Mega Publishing Limited
Bulletin of Applied Economics, 2014, 1(1), 1-13 | December 30, 2014

Do International Capital Flows Worsen Macroeconomic Volatility in Transition Economies?

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Abstract

The 2008 financial crisis helped precipitate a near crisis in the transition economies of Central and Eastern Europe, which ultimately resulted in severe output declines throughout the region. What share of the responsibility did capital movements, particularly "hot money" flows, play in the rapid growth and subsequent recession in the periphery of the European Union? To answer this question, we examine the responses of output, consumption, and investment variability to shocks to both Foreign Direct Investment and non-FDI flows, using quarterly data from the mid-1990s to 2010. Impulse-response and variance decomposition analysis shows that "hot" non-FDI flows contribute more to macroeconomic volatility than do more stable FDI flows, and that certain countries, particularly those with fixed exchange rates, seem to be more vulnerable to shocks than others.

JEL classification numbers:F41
Keywords: Capital Inflows, Macroeconomic Volatility, Transition Economies, Vector Autoregression

1 Introduction

The international financial crisis that began in 2008 put paid to a number of commonly accepted economic ideas. The drawbacks of free capital movement to emerging markets would have to be considered alongside the benefits, and it was no longer a truism that macroeconomic fluctuations had been conquered in what had become known as the "Great Moderation." Nowhere were the effects of the crisis more acutely felt than in the transition economies of Central and Eastern Europe. Those countries that maintained fixed exchange rates to the Euro, such as Estonia and Latvia, experienced Depression-level output drops after foreign capital inflows dried up. Within the CEE region, as well as within the entire European Union, only Poland escaped an economic contraction. This region thus serves as a case study of the effects of large capital flows on

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Article Info: *Received*: August 6, 2014. *Revised :* September 22, 2014
Published online : December 30, 2014

macroeconomic fluctuations in an important group of emerging markets. Here, we test empirically the contributions of capital inflows and outflows to various types of macroeconomic volatility for nine CEE countries, and find that performance varies by type of capital flow and by exchange-rate regime.

2 Literature Review

A study of the effects of capital flows must tie together two branches of the economic literature, both of which have produced a large body of analyses but little in the way of unambiguous conclusions. The first branch studies whether Foreign Direct Investment (FDI) is inherently more stable than "hot" non-FDI flows such as portfolio investment. While Claessens *et al.* (1995) conclude that they do not, the dominant view in the literature (held by Chuhan *et al.*, 1996, and Sarno and Taylor 1999), is that FDI is longer-term and less likely to be withdrawn after a shock that reduces an investment's expected profitability. The second branch of the literature analyzes the effects of access to foreign capital on a country's macroeconomic volatility, but as Kose *et al.* (2006) note in a review article, this relationship is ambiguous. In theory, such capital should allow a country to smooth its consumption in face of economic shocks. At the same time, financial openness exposes economies to instability elsewhere. Evidence of the former view is provided by for various countries by Karras (2006) and Ahmed and Suardi (2009). Razin and Rose (1994), on the other hand, find no link between trade and financial openness and the volatility of output, consumption, and investment for a set of 138 countries. Kose *et al.* (2003) uncover a "hump-shaped" pattern whereby volatility transmission is more likely for less-developed countries, and volatility smoothing is more common for developed countries.

While trade and financial openness (usually proxied by *de jure* measures such as liberalization indices, or de facto ones such as stocks of foreign investment) are often the key variable in these analyses, relatively few studies look at capital flows directly. One exception is the study by Alper (2002), who examines the cross-correlations between real output volatility and net capital inflows for Mexico and Turkey, but finds significant variables only for Mexico. Hegerty (2011) finds that non-FDI flows have a stronger impact than do FDI on macroeconomic volatility, particularly on investment, for Brazil, Mexico, South Africa, and Turkey.

Other variables have been examined as sources of macroeconomic volatility, and these have often been shown to play more of a role than does trade or financial openness. Examples include exchange-rate flexibility and shocks to the money supply and technology (Karras and Song, 1996); country size (Karras, 2006); government size and fiscal policy (Furceri, 2007); and external shocks, usually proxied by terms of trade volatility (Hirata *et al.*, 2007 and Kim, 2007). The effects of financial openness or capital flows on macroeconomic volatility specifically in transition economies have received relatively little attention in the literature, however. This may be due to the short time series that are available for the post communist period. For the same reason, earlier studies were unable to include many CEE countries at all. Ramey and Ramey (1995), for example, include no countries in the region save Yugoslavia.

This study examines the impact of capital flows on output, consumption, and investment volatility in a set of CEE countries. These volatility series, beginning in the mid 1990s,

are shown in Figure 1. Clearly, each type of variability varies throughout the period, with country- and region-specific patterns. The Balkan countries, particularly Romania and Bulgaria, register notable spikes in the around the 2008 crisis, although macroeconomic volatility was present throughout the sample period. Likewise, other countries experienced periods of high volatility, particularly during the financial crisis. Latvian investment, Polish consumption, and Lithuanian output all stand out for sharp increases. Yet, unlike its two Baltic neighbors, Estonia seems to have seen a reduction in volatility during the crisis period. This might be expected, since Estonia was the first former Soviet republic with the requisite macroeconomic performance to be invited to join the Euro. It is clear that each country and GDP component follows its own path.

