Are Devaluations Contractionary in Emerging Economies of Eastern Europe?

Mohsen Bahmani-Oskooee
The Center for Research on International Economics and
Department of Economics
The University of Wisconsin-Milwaukee
Milwaukee, WI 53201

bahmani@uwm.edu

and

Ali M. Kutan
Department of Economics and Finance
Southern Illinois University Edwardsville
Edwardsville, IL 62026-1102

akutan@siue.edu

Abstract

In most developing countries currency depreciation is said to be contractionary. This is because depreciation reduces the aggregate supply more than it increases the aggregate demand. However, emerging economies have received no attention so far, mostly due to unavailability of data. Now that enough time-series data are available, we try to fill the gap by investigating the impact of real depreciation in effective exchange rates of Belarus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Russia, and Slovak Republic on their domestic output. We find that in the short run real depreciation is expansionary in Belarus, Latvia, Poland, and Slovak Republic; contractionary in Czech Republic, Estonia, Hungary, and Russia; and has no effect in Lithuania. In almost none of the countries, the short-run effects last into the long run.

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I. Introduction

The purpose of this paper is to examine the impact of exchange rate changes -devaluations or depreciations[1] - on output in nine emerging economies of the European Union for which necessary data on all relevant variables are available. In particular, we test whether devaluations are contractionary in these economies. We focus on these emerging markets for several reasons. First, empirical evidence on this issue from these set of countries is lacking. To our best knowledge, this is the first study providing evidence on the impact of devaluations in nine emerging economies of the Union. Second, these economies are relatively small and open, relying heavily on export revenues to promote economic growth. A drop in output due to negative effects of exchange rate devaluations may therefore slow down economic growth, hurting these economies' catching-up efforts with the EU. After all, real economic convergence towards the EU standards is the ultimate objective of these countries economic integration decision with the EU. Fluctuations in output due to adverse effects of exchange rate changes on output may cause business cycles and hence delay the real convergence process. During the initial years of the transition, the key economic goal of these economies was to achieve a stable inflation environment, as the elimination of government restrictions in general and trade liberalization measures increased aggregate demand, putting pressure on prices. Over time, competitiveness has played a much more important role, as inflation was controlled and price convergence with the EU is achieved. To achieve competitiveness, the majority of transition countries initially undertook a series of official devaluations; however, later they switched to more flexible exchange rate policies. Supporting the latter view, Kočenda and Valachy (2006)

[1] In this paper, devaluations and depreciations are used interchangeably. The countries in our sample have adopted different exchange rate systems. At the beginning of transition period, most countries used fixed exchange rates systems, followed by more flexible exchange rates. Kočenda and Valachy (2006) provide a recent review of the development in exchange rate policies in our sample of countries.

provide empirical evidence that nominal exchange rates in the Czech Republic, Hungary, Poland, and Slovakia exhibited greater fluctuations over time because of the change in the exchange rate regime from relatively fixed to more flexible exchange rates. However, different countries exhibited different exchange rate flexibility. It is therefore important to test whether the differences in the exchange rate flexibility across countries have affected the output differently. In other words, the link between exchange rate fluctuations and output behavior – both in the short- and long-run - is an important issue for the newly emerging European economies. Third, given the expected enlargement of the Union in the near future[2], empirical evidence from the current and candidate EU countries in our sample may provide lessons for future members.

Despite the importance of exchange rate changes on output in these emerging, open economies of European Union, there are not many empirical studies on the exchange rate-output link. To our best knowledge, there have been two related lines of research. Some related work study the issue of the pass-through of exchange rates to inflation rates in some selected emerging EU economies (see, Billmeier and Bonato, 2004; Coricelli et al., 2006; Korhonen and Wachtel, 2006). Other line of research examines the impact of exchange rates on export or trade balance (see, Kemme and Teng, 2000; Babetskii, 2005; Égert and Morales-Zumaquero, 2005; Bahmani-Oskooee and Kutan, 2007). Even though some studies show that devaluation has helped these countries to gain competitiveness and export more, inflationary effects of devaluation could increase cost of imported resources causing a decrease in aggregate supply. If this latter effect

