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Exchange Rate Regimes in Central, Eastern and Southeastern Europe: A Euro Bloc and a Dollar Bloc?

by Slavi T. Slavov

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Abstract

There are 13 countries in Central, Eastern and Southeastern Europe (CESEE) with floating exchange rate regimes, *de jure*. This paper uses the framework pioneered by Frankel and Wei (1994) and extended in Frankel and Wei (2008) to show that most of them have been tracking either the euro or the US dollar in recent years. Eight countries, all of them current or aspiring EU members, track the euro. Of the five countries keying on the US dollar in various degrees, all but one belong to the Commonwealth of Independent States. The paper shows that the extent to which each country's currency tracks the euro (or the dollar) is correlated with the structure of its external trade and finance. However, some countries appear to track the EUR or USD to an extent which appears inconsistent with inflation targeting, trade or financial integration, or the extent of business cycle synchronization. The phenomenon is particularly pronounced among the countries in the CESEE euro bloc, which may be deliberately gravitating around the euro in anticipation of eventually joining the Euro Area.

JEL Classification Numbers: F31, F33

Keywords: Central, Eastern and Southeastern Europe; exchange rate regimes; fixed versus floating; *de jure versus de facto*

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I. INTRODUCTION

Over the past several decades, the number of countries running *de jure* floating exchange rate regimes has steadily grown. In several influential papers, Guillermo Calvo and Carmen Reinhart showed that in many of these countries, there is a discrepancy between *de jure* and *de facto*, and countries appear to actively limit fluctuations in the external value of their national monies. Calvo and Reinhart dubbed this behavior "fear of floating" and showed that it is rather pervasive across regions and levels of development. See Calvo and Reinhart (2002, 2005).

This paper investigates exchange rate flexibility in Central, Eastern and Southeastern Europe (CESEE). Out of 22 CESEE countries, 9 have officially given up exchange rate flexibility, by entering the Euro Area (Estonia, Latvia, Lithuania, Slovakia, and Slovenia), euroizing unilaterally (Kosovo and Montenegro), or establishing a currency board (Bosnia and Herzegovina, and Bulgaria). That leaves 13 countries with flexible exchange rates, at least *de jure*: Albania, Belarus, Croatia, the Czech Republic, Hungary, Macedonia, Moldova, Poland, Romania, Russia, Serbia, Turkey, and Ukraine. Table 1 below summarizes the *de jure* exchange rate regimes of these 13 countries between 2008 and 2014, as reported to the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). A higher numerical score in the table is associated with a more flexible exchange rate regime. With the exception of Belarus in 2008-2010, the lowest numerical score in the table is 7 (corresponding to "managed floating with no pre-determined path for the exchange rate"). The median in each year is 9 ("floating"). The mean is similar and the cross-section standard deviation is very low.

Table 1: *De Jure* Exchange Rate Regimes in 13 CESEE Countries, 2008-2014

	2008	2009	2010	2011	2012	2013	2014
Albania	10	10	10	10	10	10	10
Belarus	3	3	3	7	7	n.a.	7
Croatia	9	7	7	7	7	7	7
Czech Republic	10	9	9	9	9	9	9
Hungary	10	10	10	10	10	10	10
Macedonia	7	9	9	9	9	9	9
Moldova	9	9	9	9	9	9	9
Poland	10	10	10	10	10	10	10
Romania	7	7	7	7	7	7	7
Russia	8	8	8	8	8	8	9
Serbia	9	9	7	9	9	9	9
Turkey	10	10	10	10	10	10	10
Ukraine	9	9	n.a.	n.a.	n.a.	n.a.	n.a.
Median	**9.0**	**9.0**	**9.0**	**9.0**	**9.0**	**9.0**	**9.0**
Mean	**8.5**	**8.5**	**8.3**	**8.8**	**8.8**	**8.9**	**8.8**
Standard deviation	**2.0**	**1.9**	**2.1**	**1.2**	**1.2**	**1.1**	**1.2**

Source: IMF's Annual Report on Exchange Arrangements and Exchange Restrictions.

Note: 1 = No separate legal tender; 2 = Currency board; 3 = Conventional peg; 3.5 = Conventional peg to a composite; 4 = Stabilized arrangement; 5 = Crawling peg; 6 = Crawl-like arrangement; 7 = Managed floating with no pre-determined path for the exchange rate; 8 = Other managed arrangement; 9 = Floating; 10 = Free floating.

Table 2 below summarizes the *de facto* exchange rate regimes of these 13 countries between 2008

and 2014. As you can see from comparing Tables 1 and 2, there is more dispersion in Table 2 and the mean is a little bit lower. There are some substantial differences for some countries and some years, in both directions. For example, Macedonia's exchange rate regime is classified as "floating" *de jure* but as a "stabilized arrangement" *de facto*. Romania's exchange rate regime is classified as "managed floating" in Table 1 and as "floating" in Table 2. However, once again the median in each year is 9 ("floating").

Table 2: *De Facto* Exchange Rate Regimes in 13 CESEE Countries, 2008-2014

	2008	2009	2010	2011	2012	2013	2014
Albania	9	9	9	9	9	9	9
Belarus	7	7	4	8	8	6	6
Croatia	8	4	6	6	6	6	6
Czech Republic	10	10	10	10	10	8	4
Hungary	9	9	9	9	9	9	9
Macedonia	4	4	4	4	4	4	4
Moldova	9	9	9	9	9	9	9
Poland	10	10	10	10	10	10	10
Romania	9	9	9	9	9	9	9
Russia	8	8	8	8	8	8	9
Serbia	9	9	9	9	9	9	9
Turkey	9	10	9	9	9	9	9
Ukraine	8	8	4	4	4	9	9
Median	**9.0**	**9.0**	**9.0**	**9.0**	**9.0**	**9.0**	**9.0**
Mean	**8.4**	**8.2**	**7.7**	**8.0**	**8.0**	**8.1**	**7.8**
Standard deviation	**1.6**	**2.0**	**2.3**	**2.0**	**2.0**	**1.7**	**2.1**

Source: IMF's Annual Report on Exchange Arrangements and Exchange Restrictions.

Note: 1 = No separate legal tender; 2 = Currency board; 3 = Conventional peg; 3.5 = Conventional peg to a composite; 4 = Stabilized arrangement; 5 = Crawling peg; 6 = Crawl-like arrangement; 7 = Managed floating with no pre-determined path for the exchange rate; 8 = Other managed arrangement; 9 = Floating; 10 = Free floating.

