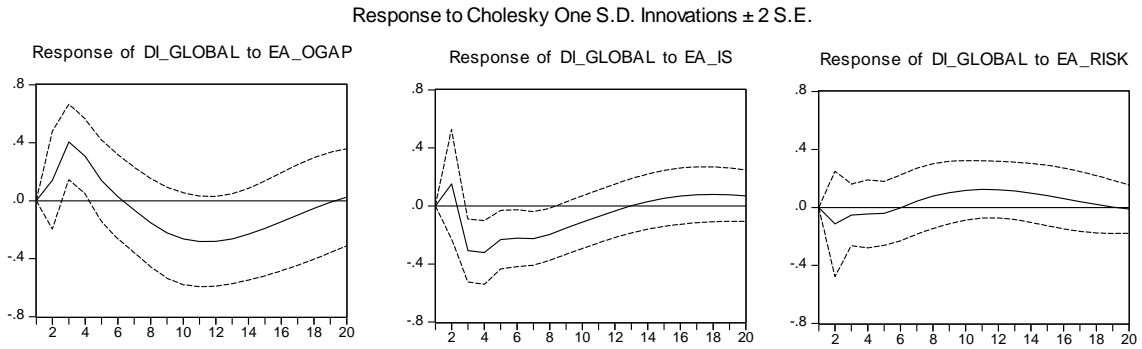
Table 2: Variance decomposition

Period	CFLOW_GLOBAL	EA_OGAP	EA_IS	EA_RISK
1	100.00	0.00	0.00	0.00
2	82.90	6.27	3.76	7.06
3	65.44	10.33	13.76	10.44
4	55.39	11.74	21.88	10.97
5	49.925	11.32	27.81	10.93
6	47.049	10.53	31.76	10.64
7	45.37	10.37	33.90	10.345
8	44.06	11.31	34.53	10.09
9	42.71	13.31	34.04	9.92
10	41.20	16.00	32.93	9.85
11	39.61	18.88	31.66	9.83
12	38.07	20.53	30.54	9.844

Cholesky Ordering: CFLOW_GLOBAL_t, EA_OGAP_t, EA_IS_t, EA_RISK_t

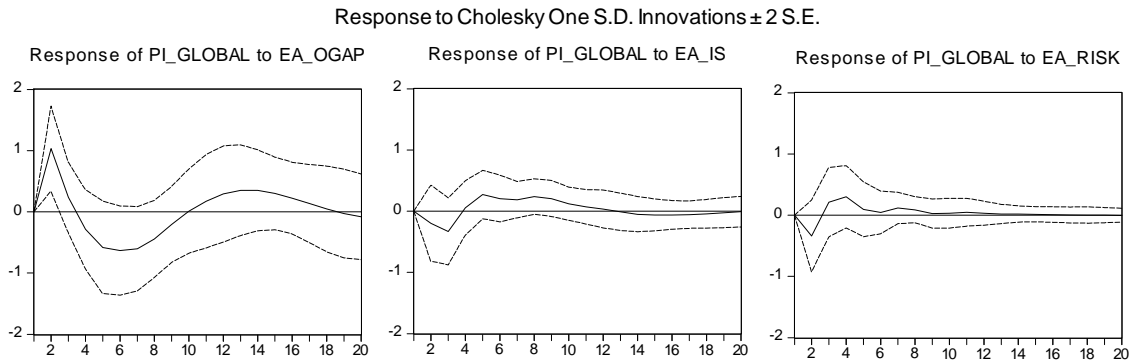
These results are confirmed when relating the common component of the capital flow subcategories (DI_GLOBAL_t , PI_GLOBAL_t , OI_GLOBAL_t) to the set of euro area variables (Figures 13a to 13c). Specifically, direct investments appear to react to the euro area business cycle and to interest rates, but not to changes in risk sentiment. This is consistent with the resilience of direct investment during the crisis shown in the descriptive analysis. Portfolio investment, somewhat surprisingly, shows a statistically significant response to the euro area output gap but not to the two financial variables. Other investment displays a particularly strong reaction to euro area interest rates and risk environment, in line with a priori and the recent experience, whereas the impact of shocks to the euro area output gap is not statistically significant.