Do these countries also respond differently to FDI and non-FDI investment? This study answers this question by entering each flow separately into each nation's estimation. By applying Vector Autoregressive (VAR) methods to data for nine transition economies, we are able to see how shocks to both flows affect macroeconomic volatility in each country. Impulse-response and variance decomposition analysis shows that "hot money" does indeed contribute more to macroeconomic volatility in the region than does FDI. Our country-specific results indicate that certain more stable countries, such as Estonia, are more insulated from these effects, while capital flows introduce more instability in the Balkans. This paper proceeds as follows: Section II outlines the methodology and Section III provides the empirical results. Section IV concludes.

3 Data and Methodology

This study examines the effects of increases (or decreases) in nine CEE countries' capital flows on their volatility of output, consumption, and investment. To do this, quarterly data from the International Financial Statistics of the International Monetary Fund are used to create relevant volatility terms and an appropriate set of control variables. The length of each final dataset varies from country to country, but each are given in Figure 1. Each series ends in 2010, before Estonia joined the Euro and ceased to control its own currency.

The variables, which are chosen based on the literature outlined above, are as follows:

YVOL = volatility of real GDP (nominal deflated by GDP deflator)
CVOL = volatility of real consumption (nominal, deflated by Consumer Price Index)
IVOL = volatility of real gross fixed capital formation plus changes in inventories (deflated by PPI)
GVOL = volatility of real Government expenditure (nominal, deflated by GDP deflator)
REERVOL = volatility of the real effective exchange rate
REALR = real interest rate (nominal money-market rate minus inflation rate)
YGROWTH = percentage change in real GDP (over four quarters previous)
FDI = net foreign direct investment (inflows minus outflows), as a share of GDP
NONFDI = net portfolio plus net other investment, as a share of GDP.

When necessary, all variables are deseasonalized using the Census X-12 procedure. Each volatility series is created by capturing the standard errors of a rolling AR(1) estimation over eight quarters, using first-differenced log data. While the literature has failed to point

toward a single best proxy for volatility, this method was chosen over an alternative (a moving standard deviation of log changes in each relevant series) because it shows less persistence after a shock. The three main macroeconomic volatility terms are included together in the VAR, since they might have a significant influence on one another. Besides FDI and non-FDI flows, variability in Government spending and the exchange rate are the focus of this study, the former to test whether fiscal policy is an effective method of stabilizing these economies, and the latter to analyze the role of external volatility on these domestic economies. Finally, growth and the real interest rate are included, since they might influence both capital flows and macroeconomic volatility.

All variables are tested for stationarity using the Phillips-Perron test, which is similar to the Augmented Dickey-Fuller test, but uses Newey-West (1987) standard errors to control for autocorrelation. Taking first differences for any I(1) variables, each variable is entered in to a VAR. This method is not only an excellent way to deal with endogenous variables, it also captures the short-term effects that sudden shocks to net capital flows might bring about. In this VAR, one lag is chosen in all cases, based on both the Schwarz criterion and the desire to reduce the number of parameters in the model. Next, impulse-response functions (IRFs) and forecast error variance decompositions (FEVDs) are obtained for each country's vector. Because these variables have been shown to affect one another—both capital flows and volatility have been shown to influence growth, for example—there is no particular "best" ordering for the variables. For this reason, the Generalized VAR approach of Pesaran and Shin (1998) is used rather than the more traditional orthogonalized method of Sims (1980). Estimations obtained using this newer approach are insensitive to the ordering of the variables. These results are as follows.

4 Main Results

The results of the Phillips-Perronstationarity test, for both level and first-differenced variables, are provided in Table 1. Capital flows are generally stationary, but other variables differ from country to country. We use these results to make sure that only stationary variables are entered into the VAR. With the exception of capital flows, a time series is differenced if the PP test suggests that it is non stationary in levels.

Next, we generate Generalized Impulse-Response Functions for each of the nine countries' VARs. These GIRFs, along with standard-error bands, are shown in Figure 2. We can compare the results in three ways: By type of capital flow, by type of macroeconomic volatility, and by country or region.

Here, we find that non-FDI flows have more of an effect on all types of macroeconomic volatility in these countries. This confirms the "hot money" hypothesis in this case. At the same time, no specific pattern can be determined for responses by the three types of variability. Output, consumption (which is expected to be more easily smoothed by households) and investment (which is usually the most volatile) each show a unique response. For example, non-FDI flows to Bulgaria seem to smooth output fluctuations, but FDI has little effect. For consumption, only FDI has an impact—but it leads to increased volatility, suggesting either transmission or the inability of the domestic market to absorb these inflows.

These differences persist, especially for those countries that are more integrated with Western Europe. The Czech Republic's FDI inflows reduce output variability, while

non-FDI flows have an effect only on investment variability. This suggests that the country's strong connections to German and other industry might lead to increased stability in the domestic economy. In Lithuania, which is somewhat less integrated, we find that "hot" money has led to an increase in this output variability. On the other hand, FDI seems to increase output volatility in Poland, which, like the Czech Republic, has seen a large share of German direct investment.