[2] The enlargement of the European Union continues at a speedy rate. On May 2004, ten new members joined EU. Eight of them, namely the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, and Slovenia, are the former transition economies. Cyprus and Malta are the other two new members. Bulgaria, Croatia, Romania and Turkey are the candidate countries. The next round of the enlargement is expected to include the Western Balkan countries of Albania, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia and Serbia and Montenegro.

more than offsets the expansionary effect o aggregate demand, indeed devaluations could be contractionary.[3]

In this paper, we fill an important gap in the literature by studying the impact of exchange rate changes on output in the newly emerging European economies. Our study has important policy implications. First, if evidence indicates that devaluations do not hurt economic growth, then it suggests that changes in exchange rate may not create a barrier for the catching up efforts of the new EU economies towards the EU standards. As the real convergence is one of the important conditions for joining the euro zone for the new EU members and applying for the EU memberships for the candidate countries, evidence on the significance of exchange rate devaluations on output is a key policy issue for EU policymakers. Second, our results provide insights as to whether exchange rate flexibility is an important factor in affecting the link between exchange rate changes and output. To do so, we compare our results on the exchange rate-output link with a measure of exchange rate flexibility to provide inferences on the importance of exchange rate flexibility as a factor in determining the link. In section II we outline our model and explain the methodology that is based on the bounds testing approach to cointegration and error-correction modeling. Section III presents the empirical results. A summary is provided in section IV with data definition and sources in an appendix.

II. The Model and Methodology

In assessing the impact of depreciation on output most of the previous researchers have also included in their model a measure of fiscal policy as well as a measure of monetary policy in addition to the real exchange rate. Therefore, in this paper we follow some of them, e.g.,

[3] For a general recent review article see Bahmani-Oskooee and Miteza (2003).

Edwards (1986), Bahmani-Oskooee (1998), Bahmani-Oskooee and Miteza (2004), and Bahmani-Oskooee and Kandil (2007) and adopt the following specification:

$$LnGDP_t = a + bLnM_t + cLnG_t + dLnREX_t + \varepsilon_t \qquad (1)$$

Equation (1) is a reduced form model in which GDP is a measure of real output; M is real money supply as a measure of monetary policy; G is real government spending as a measure of fiscal policy; *REX* is the real effective exchange rate, and ε is an error term. Following macro theory if expansionary monetary and fiscal policies are to have positive effects on output in the long run, we would expect estimates of b and c to be positive. By definition a decline in the real effective exchange rare (*REX*) reflects real depreciation of domestic currency against currencies of trading partners. Therefore, if real depreciation is to be expansionary, an estimate of d should be negative. Hence, for real depreciation to be contractionary, an estimate of d should be positive.

Previous research has also distinguished the short-run effects of each of the right-hand side variables on output from their long-run effects. A methodology that provides impetus for achieving both effects simultaneously through a single model is the bounds testing approach of Pesaran te al. (2001). Accordingly, the long-run equation (1) is specified as an error-correction model in the form of (2):

$$\begin{aligned}\Delta LnGDP_t = \alpha_0 + \sum_{k=1}^{n1}\alpha_{1k}\Delta LnGDP_{t-k} + \sum_{k=0}^{n2}\alpha_{2k}\Delta LnM_{t-k} + \sum_{k=0}^{n3}\alpha_{3k}\Delta LnG_{t-k} + \sum_{k=0}^{n4}\alpha_{4k}\Delta LnREX_{t-k} \\ + \beta_0 LnGDP_{t-1} + \beta_1 LnM_{t-1} + \beta_2 LnG_{t-1} + \beta_3 LnREX_{t-1} + \omega_t \qquad (2)\end{aligned}$$

Without lagged level of variables, (2) would resemble a standard VAR model. Therefore, the lagged level variables serve as a proxy for the lagged error-term from (1). To justify inclusion of lagged level variables, Pesaran *et al* (2001) propose applying the standard F test. The F tes, however, has new critical values that they tabulate. A lower bound critical value is provided by assuming all variables to be stationary and an upper bound critical value is provided by assuming all variables to be non-stationary. The upper bound critical value could also be used if some variables are stationary and some are non-stationary. If calculated F statistic is greater than the upper bound critical value, the lagged level variables are said to be not only jointly significant but also cointegrated. Once cointegration is established, the long-run effects are judged by the estimates of β_1- β_3 that is normalized by β_0. The short-run effects are, however, inferred by the estimates of $\alpha_{2k} - \alpha_{4k}$.[4]