Figure 13a: Responses of common factor "Direct investment flows" (DI_GLOBAL)



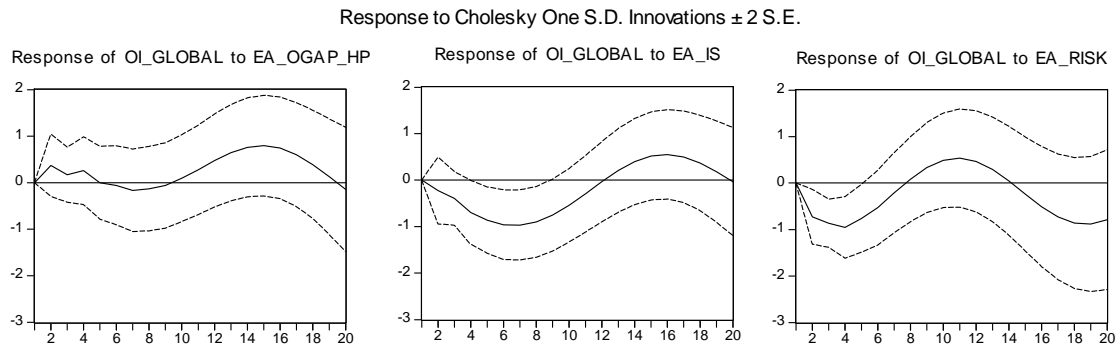
Note: Impulse responses based on VAR analysis for the period 1995Q1-2009Q4 with two lags and Cholesky ordering $x_t = (DI_GLOBAL_t, EA_OGAP_t, EA_IS_t, EA_RISK_t)$.

Figure 13b: Responses of common factor "Portfolio investment flows" (PI_GLOBAL)



Note: Impulse responses based on VAR analysis for the period 1995Q1-2009Q4 with two lags and Cholesky ordering $x_t = (PI_GLOBAL_t, EA_OGAP_t, EA_IS_t, EA_RISK_t)$.

Figure 13c: Responses of common factor "Other investment flows" (OI_GLOBAL)



Note: Impulse responses based on VAR analysis for the period 1995Q1-2009Q4 with two lags and Cholesky ordering $x_t = (OI_GLOBAL_t, EA_OGAP_t, EA_IS_t, EA_RISK_t)$.

4.3 Country-specific determinants

Looking at the country level, two main questions are of interest. First, what is the importance of global determinants for the individual countries in our sample? Second, which role do country-specific determinants play in attracting capital inflows?

We try to shed some light on the first question by estimating VAR models for all countries in our sample. The model includes the previously-defined euro area macroeconomic and financial variables ($EA_OGAP_t, EA_IS_t, EA_RISK_t$) and, separately, the country's net capital inflows (in percent of GDP). (In other words, we replace the global component in equation (2) by a country's net capital inflows.) It appears that capital flows to the Baltic countries, Slovenia and Romania tend to react more strongly to changes in the euro area economic and financial situation (Table 3). This may be explained by the stronger reliance of these countries on international bank loans - the borrowing category with the strongest dependence on euro area economic and financial conditions. As displayed in Figure 3 above, it is precisely this group of countries that has the highest shares of other investment in gross external liabilities. With the exception of Slovakia and Poland, capital flows to all countries are affected by the euro area economic and financial situation. In line with previous findings, monetary conditions seem to have a stronger impact on capital flows than euro area economic activity. The results do not suggest a strong role for the exchange rate regime. Capital flows to countries with both floating and fixed exchange rate regimes are affected by external factors—a finding in line with previous research (Alfaro et al. 2005) and the view that more structural factors determine the size of international capital flows.

Table 3: Capital flows to NMS, reaction to euro area interest, output and risk shocks

	Euro area interest rate shock	Euro area output shock	Euro area risk shock
Bulgaria	yes	no	(yes)
Czech Republic	no	no	yes
Estonia	yes	no	yes
Hungary	yes	no	yes
Latvia	yes	yes	(yes)
Lithuania	yes	yes	yes
Poland	no	no	no
Romania	(yes)	(yes)	no
Slovakia	no	no	no
Slovenia	(yes)	(yes)	(yes)

Note: Table indicates whether capital flows to country X react significantly (at the 5% significance level) to euro area interest rate, output gap and risk shocks. Brackets mean that the result is significant for only one quarter.