Section II of this paper presents some stylized facts and statistical analysis on monthly data for the period 1999-2015 which reveals that many of these 13 CESEE countries exhibit limited exchange rate flexibility and divide themselves neatly into a euro bloc and a dollar bloc. That is, the exchange rate regimes of a majority of these countries can be approximated surprisingly well by a soft peg to a currency basket dominated by the euro or the US dollar. Section III investigates whether exchange rate stability in CESEE is natural or super-natural. It concludes that the extent to which each country's currency tracks the euro or the dollar is correlated with the currency structure of its external trade and finance. However, some countries appear to track the EUR or USD to an extent which appears inconsistent with inflation targeting, trade or financial integration, or the extent of business cycle synchronization. The phenomenon is particularly pronounced among the countries in the CESEE euro bloc, which may be deliberately gravitating around the euro in anticipation of eventually joining the Euro Area. Section IV concludes and offers ideas for future research.

II. DOCUMENTING LIMITED EXCHANGE RATE FLEXIBILITY IN CESEE

A. Stylized facts

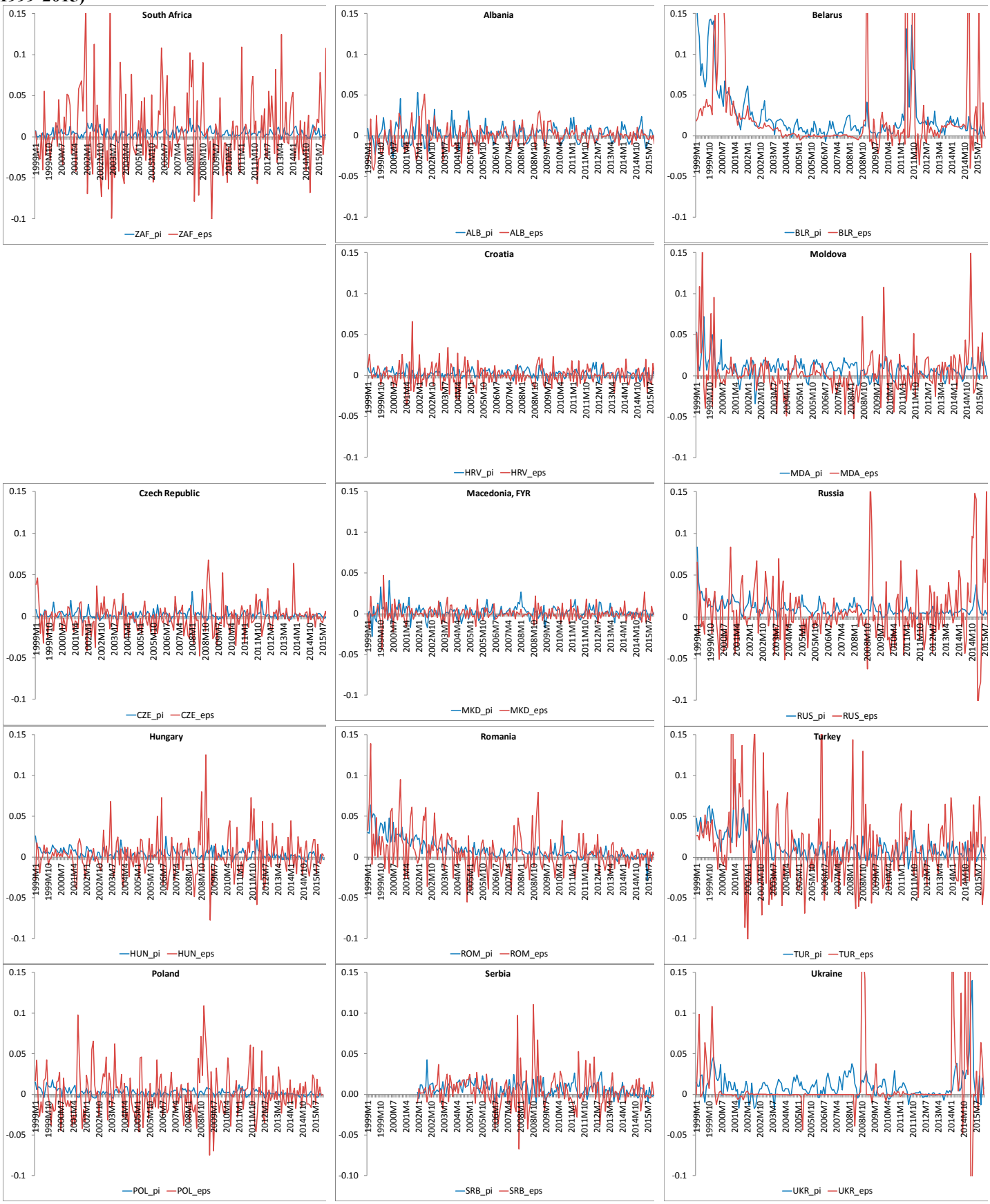
Figure 1 presents empirical evidence on the monthly volatility of a country's CPI and its exchange

rate vis-à-vis the euro or the dollar (whichever is less volatile). The figure covers the period 1999-2015 and the 13 CESEE countries with *de jure* floating exchange rates. In addition, as a benchmark, the figure includes South Africa, the one emerging market with unquestioned credentials as a free-floating inflation targeter. One would expect that such a country would have a volatile exchange rate and a stable CPI – a well-known empirical regularity about floating exchange rate regimes.[2] This is indeed the case for South Africa. By comparison, exchange rates are somewhat less volatile in the Czech Republic, Hungary, and Poland, three CESEE countries with the same monetary and exchange rate regime. The contrast with South Africa is even more dramatic for the five Balkan countries in the second column of Figure 1: not only Croatia and Macedonia (both of which are well known to be stabilizing their euro exchange rates *de facto* if not *de jure*), but also Albania, Romania, and Serbia, all of which are inflation-targeting floaters *de jure*. The third column in Figure 1 covers the remaining five CESEE countries. Turkey and perhaps Russia come close to matching South Africa in terms of the relative volatility of their exchange rate. In contrast, Belarus, Moldova, and Ukraine have much more stable currencies, apart from the occasional bursts of exchange rate volatility, corresponding to large depreciation episodes.

Table 3 summarizes the data presented in Figure 1 by reporting the ratio of the standard deviation of the monthly change in the exchange rate to the standard deviation of the monthly change in the CPI. That ratio is 9.5 for South Africa and ranges from 1.2 to 6.7 for the 13 CESEE countries with *de jure* floating exchange rates. Note that the ratio ranges from 3.1 to 6.7 for the Czech Republic, Hungary, Poland, Russia, and Turkey. In contrast, the ratio ranges from 1.2 to 2.6 for the remaining CESEE countries (with Ukraine as a special case, due to infrequent large depreciations).