III. The Results

Error-correction model outlined by specification (2) is estimated for nine emerging economies of Belarus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Russia, and Slovak Republic using quarterly data. The exact definition, frequency, and sources of data are provided in the appendix. Previous research has shown that the result of the F test could be sensitive to the number of lags imposed on each first-differenced variable. We therefore follow Bahmani-Oskooee and Tanku (2007) and impose a maximum of eight lags on each first-differenced variable and use the AIC criterion to select the optimum lag length. The F test then is carried out at optimum lags. The full-information results from each optimum model and for each country are reported in Tables 1-9. In each table the results are reported in two panels. While panel A reports the short-run coefficient estimates, panel B reports the long-run estimates along with all diagnostics.

[4] The methodology in this section closely follows Bahmani-Oskooee and Kandil (2007). However, for a detailed and step by step explanation of the bounds testing approach see Bahmani-Oskooee and Tanku (2007).

Tables 1-9 go about here

Concentrating on the short-run results we gather that for each variable there is at least one short-run coefficient that is significant (at least at the 10% level). Since this is almost the case in all countries, we may conclude that not only currency depreciation has short-run effects on output in emerging economies, but so do fiscal and monetary policies. More specifically, it appears that in the short run real depreciation is expansionary in Belarus, Latvia, Poland and Slovak Republic and contractionary in Czech Republic, Estonia, Hungary, and Russia. This is because all short-run coefficients obtained for the real effective exchange rate is negative for the countries in the first group and positive for those in the second group. Of course, we see no short-run effects in the results for Lithuania. In order to see whether these short-run effects translate into the long run, we shift to long-run results reported in panels B.

From the long-run coefficient estimates we gather that the normalized coefficient obtained for the real effective exchange rate is only significant in the cases of Latvia, Lithuania, Russia, and Slovak Republic. However, the significant long-run coefficient is meaningful only in the case of Slovak Republic since the F statistic for cointegration is greater than its critical value of 4.01 only in this country. Thus, it appears that in almost all emerging countries real depreciation has only short-run effects which are consistent with previous research.

We also calculated standard deviation of the real effective exchange rate as a measure of exchange rate flexibility in each country. Here they are in parenthesis next to each country. In the short run we find that real depreciation is expansionary in Belarus (20.6), Latvia (17.8), Poland (10.4), and Slovak Republic (18.2), while it is contractionary in Czech Republic (14.7), Estonia (21.6), Hungary (14.9), and Russia (21.7). It has no effect in Lithuania (31.2). These results suggest that exchange rate flexibility is not a significant factor in affecting the exchange rate-output link in our sample countries.

Other aspects of the results in panel B deserve attention. First, the F statistic is greater than its upper bound critical value in the results for Belarus, Czech Republic, Estonia, and Slovak Republic. This significant F statistic in the cases of Belarus and Estonia implies that cointegration among four variables is due to strong relation between output, money, and government spending. The list excludes the real effective exchange rate since it carries an insignificant coefficient. However, in the case of Slovak Republic, cointegrating space excludes money. In all these cases monetary and fiscal variables carry their expected positive signs. Second, in order to infer the speed of adjustment, we use normalized long-run coefficient estimates and calculate the residuals using equation (1). Denoting the lagged residuals by EC_{t-1}, we replace the lagged level variables in (2) by EC_{t-1} and estimate the error-correction model for each country using the same optimum lags. A negative and significant coefficient obtained for EC_{t-1} will be an indication of adjustment toward equilibrium. Note that Banerji et al. (1998) have demonstrated that the limit distribution of the t ratio for the lagged error-correction term is non-standard and they tabulate new critical values that depend on number of observations as well as number of regressors. Given the critical value of -3.86 at the 10% level, clearly EC_{t-1} carries a significant coefficient in the cases of Belarus, Czech Republic, Estonia, Latvia, Russia, and Slovak Republic.[5] In all these six countries adjustment is toward equilibrium except Latvia. Furthermore, while in Czech Republic the adjustment speed is slow, in the remaining five countries it is very fast. Indeed, in Belarus 75% of the adjustment takes place in half a quarter.

[5] This critical value for 50 observations comes from Banerjee et al. (1998, Panel B, Table 1, p. 277). Note that comparable critical value at the 5% significance level is -4.25.