Of the four fixed-rate regimes (the three Baltic nations plus Bulgaria), two have seen clear increases in domestic macroeconomic instability as a result of increased capital inflows. One may argue that the two countries where the responses are statistically insignificant—particularly Estonia, whose economic success allowed it to join the Euro in 2011—are the more advanced countries in the group. Therefore, our results suggest that maintaining a fixed rate, which removes the main adjustment mechanism to deal with capital inflows, might make transition economies more vulnerable to volatility increases. These results are more pronounced for the less developed economies in the group. A floating rate seems to help here: The results for Romania suggest that capital flows can reduce volatility. A positive shock to FDI results in reduced investment volatility, while non-FDI leads to a reduction in consumption variability that is significant at a level just higher than 10 percent.

What is the role of the other types of volatility, both external and internal, in influencing this macroeconomic variability? Figure 1 shows the responses to variability in Government spending and in the real effective exchange rate. We find that GVOL increases investment volatility in Lithuania and Croatia, but reduces output variability in Latvia and Hungary. It is important to recall that Latvia maintained its Euro peg during the crisis by implementing an "internal devaluation," whereby the government drastically contracted the economy so that prices would fall instead of the lats. This allowed the small Baltic country to meet the criteria to join the Euro in 2014. Hungary also received an IMF bailout, and while the forint floats, we do see the two hardest-hit countries reducing output volatility through fiscal changes. When we look at the volatility of the real effective exchange rate, we surprisingly find little evidence of any significant response to external shocks, in any country.

Our Forecast Error Variance Decompositions are presented in Table 2, for all variables in each VAR, at one- and four-quarter horizons. These tend to confirm the results of our IRFs. Since Generalized FEVDs do not need to sum to 1, and since shocks to each type of volatility makes up the largest share of their own forecast error, we choose the value of 0.1 as our threshold of what is an "important" contributor. We also consider the relative size of different variances, particularly when comparing the effects of FDI and non-FDI flows, and focus on those instances where one variance is twice the other.

In results that are similar to what was described above, shocks to non-FDI flows play an important role in determining volatility in the region. In Bulgaria, this is true for consumption and output. In Latvia, Investment flows are influenced in a way that was not depicted in the IRFs. For the other countries, the outsize role of "hot" money is demonstrated in certain cases that match the IRF results. Examples include investment volatility in the Czech Republic and Poland and consumption volatility in Romania. Most importantly, while both types of investment make large contributions to the forecast error of Poland's real GDP volatility, FDI inflows play the largest role of any flow or country studied here.