[2] See Mussa (1986), among others.

Figure 1: Monthly Changes in the CPI and the Exchange Rate with USD or EUR for 13 CESEE Countries and South Africa (1999-2015)



Source: IMF's IFS database.

Table 3: Ratio of the Standard Deviation of the Monthly Change in the Exchange Rate with USD or EUR and the Standard Deviation of the Monthly Change in the CPI for 13 CESEE Countries and South Africa (1999-2015)

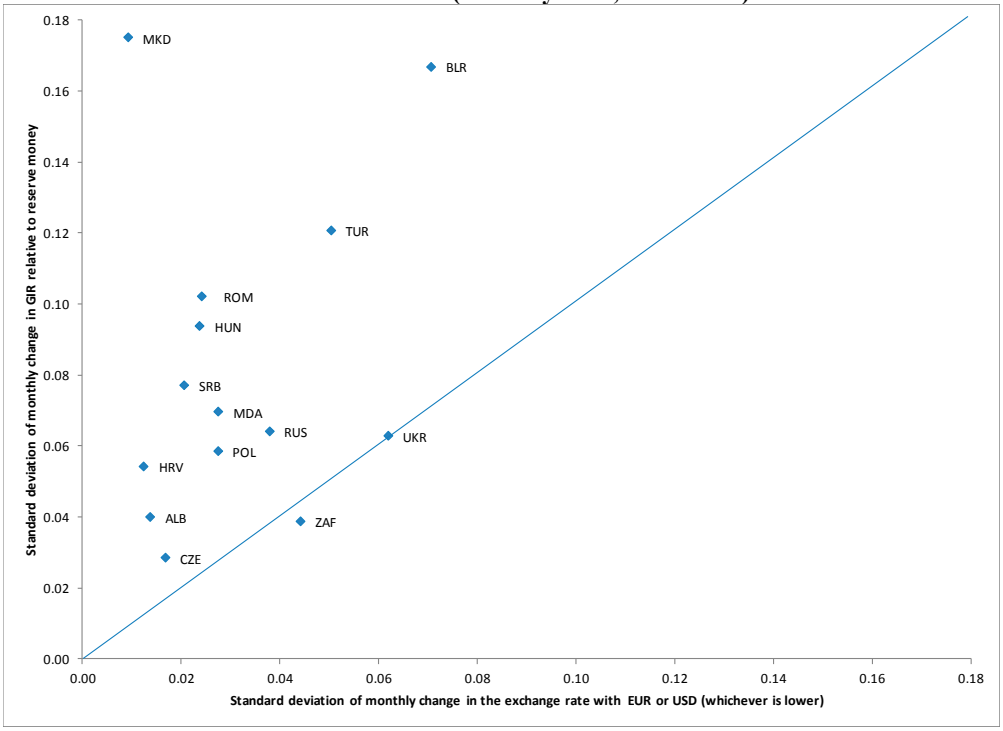
Country	$\frac{\sigma_\epsilon}{\sigma_\pi}$	Country	$\frac{\sigma_\epsilon}{\sigma_\pi}$	Country	$\frac{\sigma_\epsilon}{\sigma_\pi}$
ZAF	9.5	ALB	1.3	BLR	2.2
		HRV	2.6	MDA	2.4
CZE	3.5	MKD	1.2	RUS	4.2
HUN	4.3	ROM	2.0	TUR	3.1
POL	6.7	SRB	2.5	UKR	3.8

Source: IMF's IFS database.

Figure 2 reports further summary statistics on the 13 CESEE floaters plus South Africa. It plots the standard deviation of the monthly change in gross international reserves (relative to reserve money) against the standard deviation of the monthly percentage change in each country's exchange rate vis-à-vis the euro or the US dollar (whichever is lower) over 1999-2015.

The upward-sloping line in the figure has a slope of unity. Note that the only country which lies below the 45-degree line, a somewhat arbitrary benchmark, is South Africa. Since all 13 CESEE countries lie above that line, gross international reserves are more volatile than their euro or dollar exchange rates. This is further suggestive evidence that many of these CESEE countries might be showing signs of limited exchange rate flexibility. For many of these countries, the stock of international reserves appears to play a relatively more important role in absorbing shocks to the balance of payments than the exchange rate.

Figure 2: Volatility of Gross International Reserves versus Exchange Rate Volatility for 13 CESEE Countries and South Africa (monthly data, 1999-2015)



Source: IMF's IFS database.

B. The empirical model and the data

A statistical model developed by Frankel and Wei (1994) and extended later in Frankel and Wei (2008) offers a simple way to identify a country's *de facto* exchange rate regime. Intuitively, the methodology proceeds in two steps. First, is the country pursuing a floating or a fixed exchange rate regime? Second, if fixing, what currency is the country fixing to? The regression equation to be estimated here is almost identical to the one estimated in Frankel and Wei (2008), with one difference (discussed below). Taking Bulgaria as an illustrative example:

$$\varepsilon_{BGN/SDR} = \beta_0 + \beta_1 EMP + \beta_2 \varepsilon_{USD/SDR} + \beta_3 \varepsilon_{EUR/SDR} + \beta_4 \varepsilon_{GBP/SDR} + u, \quad \textbf{(1)}$$

$$\text{where } EMP \equiv -\frac{\Delta GIR}{RM} \quad \textbf{(2)}$$

where $\varepsilon_{BGN/SDR}$ denotes the percentage change in the Bulgarian lev-SDR exchange rate, and three of the independent variables are defined similarly. EMP stands for "exchange market pressure." GIR and RM denote gross international reserves and reserve money, respectively.

Estimating β_1 would answer the first question above by telling us how flexible the domestic currency really is. EMP measures the exchange market pressure on the domestic currency, as reflected by the change in gross international reserves normalized by reserve money. If there is a negative shock to the demand for domestic currency, we would expect it to show up either as exchange rate *depreciation* or as a *reduction* in international reserves (so that the EMP variable goes *up*). The

regression coefficient β_1 then measures the extent to which market pressure on the domestic currency is allowed to be reflected in the exchange rate, as opposed to the stock of international reserves. If the Bulgarian lev is completely pegged to a currency (which it is), we would expect to find that β_1 is zero, that is, shocks to demand for the currency are reflected in the stock of international reserves and not in the exchange rate. Vice versa, if the lev is freely floating, we would expect to find a higher (and statistically significant) value for β_1 indicating that exchange market shocks are absorbed mostly by the exchange rate, rather than by the stock of international reserves.[3,4]

Note that β_1 is measuring only *correlation*, rather than any *causal* relationship between the stock of international reserves and the exchange rate. Instead, both variables are jointly driven by a third one, the demand for domestic currency. Therefore, β_1 measures only the relative "division of labor" between international reserves and the exchange rate in absorbing shocks to the demand for domestic currency.