To examine the role of country-specific determinants, we model the idiosyncratic component of capital flows separately for each NMS by regressing the country-specific component from

the first stage ($CFLOW_COUNTRY_t$) on variables intended to capture shocks specific to each country:

$$(3) CFLOW_COUNTRY_t = \gamma_1 \Delta Y_{t-1} + \gamma_2 \Delta IS_{t-1} + \gamma_3 \Delta HP_{t-1} + \beta_3 CRISK_{t-1} + v_t$$

where $CFLOW_COUNTRY_t$ is the country-specific component of capital flows, ΔY_{t-1} is real GDP growth (in logs), IS_{t-1} is the three month interest rate, ΔHP_{t-1} is house price growth (in logs) and $CRISK_{t-1}$ is country-specific risk (explained below).⁸ To avoid problems of reverse causality, we use lagged values of the explanatory variables.⁹ For the domestic growth and the interest rate variable we expect positive coefficients as stronger growth and higher interest rate increase the expected return of investment (Agénor 1998). Given the important role of the housing sector in several NMS in recent years, we include house prices as one of the possible pull factors for foreign capital. Higher house prices, and the fact that the number of transactions on the housing market is generally higher during housing boom episodes (Stein 1995), increase the demand for credit, which in turn feeds into the demand for financing capital. Moreover, growing housing wealth loosens the borrowing constraints faced by economic agents by increasing collateral value. Thus there is a direct positive link between housing and capital flows.

A problem with constructing an appropriate measure of country risk is that usual proxies of risk like bond spreads, exchange rate or stock market volatility are also influenced by global movements in asset markets. In this exercise, we are however only concerned with the "pure" country risk, i.e. the idiosyncratic portion of country risk which is independent of global movements in risk sentiment. Following Fiess (2003), we apply a two-step procedure to extract the country-specific component of country risk. In the first step, we construct a "broad country risk indicator". This is done by calculating on a weekly basis for each country the first principal component of 10-year government bond yield spreads to Germany and stock market volatility. Next, we regress this country risk indicator on our euro area risk indicator (EA_RISK_t), which is taken as accounting for global risk. The residual of this estimation is purely orthogonal to the euro area risk indicator and thus captures only the portion of the overall country risk that is attributable to the individual country. It is then converted from weekly to quarterly frequency and used as an indicator of "pure" country risk.

In principle, the idiosyncratic component of capital flows to the NMS may also be driven by institutional factors such as political stability, financial development, EU/euro area membership or the physical infrastructure. However, institutional characteristics change little over time, if available in the form of time series at all, so that time series analysis with such data is precluded. Therefore, in the above specification, these effects are not explicitly modelled.¹⁰

⁸ We did not calculate output gap measures as these are subject to large uncertainty for the NMS10.

⁹ We refrained from using panel techniques like pooled or random effects regressions, since we were mainly interested in the cross-country variation of the coefficients. A seemingly unrelated regression (SUR) estimation was not feasible since - due to the unavailability of house price data for Romania and Slovakia - we didn't have the same set of explanatory variables for all countries.

¹⁰ Another reason to relinquish institutional variables are problems with multicollinearity. These arise because institutional variables affect capital flows via economic variables. For instances, if higher economic freedom spurs economic growth which in turn causes capital flows to grow, estimation results could possibly attribute an increase in capital flows partly to the high economic freedom and partly to the higher economic growth rate with the results that none of the two effects turns out to be statistically significant. Accordingly, an empirical specification that combines institutional and economic variables might wash out some of the effects.

Table 4 displays the result of the country estimation. Due to lack of long house price series, the sample had to be shortened for most countries. In view of the low number of degrees of freedoms, the results in Table 4 should be interpreted with caution. With the exception of Poland, for all countries meaningful econometric models could be established that illustrate the importance of national developments for capital inflows. As expected, capital flows to NMS10 react procyclically as they increase in times of buoyant economic development and rising interest rates. International investors seem to react relatively more strongly to country-specific changes in risk assessment in the Czech Republic, Hungary, Romania and Slovenia. The results point to an important role for house prices in Bulgaria, Estonia and Lithuania. For the remaining countries no strong link between house price developments and capital inflows can be established. There are no signs of serial correlation in the errors and the model fit is satisfactory, in particular when considering that the model is expressed in flows and not in levels. Nevertheless, in view of the relatively short sample period, the results should be interpreted with caution.

The low explanatory power of housing may partly be related to the low quality of official house price statistics. However, it can also be expected that house prices influence only certain subcategories of capital flows, in particular intra-bank flows that are included in "other investment flow". Indeed, the importance of house prices seems to be somewhat stronger when using the idiosyncratic component of "other investment flows" (including bank loans) as a dependent variable. In addition to Bulgaria, Estonia and Lithuania, house price developments then turn out to be significant for Hungary and Latvia at the 10 percent level.