5 Figures and Tables

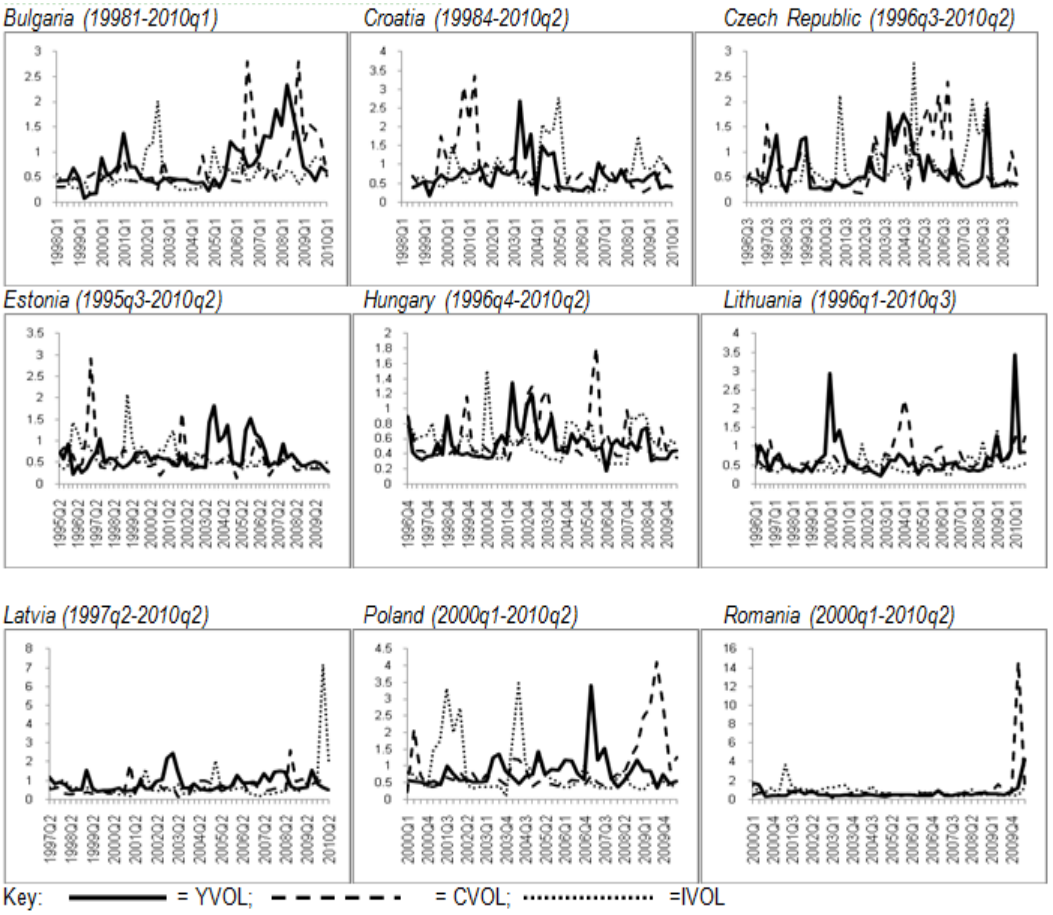
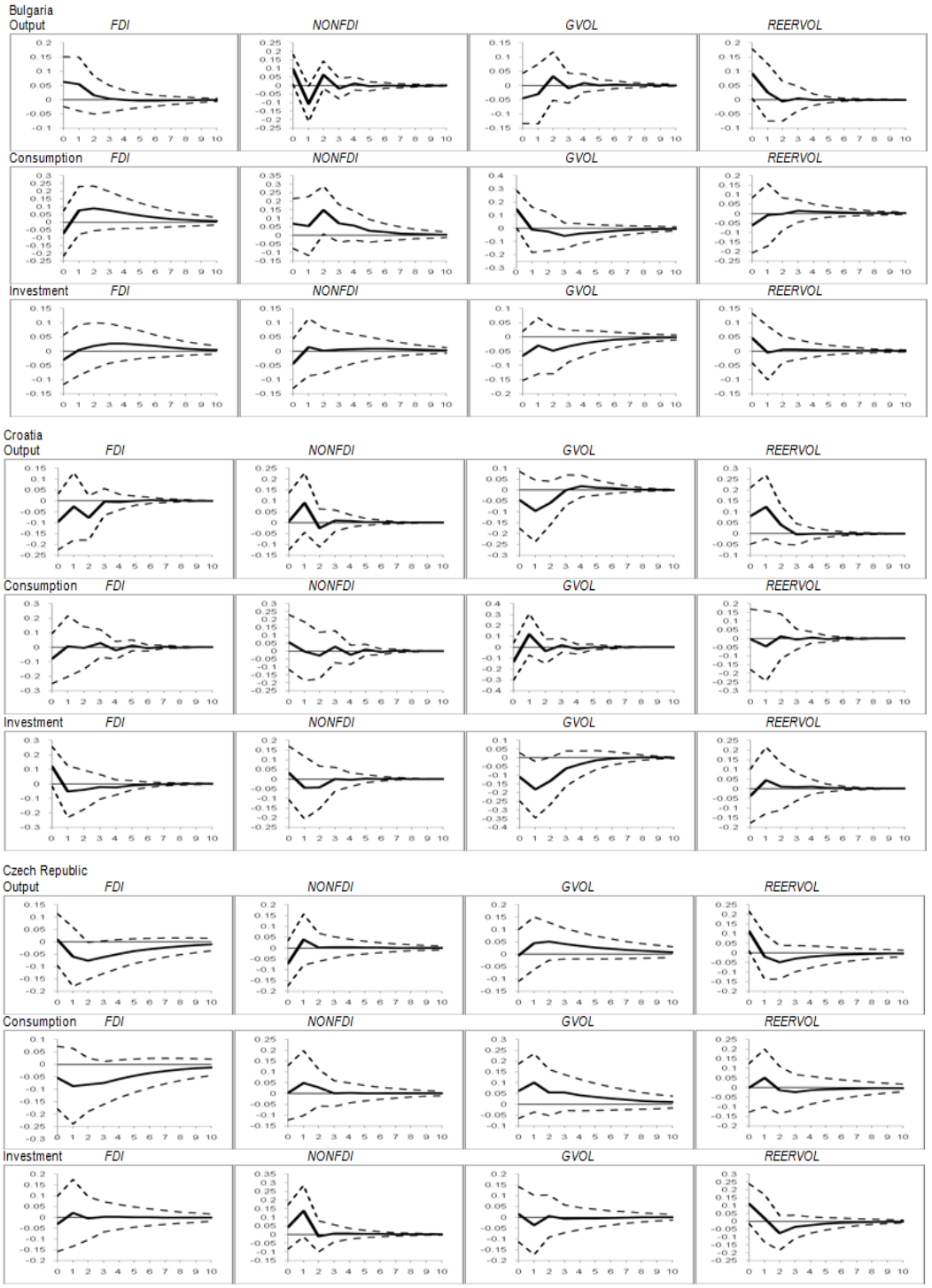