Regarding the SDR, intuitively, we want to look at the exchange rate between the domestic currency and some *numéraire* currency and study its degree of co-movement with the exchange rate between the euro (or the US dollar) and the same *numéraire* currency. The SDR is a good candidate for a *numéraire* because by virtue of being a basket of the major free-floating currencies, it floats freely against all of them.[5]

If the Bulgarian lev is indeed floating against the euro, there should be little to no correlation between the lev-SDR and the euro-SDR exchange rates, and we expect to find $\beta_3 \approx 0$. If the lev is completely pegged to the euro (which it is), the two exchange rates should be perfectly correlated, and we expect to find $\beta_3 = 1$. By including the US dollar and the British pound, we allow for the possibility that the lev could be pegged to one of these other major currencies rather than the euro. We also allow for the possibility that the Bulgarian authorities could be stabilizing the external value of domestic money against a basket of these three currencies. In this case, β_2, β_3, and β_4 would measure the basket weights assigned to each. So these regression coefficients would answer the second question posed above ("If fixing, what currency, or basket of currencies, is the country fixing to?"). Finally, the constant β_0 captures the "drift" in the domestic currency, that is, its tendency to depreciate or appreciate over time.

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[3] Frankel and Wei (2008) defined EMP as $\varepsilon_{BGN/SDR} - \frac{\Delta GIR}{RM}$, which creates an obvious endogeneity problem, as $\varepsilon_{BGN/SDR}$ appears on both sides of the regression equation, resulting in biased coefficient estimates. Frankel and Wei's preferred solution to this problem was instrumental variable (IV) estimates for EMP. Their preferred instrument (commodity prices) is not a good fit for most CESEE countries.

[4] Note that β_1 is indeterminate for the extreme case of a pure float under which GIR are zero (or constant). While this is a valid concern in theory, it is not a problem in practice, as there is always some volatility in each country's stock of GIR.

[5] Other authors have used the Swiss franc as the *numéraire* currency. However, between September 2011 and January 2015, the CHF did not float freely against the euro, as Switzerland's monetary authorities embarked on various initiatives to curb the franc's appreciation against the euro. In general, other authors have demonstrated that regression results are fairly robust to the choice of a *numéraire* currency.

(continued)

Equation (1) will be estimated using monthly data from January 1999 to December 2015.[6] The data source for all variables is the IMF's International Financial Statistics (IFS) database. For all results reported below, I dropped observations associated with an annual inflation rate higher than 20 percent.[7] This was done in order to restrict the data set only to periods during which the various countries had a credible and time-consistent monetary policy framework in place.

C. The results

To provide a useful benchmark, equation (1) was first estimated for Bulgaria (a CESEE country with a currency board with the euro) and South Africa (an inflation-targeting free-floater). The model correctly identifies both countries' exchange rate regimes. In Table 4, Bulgaria's estimated weight on the euro is unity, while all other coefficients are essentially zero. The adjusted R^2 is very high. In contrast, South Africa's adjusted R^2 is extremely low. The only statistically significant regression coefficients are the constant (which indicates a tendency for the rand to depreciate over time by about 1 percent per month) and the EMP (which indicates that the country's exchange rate plays an important role as a shock absorber). Note that the estimated weight on the euro is only marginally statistically significant.

Table 4: Regression Results for Bulgaria and South Africa, 1999-2015

Country / Variables	(1) BGR	(2) ZAF
Constant	-0.00	0.01**
	(0.00)	*(0.00)*
EMP	0.00	0.22***
	(0.00)	*(0.08)*
$\varepsilon_{USD/SDR}$	0.01	-0.01
	(0.04)	*(0.39)*
$\varepsilon_{EUR/SDR}$	1.03***	0.51*
	(0.03)	*(0.29)*
$\varepsilon_{GBP/SDR}$	-0.00	0.32
	(0.02)	*(0.23)*
Observations	204	204
Adjusted R^2	0.95	0.07

Notes: Columns (1)-(2) estimate equation (1) in the main text of the paper. The dependent variable is the percentage change in the country's exchange rate with the SDR. EMP is defined in equation (2) in the main text of the paper. $\varepsilon_{USD/SDR}$ is the percentage change in the US dollar's exchange rate with the SDR. The remaining independent variables are defined similarly for the euro and the British pound. Robust standard errors are reported in parentheses. ***, **, * denote statistical significance at the 1%, 5%, 10% level, respectively.

[6] D'Adamo (2009) estimates the same model for several countries in Emerging Europe, among many others. However, his sample ends in 2009, and he covers only a handful of the 13 CESEE countries covered in this paper: the Czech Republic, Hungary, Poland, and Romania.

[7] Specifically, I dropped month *t* if the 12-month inflation rate in month *t+12* was higher than 20 percent. Frankel and Wei (2008) used a more generous threshold of 40 percent. I used WEO projections for the last few months of the sample.

When equation (1) was estimated for the 13 CESEE countries with *de jure* floating exchange rates, they divided themselves neatly into two groups: a euro bloc and a dollar bloc. Tables 5 and 6 below presents estimation results for the eight countries which were found to track the euro very closely. All of them are either current or aspiring EU members. Table 5 reports results for the 5 Balkan countries in the sample, while Table 6 focuses on 3 Central European inflation targeters. Bulgaria and South Africa are also reported in both tables, for ease of reference. Thus, Tables 5-6 attempt to place these eight countries on a continuum between the two extremes of a hard peg (Bulgaria) and a free float (South Africa).

In Table 5, the estimated coefficient on the EMP variable is typically close to zero, with a median value of 0.03, which is much lower than South Africa's 0.22. In these 5 countries, shocks to demand for the domestic currency tend to be reflected in the stock of international reserves and not in the exchange rate. This is the opposite of what one would expect to find under freely floating exchange rate regimes. The estimated coefficient on the euro is always highly statistically significant and close to one for all countries, with a median value of 0.93. The median weights on the US dollar and the British pound are close to zero, although they are statistically significant in a few cases. The median adjusted R^2 is 0.57, and is a bit higher in Croatia and Macedonia, two countries known to stabilize their currencies. Overall, these 5 countries look a lot more like Bulgaria than South Africa.