Table 4: Determinants of country-specific component

	ΔY_{t-1}	IS_{t-1}	$\Delta HP_{i,t-1}$	$CRISK_{t-1}$	Sample start	R ² adjusted	LM(1)	LM(4)
Bulgaria	n.s.	0.05*** (0.02)	1.04** (0.42)	n.s.	2003Q1	0.27	0.60	0.46
Czech Republic	n.s.	n.s.	n.s.	-0.015* (0.007)	2000Q1	0.11	0.92	0.46
Estonia	n.s.	n.s.	0.43** (0.20)	n.s.	1998Q1	0.12	0.41	0.76
Hungary	0.46** (0.19)	n.s.	n.s.	-0.06* (0.03)	2003Q1	0.25	0.46	0.37
Latvia	0.96* (0.56)	0.011** (0.004)	n.s.	n.s.	2001Q1	0.12	0.70	0.68
Lithuania	1.67*** (0.60)	n.s.	0.74*** (0.18)	n.s.	2001Q1	0.40	0.93	0.83
Poland	n.s.	n.s.	n.s.	n.s.				
Romania	0.39* (0.22)	0.01** (0.004)	n.a.	-0.02** (0.01)	2003Q1	0.43	0.57	0.48
Slovakia	1.50*** (0.49)	0.005*** (0.001)	n.a.	n.s.	1995Q1	0.21	0.78	0.59
Slovenia	2.04** (0.44)	0.06*** (0.01)	n.s.	-0.05* (0.03)	2003Q1	0.39	0.63	0.16

Note: Dependent variable: Idiosyncratic component of capital flows. Statistically significant variables reported; n.s. = not statistically significant at 1 percent, 5 percent, or 10 percent; n.a.- data series not available. LM(j) - test for no autocorrelation up to order j (p-value).

5. Conclusion

Using both descriptive and econometric techniques, this paper sheds some light on the determinants of capital flows to the new EU Member States from central and eastern Europe.

Following the 2004 EU enlargement, external borrowing by the NMS10 increased sharply, resulting in a rapid deterioration in the international investment position. However, there appears to be no clear correlation between the balance in the international investment position and the composition of gross foreign liabilities. The boom in foreign capital inflows was then sharply interrupted by the global financial crisis when capital sought a safe haven in more advanced countries. Net foreign capital inflows into the NMS10 excluding official international financial assistance declined substantially in H2-2008 and practically ceased in H1-2009, before recovering somewhat in H2-2009. Capital outflows initially mainly materialised through portfolio investment and financial derivatives, but later also through other investment outflows. Conversely, direct investment remained a source of net foreign capital inflows into the region throughout the whole crisis period.

The surge in foreign capital flows to the NMS10 in the pre-crisis years was the result of two basic forces. First, international developments, in particular the relatively low interest rate environment in the euro area and low risk perception, encouraged investors to seek higher return in the NMS10 in the pre-crisis period. This result is consistent with the view that ample “global liquidity” and increasing financial integration have been an important external push factor for capital flows into emerging markets, including the NMS10. The important role played by external factors has been confirmed during the recent financial crisis, when NMS10 experienced large capital flow reversals. This turnaround was not initiated by any major domestic policy reversal but was rather mainly the result of a sharp turn in investors' risk sentiment (suddenly making foreign investors more attentive to the imbalances which had emerged in some NMS) and the deterioration of macroeconomic conditions in the euro area.

Second, the ability of the NMS10 to finance current account deficits is also influenced by domestic economic conditions and policies. National GDP growth, interest rates, house prices and country-specific risk tend to exert a pro-cyclical influence on capital inflows. In particular, stronger growth and higher short-term interest rates in the NMS10 tend to be associated with larger foreign capital inflows. Some caveats apply however with respect to these empirical findings due to the short time span available.

Overall, the analysis in this paper suggests a need for caution by the NMS10 in borrowing too heavily during good economic times, especially if the capital flows are largely driven by external liquidity and economic conditions rather than by domestic 'pull' factors and are not directed at productivity-enhancing investment. As a reversal in credit availability can be triggered by developments unrelated to the domestic policy framework, the accumulation of large external liabilities and a high dependence on large foreign capital inflows are a source of high vulnerability to changes in the external and domestic environment and risk perception.