Third, to test for serial correlation, the Lagrange Multiplier (LM) statistic is reported. It has a χ^2 distribution with four degrees of freedom. Given the critical value of 9.48 at the usual 5% level of significance, clearly residuals are not auto correlation free except in the case of Slovak Republic. Are optimum models misspecified? Ramsey's RESET test provides the answer. This statistic is also distributed as χ^2 but only with one degree of freedom. Given its critical value of 3.84 at the usual 5% level of significance, the calculated RESET statistic is less than the critical value in six countries. Thus, almost two-third of the optimum models are correctly specified.

Finally, are the estimated short run and long run coefficients stable? To answer this question, following Bahmani-Oskooee *et al*. (2005) we apply the CUSUM and CUSUMSQ tests to the residuals of each optimum error-correction model. These results are also reported under diagnostics. As can be seen, stability is supported by both tests in all models.[6] These results suggest that the switch from relatively fixed exchange rates to relatively more flexibility exchange rates observed in our countries did not cause significant breaks in the exchange rate-output relationship. Note further that the size of adjusted R^2 reflects an excellent fit in all models.

IV. Summary and Conclusion

Currency depreciation is said to stimulate aggregate demand by increasing its next export component. On the other hand, it is said to discourage aggregate supply by increasing cost of imported inputs. The ultimate impact is ambiguous on theoretical ground. A recent review article reveals that in developing countries, devaluation or real depreciation is indeed contractionary in the short run. In the long run, however, devaluation is neutral in most countries. Emerging economies have received no attention and we try to fill this gap in this paper.

[6] For a graphical presentation of the CUSUM and CUSUMSQ tests see Bahmani-Oskooee *et al.* (2005).

In this paper we consider the experience of nine emerging countries of Belarus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Russia, and Slovak Republic with currency depreciation. Using the bounds testing approach to cointegration and error-correction modeling that distinguishes the short-run effects from the long-run effects, the results turn out to be country specific. Our results are consistent with those of Kočenda and Valachy (2006) who conclude that exchange rate volatility in their sample counters (the Czech Republic, Hungary, Poland, and Slovakia), which are also included in this paper, has been driven primarily by country-specific effects. In the short run we find that real depreciation is expansionary in Belarus, Latvia, Poland, and Slovak Republic; contractionary in Czech Republic, Estonia, Hungary, and Russia; and has no effect in Lithuania. In almost none of the countries, the short-run effects lasted into the long run.

Our results have important policy implications. First of all, because there are no significant long-run effects of exchange rates on output, we conclude exchange rate changes (or exchange rate policy, in general) may not hurt the catching-up efforts of the countries in our sample towards the EU. Second, exchange rate flexibility appears to have no significant impact on the exchange rate-output link in our sample countries. This suggests that the short-run results are probably driven by country-specific factors. In terms of future EU members, our results suggest that exchange rate policy and flexibility may not matter much as far as real convergence towards the EU. This means that monetary/fiscal policies (and the coordination of the two) may provide the best means for achieving real convergence.

Appendix

Data Definition and Sources

All data are quarterly and come from the International Financial Statistics of the IMF. The study period differed somewhat from one country to another. They were 1994IV-2005II for Belarus; 1994I-2006II for Czech Republic; 1993I-2005II for Estonia; 1995I-2006II for Hungary; 1993III-2005I for Latvia; 1993IV-2005II for Lithuania; 1995I-2005IV for Poland; 1994I-2006II for Russia; and 1993I-2006II for Slovak Republic.

Variables:

GDP = Real GDP in national currency.

M = Real money supply defined as broad money. Nominal figures in national currency is deflated by CPI (by GDP deflator in the case of Belarus and Lithuania).

G = Real government spending. Nominal data in national currency is deflated by CPI (by GDP deflator in the case of Belarus and Lithuania) .

REX = Real Effective Exchange Rate.