Note that what establishes limited exchange rate flexibility in Table 5 is not exchange rate comovement with the euro. Rather, it is the volatility of the country's SDR exchange rate relative to the volatility of gross international reserves (as measured by the EMP regression coefficient).

Table 5: Regression Results for 5 Balkan Countries, 1999-2015

Country Variables	(1) HRV	(2) MKD	(3) ALB	(4) ROM[8]	(5) SRB	Median	(6) BGR	(7) ZAF
Constant	0.00	0.00	-0.00	0.00**	0.00***	**0.00**	-0.00	0.01**
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*		*(0.00)*	*(0.00)*
EMP	0.06***	0.00*	0.04	0.02	0.03	**0.03**	0.00	0.22***
	(0.02)	*(0.00)*	*(0.06)*	*(0.02)*	*(0.02)*		*(0.00)*	*(0.08)*
$\varepsilon_{USD/SDR}$	-0.06	0.02	0.17	0.57**	0.58**	**0.17**	0.01	-0.01
	(0.13)	*(0.10)*	*(0.16)*	*(0.28)*	*(0.26)*		*(0.04)*	*(0.39)*
$\varepsilon_{EUR/SDR}$	0.76***	0.93***	0.82***	1.24***	1.59***	**0.93**	1.03***	0.51*
	(0.09)	*(0.08)*	*(0.13)*	*(0.26)*	*(0.25)*		*(0.03)*	*(0.29)*
$\varepsilon_{GBP/SDR}$	0.03	-0.02	0.06	0.20**	0.25*	**0.06**	-0.00	0.32
	(0.04)	*(0.05)*	*(0.06)*	*(0.08)*	*(0.13)*		*(0.02)*	*(0.23)*
Observations	204	204	204	172	168	**204**	204	204
Adjusted R^2	0.64	0.76	0.51	0.44	0.57	**0.57**	0.95	0.07

Notes: Columns (1)-(7) estimate equation (1) in the main text of the paper. The dependent variable is the percentage change in the country's exchange rate with the SDR. EMP is defined in equation (2) in the main text of the paper. $\varepsilon_{USD/SDR}$ is the percentage change in the US dollar's exchange rate with the SDR. The remaining independent variables are defined similarly for the euro and the British pound. Robust standard errors are reported in parentheses. ***, **, * denote statistical significance at the 1%, 5%, 10% level, respectively.

[8] Results are unchanged for Romania if the sample is restricted to the period after 2005, when the country formally adopted an inflation-targeting framework.

Table 6 reports results for the 3 Central European inflation targeters. The estimated coefficients on the EMP variable is always close to zero, with a median value of 0.00, and is only marginally statistically significant in Poland. Once again, shocks to demand for the domestic currency are mostly reflected in the stock of international reserves, rather than the exchange rate. The estimated coefficient on the euro is always highly statistically significant, with a median value of 1.04 which exceeds the median in Table 5. While Poland's adjusted R^2 is only 0.35, the median is 0.52, a bit lower than in Table 5 but significantly higher than in South Africa.

Table 6: Regression Results for 3 Central European Inflation Targeters, 1999-2015

Country / Variables	(1) CZE	(2) HUN	(3) POL	Median	(4) BGR	(5) ZAF
Constant	-0.00	0.00	0.00	**0.00**	-0.00	0.01**
	(0.00)	*(0.00)*	*(0.00)*		*(0.00)*	*(0.00)*
EMP	-0.05	0.00	0.06*	**0.00**	0.00	0.22***
	(0.08)	*(0.02)*	*(0.03)*		*(0.00)*	*(0.08)*
$\varepsilon_{USD/SDR}$	-0.22	-0.00	0.15	**0.00**	0.01	-0.01
	(0.15)	*(0.26)*	*(0.35)*		*(0.04)*	*(0.39)*
$\varepsilon_{EUR/SDR}$	0.98***	1.31***	1.04***	**1.04**	1.03***	0.51*
	(0.13)	*(0.28)*	*(0.27)*		*(0.03)*	*(0.29)*
$\varepsilon_{GBP/SDR}$	0.17	0.25**	0.36**	**0.25**	-0.00	0.32
	(0.13)	*(0.10)*	*(0.15)*		*(0.02)*	*(0.23)*
Observations	204	196	204	**204**	204	204
Adjusted R^2	0.61	0.52	0.35	**0.52**	0.95	0.07

Notes: Columns (1)-(5) estimate equation (1) in the main text of the paper. The dependent variable is the percentage change in the country's exchange rate with the SDR. EMP is defined in equation (2) in the main text of the paper. $\varepsilon_{USD/SDR}$ is the percentage change in the US dollar's exchange rate with the SDR. The remaining independent variables are defined similarly for the euro and the British pound. Robust standard errors are reported in parentheses. ***, **, * denote statistical significance at the 1%, 5%, 10% level, respectively.

Table 7 below presents the estimation results for the five countries which were found to track the dollar. Except for Turkey, all others belong to the Commonwealth of Independent States. For Belarus, Moldova, and Ukraine, equation (1) was augmented by also including $\varepsilon_{RUB/SDR}$, the exchange rate of the Russian ruble against the SDR, to allow for the possibility that these three countries track Russia's currency.

Empirical estimates for Russia and (to a lesser extent) Moldova come close to matching those for South Africa. EMP coefficients are statistically significant and relatively large. The adjusted R^2 is fairly low in both cases. Both countries appear to place some substantial weight on other currencies: the US dollar in Russia's case and the ruble in Moldova's. In sum, while Moldova's case is less clear-cut, Russia is a clear example of a country whose exchange rate plays an important role as a shock absorber, relative to the stock of gross international reserves. So the model identifies it as a clear floater, even though it also appears to track the USD.

Turning to Belarus and Ukraine, the estimated coefficients on the EMP variable are small and statistically insignificant. Shocks to demand for the domestic currency are mostly reflected in the

stock of international reserves, rather than the exchange rate. The estimated coefficient on the dollar is highly statistically significant and close to unity in each country. The adjusted R^2 is significantly higher for these two countries than for Russia and Moldova (or South Africa, for that matter).

The model generates ambiguous results for Turkey. While the estimated EMP coefficient is statistically insignificant and the estimated coefficients on the dollar and the euro are both high and significant, the adjusted R^2 is extremely low.

Overall, Table 7 suggests that while most of these five countries appear to track the US dollar to a varying extent, Russia comes closer to having a freely floating currency than anybody else in CESEE.