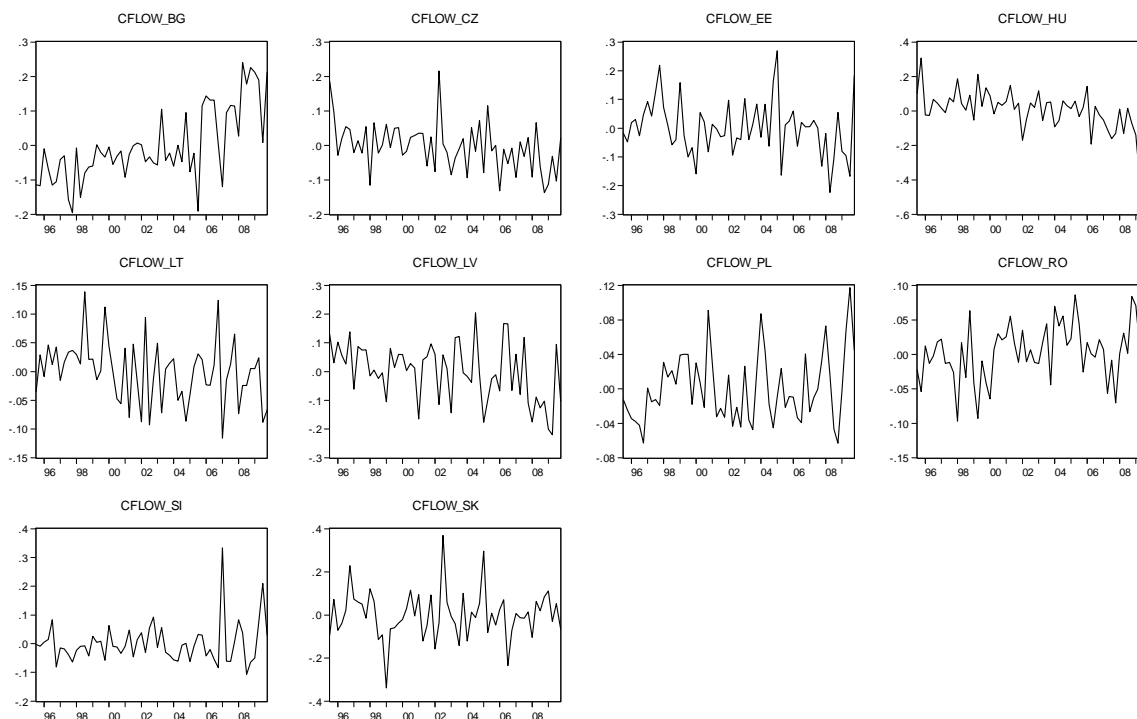
References

- Agénor, Pierre-Richard (1998), "The Surge in Capital Flows: Analysis of 'Pull' and 'Push' Factors", *International Journal of Finance and Economics*, No. 3, pp. 39–57.
- Alfaro, Laura, Sebnem Kalemli-Ozcan, Vadym Volosovych (2005), "Capital Flows in a Globalized World: The Role of Policies and Institutions", NBER Working Papers 11696, National Bureau of Economic Research.
- BIS (2009), "Capital flows and emerging market economies", CGFS Papers No. 22, Committee on the Global Financial System, Bank for International Settlements.
- Berglöf, Erik, Yevgeniya Korniyenko, Alexander Plekhanov and Jeromin Zettelmeyer (2009), "Understanding the Crisis in Emerging Europe", EBRD Working Paper No. 109, European Bank for Reconstruction and Development.
- Calvo, Guillermo A., Alejandro Izquierdo, and Luis-Fernando Mejía (2008), "Systemic Sudden Stops: The Relevance of Balance-Sheet Effects and Financial Integration", NBER Working Paper No. 14026, National Bureau of Economic Research, Cambridge, MA.
- Claessens, Stijn, Michael P. Dooley, and Andrew Warner (1995), "Portfolio Capital Flows: Hot or Cold?", *The World Bank Economic Review*, Vol. 9, No. 1, pp.153-74.
- Calvo, Guillermo, L. Leiderman, and C. Reinhart (1993), "Capital Inflows and Real Exchange Rate Appreciation in Latin America", *IMF Staff Papers* 40(1) pp. 108-151.
- Chuhan, Punam, Gabriel Perez-Quiros and Helene Popper (1996), "International Capital Flows: Do Short-term Investment and Direct Investment Differ?" Policy Research Working Paper 1669, World Bank, Washington, D.C.;
- Daude, Christian, Marcel Fratzscher (2006), "The pecking order of cross border investment", ECB working paper No. 590.
- Ferrucci Gianluigi, Valerie Herzberg, Farouk Soussa, Ashley Taylor (2004), "Understanding capital flows to emerging market economies within a push/pull framework?", *Bank of England Financial Stability Review*, June, pp. 89-96.
- Fiess, Norbert (2003), "Capital flows, country risk, and contagion", World Bank Working paper 2942.
- Gambacorta, Leonardo (2009), "Monetary policy and the risk-taking channel", *BIS Quarterly Review*, December, pp. 43-53.
- Hermann, Sabine, and Dubravko Michaljek (2010), "The determinants of cross-border bank flows to emerging markets: new empirical evidence on the spread of financial crises", Deutsche Bundesbank Discussion paper No. 17/2010.
- Herrmann, Sabine, and Hermann Winkler (2008), "Financial markets and the current account – emerging Europe versus emerging Asia, Deutsche Bundesbank Discussion paper No. 05/2008.
- Kribaeva, Koralai and Assaf Razin (2009) "Composition of international capital flows - A survey", NBER Working Paper No. 15599, National Bureau of Economic Research, Cambridge, MA.