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Table 1: Full-Information Estimate of Equation (2) for Belarus

Panel A: Short-Run Coefficient Estimates

	Lag Order							
	0	1	2	3	4	5	6	7
Δ Ln Y	-	0.55	0.43	0.34	0.82	0.29		
		(5.14)[a]	(3.74)	(3.83)	(11.3)	(3.24)		
Δ Ln M	0.09	-0.26	-042	-0.35	-0.17	-0.05		
	(3.81)	(5.22)	(7.05)	(6.95)	(4.01)	(2.46)		
Δ Ln G	0.36	-0.34	-0.25	-0.20	-0.19	0.10		
	(6.39)	(3.70)	(2.97)	(2.84)	(3.56)	(2.07)		
Δ Ln REX	-0.01	-0.21						
	(0.18)	(5.42)						

Panel B: Long-Run Coefficient Estimates and Diagnostics

Constant	Ln M	Ln G	Ln REX	$\overline{R}^2$	F[b]	EC_{t-1}	LM[c]	RESET[d]	CUSUM	CUSUMSQ
-1.18	0.29	0.59	0.01	0.99	20.2	-1.51	13.3	1.81	Stable	Stable
(5.93)	(12.4)	(14.3)	(0.41)			(8.95)				

Notes: a. Number inside the parenthesis is the absolute value of the t-ratio.
b. The upper bound critical value of the F statistic at the usual 5% level of significance is 4.01. This comes from Pesaran et al. (2001, p. 300).
c. LM is the Lagrange multiplier test for serial correlation. It has a χ^2 distribution with four degrees of freedom. The critical value at the 5% level of significance is 3.84.
d. RESET is Ramsey's specification test. It has a χ^2 distribution with only one degree of freedom. The critical value at the 5% level of significance is 3.84.

Table 2: Full-Information Estimate of Equation (2) for Czech Republic

Panel A: Short-Run Coefficient Estimates

	Lag Order							
	0	1	2	3	4	5	6	7
Δ Ln Y	-	-0.01	0.24	-0.20	-0.02	-0.15	-0.36	
		(0.03)	(2.12)	(1.58)	(0.21)	(1.78)	(3.11)	
Δ Ln M	0.05	0.24	0.33	0.52	0.31	0.11	0.16	0.06
	(0.92)	(2.79)	(4.73)	(8.01)	(4.44)	(1.53)	(2.89)	(1.32)
Δ Ln G	0.04	-0.89	-0.72	-0.36	-0.23	-0.31		
	(0.88)	(6.76)	(5.74)	(3.61)	(3.04)	(5.59)		
Δ Ln REX	0.13	0.34	0.47	0.61	0.49	0.18	0.31	0.22
	(2.69)	(3.97)	(4.86)	(6.30)	(4.84)	(2.03)	(4.63)	(3.99)

Panel B: Long-Run Coefficient Estimates and Diagnostics

Constant	Ln M	Ln G	Ln REX	$\overline{R}^2$	F	EC_{t-1}	LM	RESET	CUSUM	CUSUMSQ
9.51	-3.45	6.76	-2.62	0.99	6.72	-0.14	21.5	22.9	Stable	Stable
(1.17)	(0.98)	(0.96)	(0.74)			(5.98)				

Notes: See notes to Table 1.

Table 3: Full-Information Estimate of Equation (2) for Estonia

Panel A: Short-Run Coefficient Estimates

	Lag Order							
	0	1	2	3	4	5	6	7
Δ Ln Y	-	1.03	0.82	0.24	0.45			
		(3.82)	(3.45)	(1.32)	(3.24)			
Δ Ln M	-0.09	-0.50	-0.02	0.29	0.22	0.20		
	(0.95)	(2.68)	(0.13)	(2.62)	(2.25)	(2.32)		
Δ Ln G	-0.06	-1.19	-0.98	-0.95	-0.88	-0.49	-0.18	
	(0.84)	(5.21)	(3.89)	(4.11)	(4.61)	(3.58)	(2.46)	
Δ Ln REX	0.34	0.51	0.66	0.92	0.49	0.47	0.41	0.26
	(3.13)	(3.17)	(3.77)	(5.13)	(2.91)	(4.43)	(5.26)	(2.40)

Panel B: Long-Run Coefficient Estimates and Diagnostics

Constant	Ln M	Ln G	Ln REX	$\overline{R}^2$	F	EC_{t-1}	LM	RESET	CUSUM	CUSUMSQ
-3.93	0.45	0.52	-0.09	0.99	6.92	-1.96	18.2	0.02	Stable	Stable
(14.4)	(11.3)	(12.3)	(1.29)			(5.88)				

Notes: See notes to Table 1.