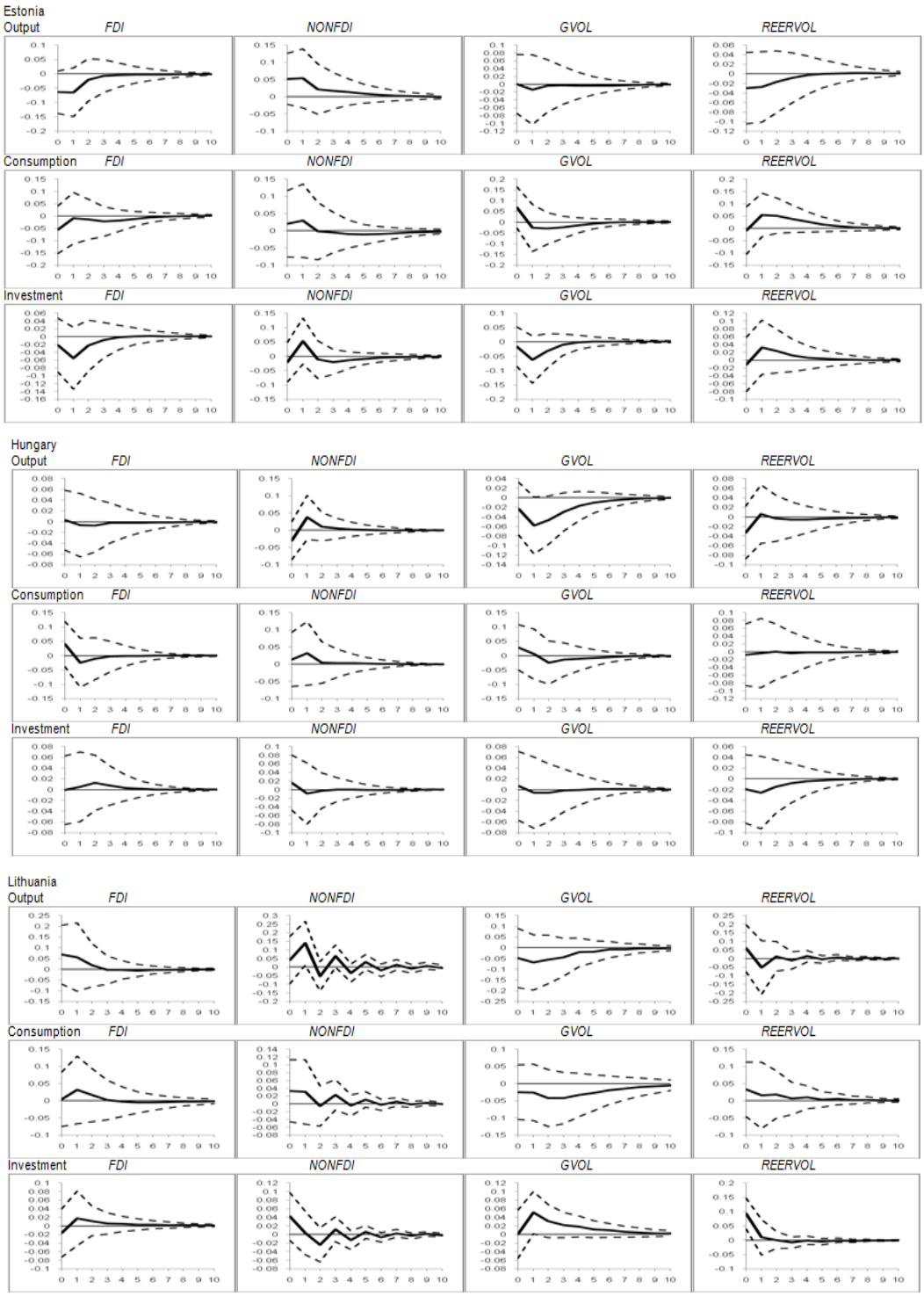
Figure 1: Macroeconomic volatility series