- Krugman, Paul (2000). "Fire-sale FDI, Capital flows and the emerging economies: Theory, evidence and controversies", Chicago, pp. 43-60.
- Lane, Philip, and Gian Maria Milesi-Ferretti (2007), "Capital Flows to Central and Eastern Europe", *Emerging Markets Review*, No. 8(2), pp. 106-123.
- Levchenko, Andrei A. and Paolo Mauro (2007), "Do Some Forms of Financial Flows Help Protect Against "Sudden Stops"?", *The World Bank Economic Review*, Vol. 21, No. 3, pp. 389-411.
- Mihaljek, Dubravko (2009), "The Spread of the Financial Crisis to Central and Eastern Europe: Evidence from the BIS Data", available at: http://www.zsem.hr/site/index2.php?option=com_docman&task=doc_view&gid=275&Itemid=168
- Mody, Ashoka, Mark P. Taylor and Jung Yeon Kim (2001), "Modelling Economic Fundamentals for Forecasting Capital Flows to Emerging Markets", *International Journal of Finance and Economics*, Vol 6, No. 3, pp. 201-216.
- Montiel Peter and Reinhart Carmen (1999), "Do Capital Controls and Macroeconomic Policies Influence the Volume and Composition of Capital Flows? Evidence from the 1990s", *Journal of International Money and Finance*, No. 18, pp. 619-635.
- Stein, Jeremy C. (1995), "Price and Trading Volume in the Housing Market: A Model with Down-Payment Effects", *Quarterly Journal of Economics*, No. 110, pp. 379-406.
- Ying, Yung-Hsiang and Yoonbai Kim (2001), "An Empirical Analysis on Capital Flows: The Case of Korea and Mexico", *Southern Economic Journal* 67, pp. 954-68.

Annex: Country specific components and data sources

A-1: Country-specific components of capital flows to NMS10



A2. Data sources

Data on **capital flows** and subcategories are from Ecwin and cross-checked and extended with data from the IMF International Financial Statistics.

Data on **GDP growth** and three month **interest rates** in the NMS10 are from Ecwin. We use three month interbank rates for Bulgaria (SOFIBOR), the Czech Republic (PRIBOR), Estonia (TALIBOR), Hungary (BUBOR), Latvia (RIGIBOR), Lithuania (VILIBOR), Poland (WIBOR), Romania (BUBOR), Slovakia (BRIBOR/EURIBOR), and Slovenia (STIBOR/EURIBOR).

On **stock markets** we use the following indices: SOFIX (Bulgaria), PX Index (Czech Republic), OMX Talinn Index (Estonia), BUX (Hungary), OMX Riga Index (Latvia), OMX Vilnius Index (Lithuania), VIG (Poland), BET (Romania), SAX (Slovakia), SBI20 (Slovenia). For Bulgaria, Lithuania and Latvia data were only available from 2000. For Romania time series starts in 1997.

House price data are collected from national statistical offices for the following countries (with the number in brackets indicating the first observation): Bulgaria (1997Q1), Czech Republic (1999Q1), Estonia (1997Q1), Hungary (2001Q1), Latvia (2000Q1), Poland (1999Q1) and Slovenia (2003Q1). For Lithuania (2000Q1), data was taken from the land registry office, for Slovakia (2005Q3) we use the house price indicator of the National

Association of Real Estate Offices of Slovakia. For Romania, no reliable house price data are available, for Poland data should be interpreted with particular caution as they are based on a small (and not necessarily representative) sample of housing transactions.

Data on euro area variables are from the ECB (EURIBOR), the OECD (output gap), Bloomberg (exchange rate and stock market volatility) and Ecwin (corporate bond spreads).