Table 4: Full-Information Estimate of Equation (2) for Hungary

Panel A: Short-Run Coefficient Estimates

	Lag Order							
	0	1	2	3	4	5	6	7
Δ Ln Y	-	0.51	1.34	-0.12	1.59	0.73	0.19	1.08
		(1.24)	(1.92)	(0.52)	(2.91)	(1.62)	(0.72)	(2.29)
Δ Ln M	-0.14	-0.32	-0.46	0.33	0.42	-0.32		
	(1.01)	(2.03)	(2.31)	(2.26)	(2.45)	(1.43)		
Δ Ln G	-0.04	0.18	0.14	0.03	0.13	0.16	-0.01	0.24
	(1.03)	(1.90)	(1.94)	(0.45)	(2.49)	(1.94)	(0.11)	(2.37)
Δ Ln REX	0.62	0.27	0.24	0.35	0.41	0.10	-0.03	0.38
	(2.08)	(1.99)	(1.38)	(2.44)	(2.20)	(0.74)	(0.27)	(1.76)

Panel B: Long-Run Coefficient Estimates and Diagnostics

Constant	Ln M	Ln G	Ln REX	$\overline{R}^2$	F	EC_{t-1}	LM	RESET	CUSUM	CUSUMSQ
-2.42	1.12	-0.45	-0.04	0.99	0.81	-0.71	30.5	16.9	Stable	Stable
(5.59)	(7.60)	(0.98)	(0.08)			(2.37)				

Notes: See notes to Table 1.

Table 5: Full-Information Estimate of Equation (2) for Latvia

Panel A: Short-Run Coefficient Estimates

	Lag Order							
	0	1	2	3	4	5	6	7
Δ Ln Y	-	-2.39	-2.64	-2.52	-2.13	-1.59	-1.14	-0.26
		(5.63)	(6.45)	(6.25)	(5.38)	(4.75)	(4.61)	(2.01)
Δ Ln M	-0.19	0.55	0.52	0.55	0.59	0.50	0.23	0.33
	(1.57)	(3.71)	(6.25)	(4.92)	(4.96)	(5.87)	(2.24)	(4.37)
Δ Ln G	0.01	-0.72	-0.63	-0.60	-0.54	-0.48	-0.44	-0.22
	(0.03)	(5.24)	(6.04)	(5.37)	(5.21)	(4.79)	(4.13)	(3.64)
Δ Ln REX	-0.55	-0.28	-0.02	-0.34	-0.35	-0.19	-0.06	-0.17
	(3.59)	(2.39)	(0.14)	(3.96)	(2.26)	(1.45)	(0.49)	(2.45)

Panel B: Long-Run Coefficient Estimates and Diagnostics

Constant	Ln M	Ln G	Ln REX	$\overline{R}^2$	F	EC_{t-1}	LM	RESET	CUSUM	CUSUMSQ
1.61	0.69	-0.54	0.19	0.94	3.30	1.25	36.9	4.79	Stable	Stable
(2.92)	(3.98)	(1.48)	(3.29)			(5.14)				

Notes: See notes to Table 1.

Table 6: Full-Information Estimate of Equation (2) for Lithuania

Panel A: Short-Run Coefficient Estimates

	Lag Order							
	0	1	2	3	4	5	6	7
Δ Ln Y	-	2.44	1.93	2.27	1.86	1.56	0.49	
		(1.34)	(1.22)	(1.75)	(2.22)	(3.14)	(0.94)	
Δ Ln M	0.59	-0.79	-0.24	-0.20	-0.64	-0.14	0.42	-0.36
	(1.46)	(0.66)	(0.65)	(2.12)	(0.44)	(1.58)	(1.23)	(2.56)
Δ Ln G	0.45	-0.48	-0.68	-0.59	-0.42	-0.18	-0.18	
	(2.55)	(0.80)	(1.19)	(1.31)	(1.25)	(0.81)	(1.20)	
Δ Ln REX	-0.50	0.33	0.40	-0.02	0.36	0.31		
	(1.44)	(0.82)	(1.18)	(0.06)	(1.31)	(0.58)		

Panel B: Long-Run Coefficient Estimates and Diagnostics

Constant	Ln M	Ln G	Ln REX	$\overline{R}^2$	F	EC_{t-1}	LM	RESET	CUSUM	CUSUMSQ
-0.82	0.37	0.30	-0.07	0.94	1.54	-3.46	24.7	1.15	Stable	Stable
(1.37)	(23.1)	(4.08)	(2.79)			(1.94)				

Notes: See notes to Table 1.