Table 7: Regression Results for the Dollar Bloc, 1999-2015

Country Variables	(1) BLR	(2) MDA	(3) RUS	(4) TUR	(5) UKR	Median	(6) BGR	(7) ZAF
Constant	0.01*** *(0.00)*	0.00** *(0.00)*	0.01*** *(0.00)*	0.00 *(0.00)*	0.00* *(0.00)*	**0.00**	-0.00 *(0.00)*	0.01** *(0.00)*
EMP	-0.02 *(0.01)*	0.08** *(0.03)*	0.15** *(0.06)*	0.08 *(0.06)*	0.04 *(0.04)*	**0.08**	0.00 *(0.00)*	0.22*** *(0.08)*
$\varepsilon_{USD/SDR}$	1.02** *(0.40)*	0.33 *(0.27)*	0.57* *(0.30)*	1.10** *(0.48)*	1.30*** *(0.22)*	**1.02**	0.01 *(0.04)*	-0.01 *(0.39)*
$\varepsilon_{EUR/SDR}$	0.54 *(0.42)*	-0.09 *(0.17)*	0.53 *(0.35)*	1.02** *(0.42)*	0.21 *(0.25)*	**0.53**	1.03*** *(0.03)*	0.51* *(0.29)*
$\varepsilon_{GBP/SDR}$	-0.27** *(0.12)*	-0.19* *(0.10)*	0.33* *(0.19)*	0.37 *(0.24)*	0.66** *(0.26)*	**0.33**	-0.00 *(0.02)*	0.32 *(0.23)*
$\varepsilon_{RUB/SDR}$	0.67*** *(0.15)*	0.20** *(0.08)*			0.05 *(0.09)*	**0.20**		
Observations	126	191	190	158	156	**158**	204	204
Adjusted R^2	0.59	0.21	0.12	0.07	0.41	**0.21**	0.95	0.07

Notes: Columns (1)-(7) estimate equation (1) in the main text of the paper. The dependent variable is the percentage change in the country's exchange rate with the SDR. EMP is defined in equation (2) in the main text of the paper. $\varepsilon_{USD/SDR}$ is the percentage change in the US dollar's exchange rate with the SDR. The remaining independent variables are defined similarly for the euro, the British pound, and the Russian ruble. Robust standard errors are reported in parentheses. ***, **, * denote statistical significance at the 1%, 5%, 10% level, respectively.

One might criticize Tables 5-7 for their implicit assumption that these 13 countries maintained their exchange rate regimes without any changes at all for the entire 17-year sample period. It would be interesting to see if and how their exchange rate regimes have evolved since 1999. Therefore, Figures 3-5 report estimates from rolling 36-month regressions for the 13 CESEE countries. The data points on the far left corner in each figure correspond to the 36-month period from January 1999 to December 2001. The 36-month horizon is a balancing act. On the one hand, we need to have a sufficient number of degrees of freedom in order to estimate the exchange rate regime reliably. On the other hand, we want to allow for exchange rate regimes to evolve over time. To avoid clutter, the figures reports only the median weights on the euro (or the dollar), the median EMP coefficient, and the median adjusted R^2 for each 36-month period.[9]

[9] Since I focus on medians across countries, I dropped the restriction on annual inflation to be lower than 20 percent.

Figure 3 covers the 5 Balkan countries (Albania, Croatia, Macedonia, Romania, and Serbia) and shows that exchange rate regimes shifted a bit around 2008. The median euro weight started out between 0.6 and 0.8 but jumped to unity in 2008, and has fallen somewhat since then. The median adjusted R^2 followed a very similar path. The median EMP coefficient was very close to zero throughout the sample period, apart from a few blips (for example, during the global financial crisis and its immediate aftermath). All these findings point to a *de facto* soft peg to the euro for the median country over most of the sample period.

Figure 3: Median Basket Weight on the Euro, Median EMP, and Median Adjusted R^2 from 36-Month Rolling Regressions for 5 Balkan Countries, 1999-2015