Table 1: Phillips-Perron stationarity tests

Country	*Variable*	*Level*	*First Diff.*	*Country*	*Variable*	*Level*	*First Diff.*
Bulgaria	YVOL	-2.666	-8.814	Latvia	YVOL	-4.498	-9.582
	CVOL	-4.483	-10.797		CVOL	-6.651	-16.745
	GVOL	-5.875	-14.146		GVOL	-3.827	-11.733
	IVOL	-4.767	-10.996		IVOL	-6.102	-15.117
	REERVOL	-3.196	-9.236		REERVOL	-3.277	-7.917
	GROWTH	-6.948	-8.226		GROWTH	-1.760	-5.884
	FDI	-3.027	-14.912		FDI	-4.331	-14.377
	NONFDI	-5.374	-16.199		NONFDI	-4.336	-13.217
	REALR	-3.071	-5.294		REALR	-2.344	-7.519
Croatia	YVOL	-5.132	-15.124	Lithuania	YVOL	-5.838	-14.672
	CVOL	-3.499	-11.021		CVOL	-4.451	-10.351
	GVOL	-5.078	-10.369		GVOL	-5.255	-8.501
	IVOL	-3.693	-8.129		IVOL	-4.986	-13.926
	REERVOL	-2.711	-7.783		REERVOL	-2.599	-6.422
	GROWTH	-2.604	-6.045		GROWTH	-6.213	-14.965
	FDI	-6.871	-16.308		FDI	-1.940	-17.414
	NONFDI	-8.246	-20.486		NONFDI	-2.699	-6.710
	REALR	-2.657	-8.069	Poland	REALR	-6.686	-15.070
Czech R.	YVOL	-4.673	-11.974		YVOL	-7.066	-14.537
	CVOL	-4.160	-14.181		CVOL	-2.952	-8.094
	GVOL	-4.518	-10.098		GVOL	-5.572	-12.936
	IVOL	-5.620	-13.321		IVOL	-4.049	-9.291
	REERVOL	-5.395	-13.661		REERVOL	-13.946	-25.468
	GROWTH	-2.360	-6.677		GROWTH	-2.449	-6.542
	FDI	-6.145	-16.596		FDI	-5.713	-14.200
	NONFDI	-8.123	-20.734		NONFDI	-4.119	-7.715
	REALR	-3.833	-13.138		REALR	-0.861	-4.900
Estonia	YVOL	-4.029	-8.971	Romania	YVOL	-4.413	-9.987
	CVOL	-4.734	-9.368		CVOL	-6.688	-15.331
	GVOL	-6.106	-14.350		GVOL	-5.094	-11.764
	IVOL	-4.929	-10.685		IVOL	-5.804	-15.840
	REERVOL	-5.759	-9.611		REERVOL	-4.134	-11.543
	GROWTH	-2.270	-5.935		GROWTH	-2.724	-6.671
	FDI	-4.892	-11.722		FDI	-4.151	-10.528
	NONFDI	-5.790	-14.617		NONFDI	-4.737	-14.035
	REALR	-2.777	-5.899		REALR	-3.188	-5.734
Hungary	YVOL	-5.062	-12.461				
	CVOL	-4.782	-9.515				
	GVOL	-4.302	-10.133				
	IVOL	-5.028	-10.257				
	REERVOL	-4.402	-13.489				
	GROWTH	-1.906	-8.136				
	FDI	-4.333	-13.622				
	NONFDI	-7.099	-21.992				
	REALR	-2.965	-5.352				

Critical values: -3.6, -2.9, and -2.6 at 1, 5, and 10 percent.


Bulgaria
Output
FDI
NONFDI
GVOL
REERVOL
Consumption
FDI
NONFDI
GVOL
REERVOL
Investment
FDI
NONFDI
GVOL
REERVOL
Croatia
Output
FDI
NONFDI
GVOL
REERVOL
Consumption
FDI
NONFDI
GVOL
REERVOL
Investment
FDI
NONFDI
GVOL
REERVOL
Czech Republic
Output
FDI
NONFDI
GVOL
REERVOL
Consumption
FDI
NONFDI
GVOL
REERVOL
Investment
FDI
NONFDI
GVOL
REERVOL


Estonia
Output FDI NONFDI GVOL REERVOL
Consumption FDI NONFDI GVOL REERVOL
Investment FDI NONFDI GVOL REERVOL
Hungary
Output FDI NONFDI GVOL REERVOL
Consumption FDI NONFDI GVOL REERVOL
Investment FDI NONFDI GVOL REERVOL
Lithuania
Output FDI NONFDI GVOL REERVOL
Consumption FDI NONFDI GVOL REERVOL
Investment FDI NONFDI GVOL REERVOL