Table 7: Full-Information Estimate of Equation (2) for Poland

Panel A: Short-Run Coefficient Estimates

	Lag Order							
	0	1	2	3	4	5	6	7
Δ Ln Y	-	-0.55 (1.82)	-0.59 (2.42)	-0.66 (3.16)	0.30 (1.67)			
Δ Ln M	0.04 (0.44)							
Δ Ln G	0.11 (1.11)							
Δ Ln REX	-0.13 (2.60)							

Panel B: Long-Run Coefficient Estimates and Diagnostics

Constant	Ln M	Ln G	Ln REX	$\overline{R}^2$	F	EC_{t-1}	LM	RESET	CUSUM	CUSUMSQ
-3.36 (0.94)	0.33 (0.90)	0.84 (0.84)	-1.03 (1.03)	0.96	2.71	-0.13 (0.62)	11.8	0.32	Stable	Unstable

Notes: See notes to Table 1.

Table 8: Full-Information Estimate of Equation (2) for Russia

Panel A: Short-Run Coefficient Estimates

	Lag Order							
	0	1	2	3	4	5	6	7
Δ Ln Y	-	-0.36 (1.86)	-0.95 (4.46)	-1.35 (4.17)	-1.28 (2.79)	-1.11 (2.47)	-0.47 (2.51)	-0.56 (3.19)
Δ Ln M	0.54 (2.76)	-3.06 (4.38)	-3.14 (4.06)	-3.10 (4.22)	-2.79 (3.70)	-2.07 (3.34)	1.69 (3.02)	-0.58 (1.87)
Δ Ln G	0.07 (0.85)	1.32 (4.09)	1.59 (4.82)	1.85 (3.91)	1.37 (3.49)	1.31 (3.31)	0.75 (2.76)	0.20 (1.58)
Δ Ln REX	-0.65 (3.69)	3.00 (3.62)	2.33 (3.47)	1.49 (2.89)	1.08 (3.33)	0.59 (2.96)	0.25 (2.09)	

Panel B: Long-Run Coefficient Estimates and Diagnostics

Constant	Ln M	Ln G	Ln REX	$\overline{R}^2$	F	EC_{t-1}	LM	RESET	CUSUM	CUSUMSQ
-12.4 (26.7)	2.79 (36.7)	-0.89 (6.46)	-2.98 (22.1)	0.96	3.15	-1.32 (4.24)	18.09	0.61	Stable	Stable

Notes: See notes to Table 1.

Table 9: Full-Information Estimate of Equation (2) for Slovak Republic.

Panel A: Short-Run Coefficient Estimates

	Lag Order							
	0	1	2	3	4	5	6	7
Δ Ln Y	-	-0.29	-0.86	-0.96	-0.46	-0.69	-0.42	-0.29
		(2.08)	(5.97)	(4.86)	(2.20)	(2.95)	(2.32)	(1.81)
Δ Ln M	0.36	0.03	-0.10	0.18	0.13	0.14		
	(2.95)	(0.28)	(1.19)	(1.98)	(1.43)	(2.09)		
Δ Ln G	0.03	-0.13	-0.07	-0.03	-0.05	-0.04	-0.10	-0.13
	(0.56)	(1.60)	(0.84)	(0.42)	(1.03)	(1.22)	(2.76)	(4.16)
Δ Ln REX	0.15	-0.41	-0.53	-0.43	-0.58	-0.07	-0.36	-0.53
	(1.94)	(3.52)	(4.61)	(3.47)	(4.47)	(0.58)	(3.09)	(4.55)

Panel B: Long-Run Coefficient Estimates and Diagnostics

Constant	Ln M	Ln G	Ln REX	$\overline{R}^2$	F	EC_{t-1}	LM	RESET	CUSUM	CUSUMSQ
-4.72	0.24	0.25	0.78	0.98	9.91	-1.01	3.41	3.06	Stable	Stable
(26.7)	(1.57)	(2.28)	(9.19)			(7.04)				

Notes: See notes to Table 1.