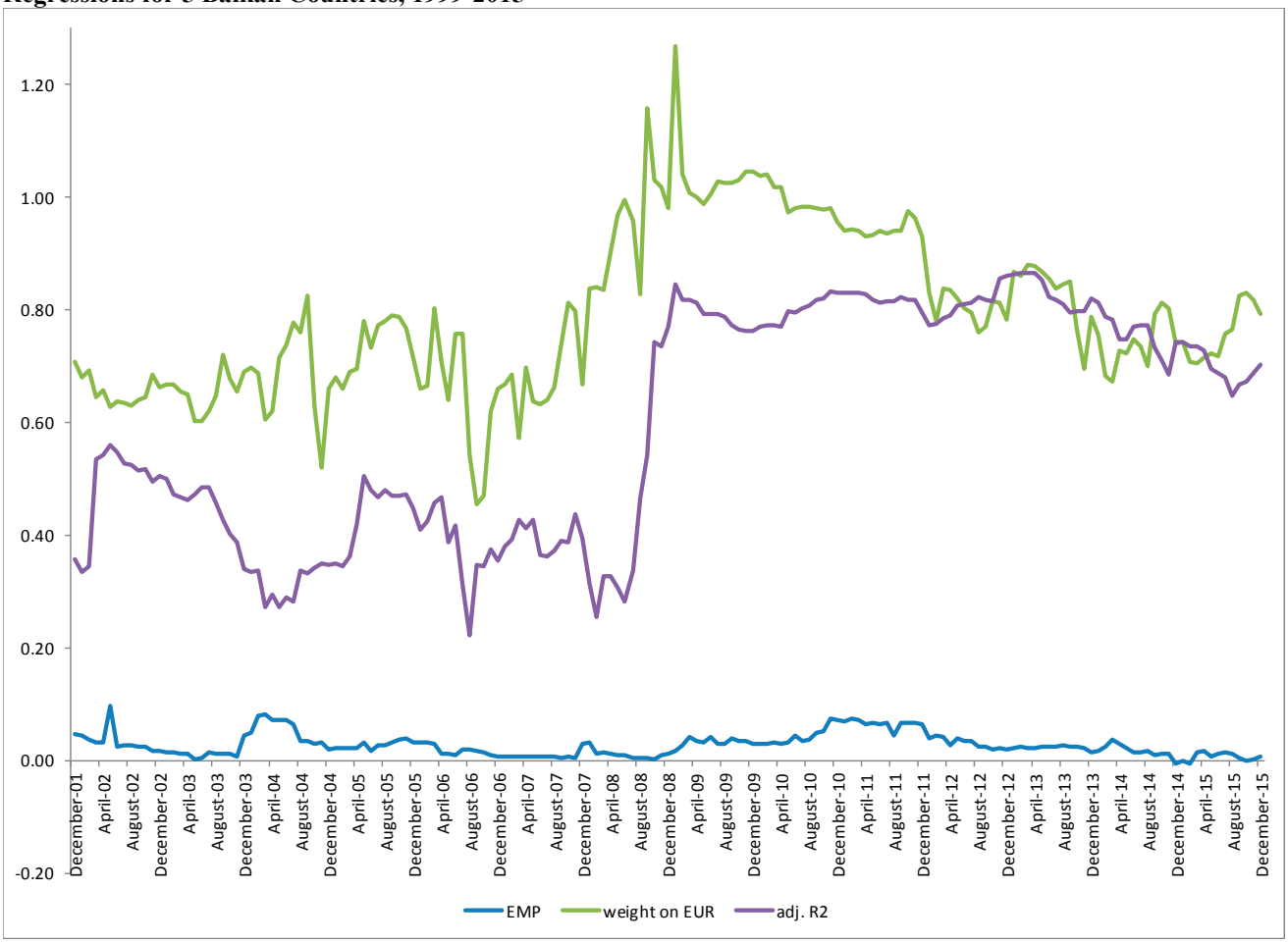


Figure 4 covers the 3 Central European inflation targeters (the Czech Republic, Hungary, and Poland). The story that emerges from that figure is qualitatively similar, if a bit noisier. The euro has been an important anchor for monetary policy in these countries, particularly since 2008. The median adjusted R^2 also jumped up in 2008. The median EMP coefficient was a bit higher during 2008-2010.

Figure 4: Median Basket Weight on the Euro, Median EMP, and Median Adjusted R^2 from 36-Month Rolling Regressions for 3 Central European Inflation Targeters, 1999-2015

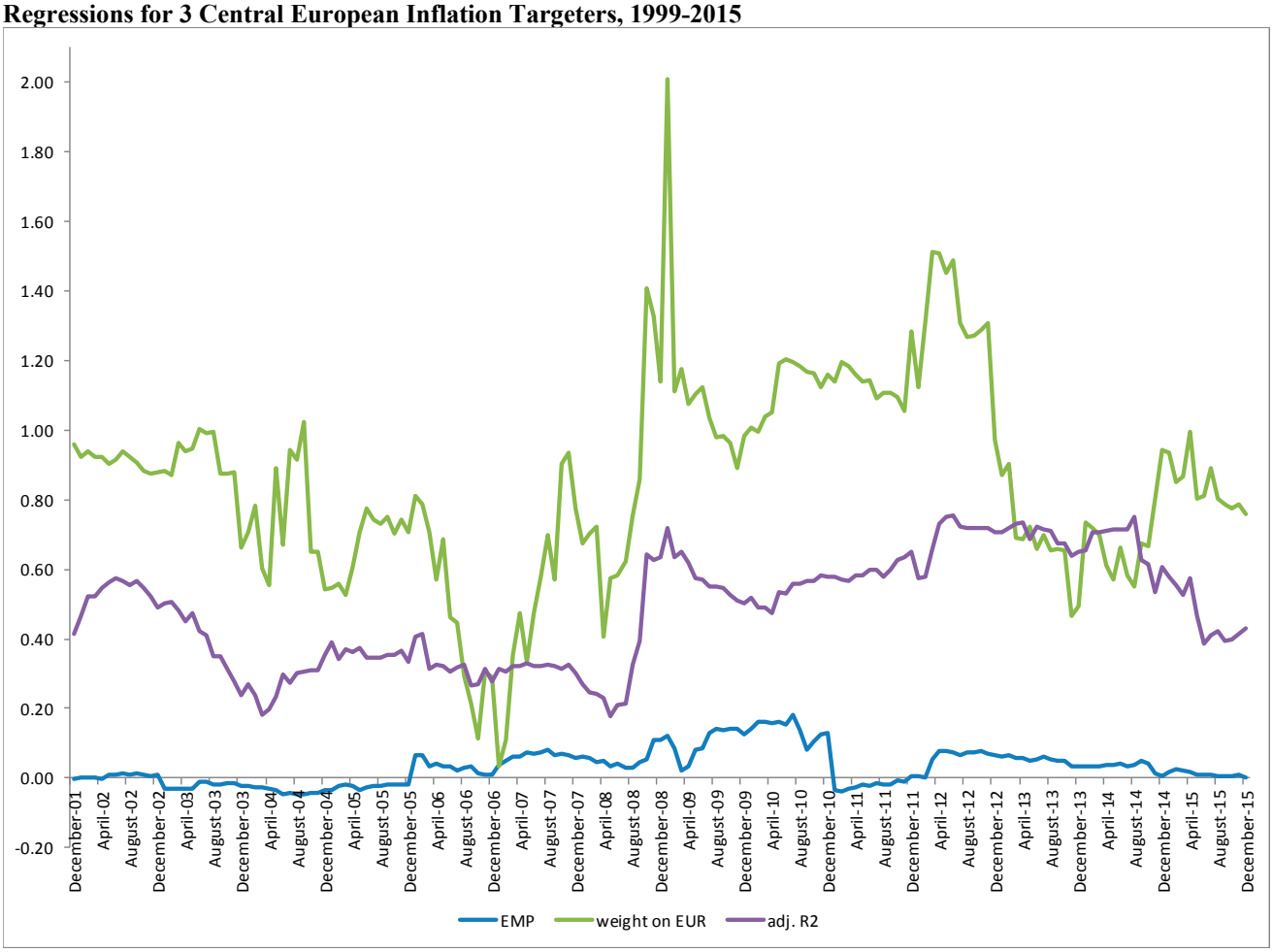
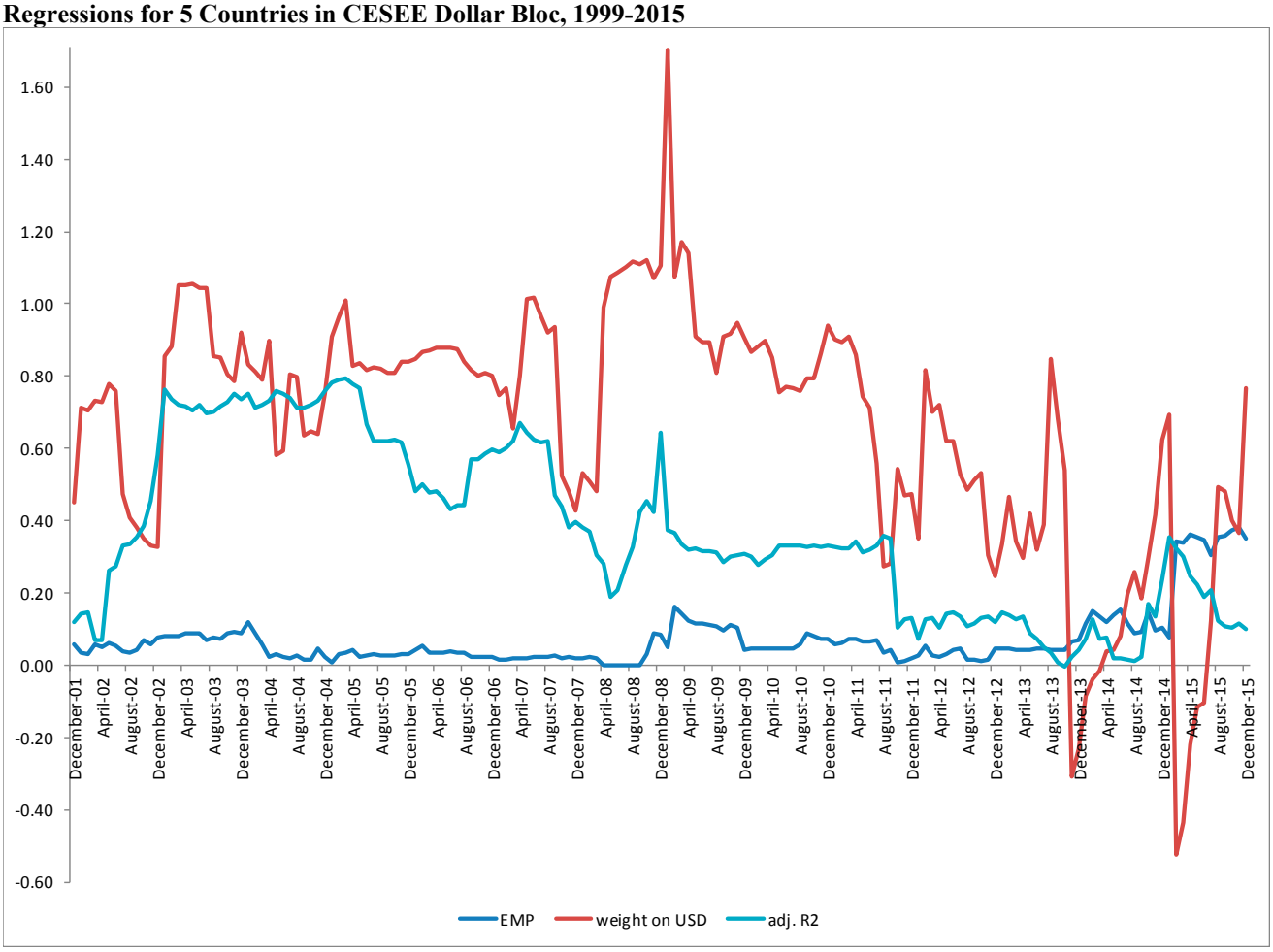