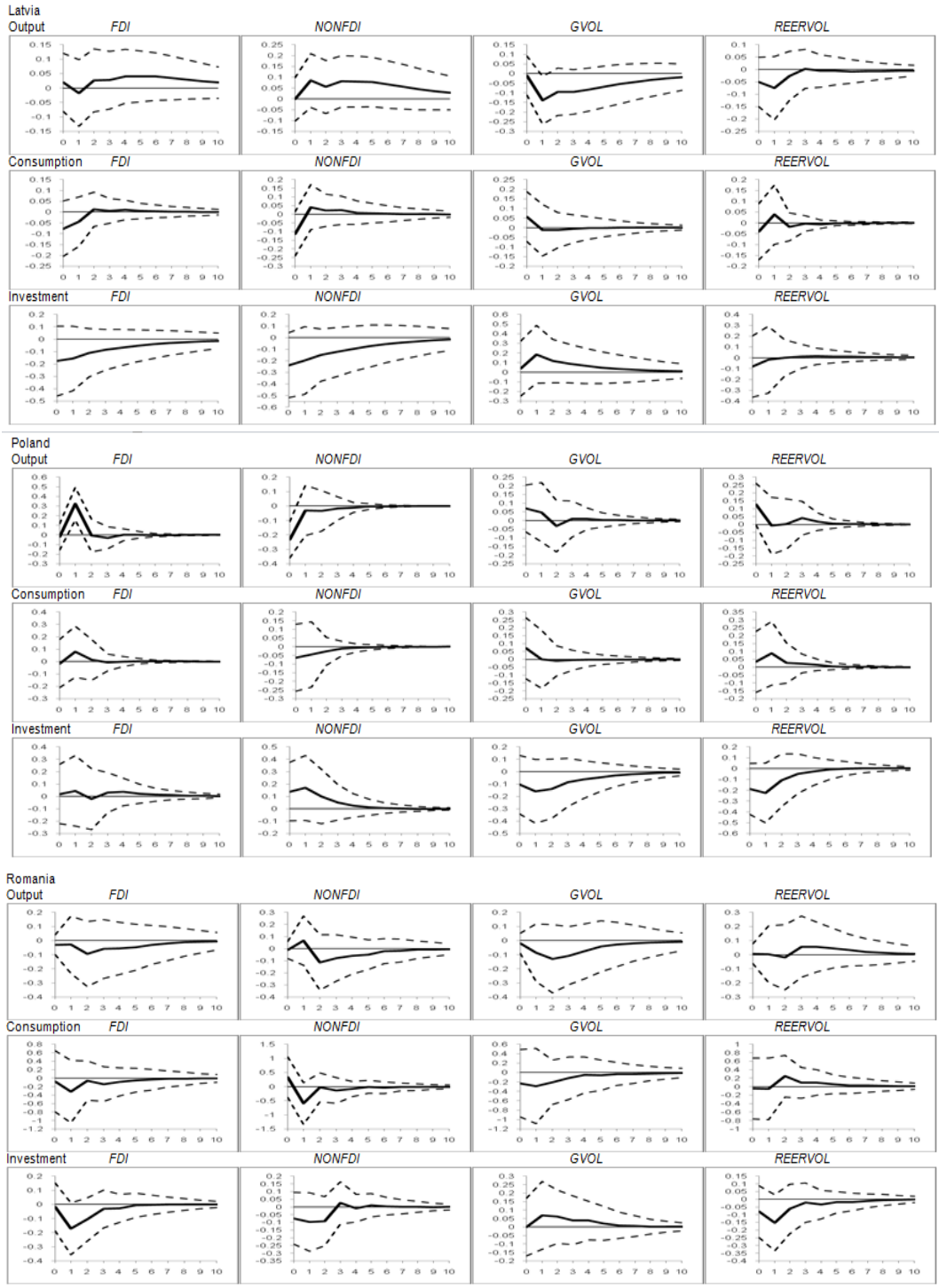


Figure 2: Generalized impulse response functions with ±2 standard error bands

Table 2: Generalized forecast error variance decompositions

Bulgaria	Horizon	*FDI*	*NONFDI*	*GVOL*	*REERVOL*	*GROWTH*	*REALR*	*YVOL*	*CVOL*	*IVOL*
YVOL	1	0.058	0.170	0.025	0.075	0.055	0.007	0.776	0.208	0.050
	4	0.055	0.190	0.032	0.069	0.066	0.007	0.743	0.193	0.053
CVOL	1	0.034	0.024	0.066	0.012	0.008	0.040	0.248	0.895	0.074
	4	0.074	0.101	0.071	0.011	0.012	0.035	0.213	0.778	0.071
IVOL	1	0.009	0.020	0.050	0.020	0.051	0.001	0.043	0.080	0.930
	4	0.021	0.017	0.073	0.017	0.157	0.002	0.054	0.070	0.792
Croatia	Horizon	*FDI*	*NONFDI*	*GVOL*	*REERVOL*	*GROWTH*	*REALR*	*YVOL*	*CVOL*	*IVOL*
YVOL	1	0.041	0.035	0.048	0.091	0.006	0.043	0.860	0.019	0.010
	4	0.062	0.036	0.060	0.091	0.016	0.041	0.808	0.020	0.029
CVOL	1	0.015	0.008	0.072	0.005	0.005	0.013	0.013	0.973	0.011
	4	0.016	0.011	0.072	0.005	0.005	0.013	0.013	0.957	0.012
IVOL	1	0.054	0.010	0.142	0.010	0.007	0.025	0.024	0.013	0.896
	4	0.055	0.014	0.187	0.010	0.017	0.027	0.038	0.012	0.841
Czech R.	Horizon	*FDI*	*NONFDI*	*GVOL*	*REERVOL*	*GROWTH*	*REALR*	*YVOL*	*CVOL*	*IVOL*
YVOL	1	0.022	0.037	0.012	0.074	0.011	0.005	0.896	0.034	0.021
	4	0.074	0.030	0.035	0.078	0.010	0.009	0.740	0.099	0.017
CVOL	1	0.037	0.008	0.048	0.009	0.017	0.014	0.009	0.900	0.030
	4	0.077	0.009	0.062	0.010	0.019	0.013	0.017	0.824	0.025
IVOL	1	0.005	0.071	0.005	0.044	0.025	0.037	0.031	0.060	0.790
	4	0.004	0.064	0.005	0.063	0.043	0.102	0.028	0.057	0.713
Estonia	Horizon	*FDI*	*NONFDI*	*GVOL*	*REERVOL*	*GROWTH*	*REALR*	*YVOL*	*CVOL*	*IVOL*
YVOL	1	0.073	0.049	0.002	0.014	0.015	0.024	0.934	0.051	0.068
	4	0.067	0.050	0.002	0.015	0.013	0.021	0.908	0.079	0.074
CVOL	1	0.018	0.007	0.031	0.017	0.027	0.055	0.024	0.890	0.024
	4	0.021	0.007	0.036	0.040	0.024	0.067	0.024	0.811	0.048
IVOL	1	0.035	0.032	0.041	0.012	0.010	0.098	0.076	0.016	0.830
	4	0.038	0.036	0.048	0.018	0.016	0.100	0.090	0.016	0.791
Hungary	Horizon	*FDI*	*NONFDI*	*GVOL*	*REERVOL*	*GROWTH*	*REALR*	*YVOL*	*CVOL*	*IVOL*
YVOL	1	0.001	0.044	0.075	0.021	0.010	0.019	0.880	0.012	0.006
	4	0.002	0.043	0.126	0.021	0.010	0.021	0.826	0.012	0.007
CVOL	1	0.021	0.011	0.008	0.001	0.052	0.029	0.012	0.885	0.009
	4	0.020	0.011	0.015	0.001	0.051	0.037	0.013	0.859	0.008
IVOL	1	0.000	0.005	0.001	0.016	0.016	0.099	0.001	0.047	0.956
	4	0.004	0.005	0.002	0.019	0.023	0.095	0.002	0.066	0.920
Latvia	Horizon	*FDI*	*NONFDI*	*GVOL*	*REERVOL*	*GROWTH*	*REALR*	*YVOL*	*CVOL*	*IVOL*
YVOL	1	0.003	0.035	0.094	0.040	0.020	0.019	0.823	0.020	0.011
	4	0.013	0.081	0.155	0.031	0.061	0.035	0.645	0.021	0.130
CVOL	1	0.034	0.063	0.015	0.014	0.004	0.063	0.004	0.957	0.021
	4	0.035	0.067	0.016	0.015	0.004	0.063	0.004	0.948	0.021
IVOL	1	0.048	0.081	0.031	0.006	0.224	0.050	0.001	0.062	0.920
	4	0.063	0.112	0.049	0.006	0.216	0.064	0.001	0.073	0.879
Lithuania	Horizon	*FDI*	*NONFDI*	*GVOL*	*REERVOL*	*GROWTH*	*REALR*	*YVOL*	*CVOL*	*IVOL*
YVOL	1	0.024	0.064	0.021	0.019	0.151	0.044	0.913	0.027	0.011
	4	0.023	0.082	0.034	0.019	0.142	0.050	0.860	0.027	0.014
CVOL	1	0.008	0.016	0.010	0.011	0.001	0.001	0.025	0.972	0.008
	4	0.009	0.018	0.039	0.012	0.001	0.003	0.036	0.937	0.009
IVOL	1	0.011	0.035	0.051	0.171	0.038	0.060	0.020	0.043	0.888
	4	0.014	0.048	0.078	0.158	0.035	0.057	0.024	0.080	0.812
Poland	Horizon	*FDI*	*NONFDI*	*GVOL*	*REERVOL*	*GROWTH*	*REALR*	*YVOL*	*CVOL*	*IVOL*
YVOL	1	0.323	0.169	0.021	0.050	0.019	0.003	0.601	0.000	0.019
	4	0.302	0.161	0.024	0.052	0.029	0.017	0.569	0.003	0.027
CVOL	1	0.016	0.015	0.012	0.022	0.023	0.024	0.006	0.949	0.061
	4	0.016	0.017	0.013	0.025	0.024	0.024	0.007	0.938	0.061
IVOL	1	0.003	0.062	0.048	0.112	0.016	0.103	0.059	0.066	0.944
	4	0.006	0.071	0.079	0.118	0.014	0.108	0.063	0.062	0.905
Romania	Horizon	*FDI*	*NONFDI*	*GVOL*	*REERVOL*	*GROWTH*	*REALR*	*YVOL*	*CVOL*	*IVOL*
YVOL	1	0.004	0.011	0.018	0.000	0.038	0.020	0.363	0.864	0.007
	4	0.026	0.040	0.063	0.010	0.031	0.013	0.306	0.777	0.022
CVOL	1	0.018	0.078	0.023	0.001	0.046	0.044	0.161	0.894	0.037
	4	0.021	0.076	0.030	0.013	0.048	0.043	0.162	0.857	0.037
IVOL	1	0.079	0.039	0.012	0.078	0.058	0.044	0.004	0.033	0.779
	4	0.091	0.052	0.024	0.074	0.055	0.067	0.032	0.146	0.651

6 Conclusion

The transition economies of Central and Eastern Europe have, in the past decade, seen the potential downsides to both inflows and outflows of capital. Whereas before the 2008 financial crisis, excessive inflows had led to credit bubbles and high inflation, the "sudden stop" that followed helped usher in a severe economic contraction. This study looks at the role of capital inflows on macroeconomic volatility on nine economies in the region, from the mid 1990s to 2010. Modeling these types of volatility along with capital flows and other related variables in a VAR framework, we arrive at two main conclusions. First, "hot" non-FDI does seem to have more of an impact on output, consumption, and investment variability in the region than does Foreign Direct Investment. This confirms the idea that more volatile capital flows do indeed serve to destabilize these economies. At the same time, external volatility plays less of a role here than has been shown in certain previous studies. Secondly, each country responds to shocks in capital flows in its own way, which yields certain clear patterns. The Czech Republic, which has attracted a large amount of German manufacturing, has seen FDI reduce its level of output variability. The countries that have fixed their exchange rates to the Euro as a precursor to joining the common currency appear to have exposed themselves to macroeconomic instability as a result.

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