Figure 5 covers the five countries in the CESEE dollar bloc (Belarus, Moldova, Russia, Ukraine, and Turkey). The dollar's importance as a monetary anchor in the region appears to have fallen over time. Especially after end-2013, and corresponding to macroeconomic turmoil in several of these countries, the median EMP coefficient has jumped up and the median weight on the dollar has declined. Median adjusted R^2 has trended downwards over the entire period.

Figure 5: Median Basket Weight on the Dollar, Median EMP, and Median Adjusted R^2 from 36-Month Rolling Regressions for 5 Countries in CESEE Dollar Bloc, 1999-2015



D. Robustness checks

This section describes results from two robustness checks. First, it is possible that the response of the domestic currency to appreciations and depreciations of the major currencies is asymmetric. To test this hypothesis, I supplemented equation (1) with three dummy variables, each of which equals 1 during those periods when the US dollar (or the euro or the British pound) depreciated against the SDR, and 0 otherwise. More importantly, I supplemented equation (1) with three interaction terms: of each dummy with $\varepsilon_{USD/SDR}$, $\varepsilon_{EUR/SDR}$, and $\varepsilon_{GBP/SDR}$, respectively. Furthermore, equation (1) was supplemented with three additional interaction terms: of each currency dummy with *EMP*, in order to test for the possibility that EMP coefficients differs in appreciation versus depreciation episodes. (I also included a dummy and interaction terms for the Russian ruble for Belarus, Moldova, and Ukraine.)

Turning to the results (not reported here, but available upon request), I found some evidence for certain countries that their basket weights tend to respond more strongly to depreciations in major currencies than appreciations. This is the case for the Czech Republic, Hungary, and Belarus with respect to the euro, Ukraine with respect to the British pound, and Belarus and Moldova with respect

to the Russian ruble. Regarding interaction terms with the EMP variable, only about 10 percent of the coefficients on those turned out to be statistically significant (at the 10 percent level of significance). This is what one would expect if the results were driven entirely by sampling variation. Thus, it is reasonable to conclude that there is no evidence of an asymmetry in EMP with respect to appreciations and depreciations in major currencies.

Second, a possible criticism of the model described in equations (1) and (2) is that it takes a narrow view of exchange market pressure. In addition to the stock of international reserves, interest rates may also play a role as a shock absorber. An alternative way to define EMP in order to incorporate this possibility would be:

$$EMP \equiv -\frac{1}{100\sigma_1}\left(\frac{\Delta GIR}{RM}\right)+\frac{1}{100\sigma_2}\Delta\left(i-i^*\right) \qquad \textbf{(3)}$$

Above, i and i^* denote the domestic and foreign short-term interest rate, respectively.[10] σ_1 and σ_2 denote the standard deviations of $\frac{\Delta GIR}{RM}$ and $\Delta\left(i-i^*\right)$, respectively. 100 is just a scaling factor.

EMP now is a weighted average of the change in the stock of gross international reserves and the change in the short-term interest premium, both weighted by the inverse of their respective standard deviations. If there is a negative shock to the demand for domestic currency, we would expect it to show up as exchange rate *depreciation*, as a *reduction* in international reserves, or as in *increase* in the interest rate spread. The regression coefficient β_1 would then measure the extent to which market pressure on the domestic currency is allowed to be reflected in the exchange rate, as opposed to the stock of international reserves or domestic short-term interest rates.

Tables 8-10 re-estimate results for the thirteen countries in CESEE plus Bulgaria and South Africa over 1999-2015. The results are quite similar to those reported in Tables 5-7. EMP coefficients are much higher than they were in Tables 5-7, but the scale is different here.

[10] I typically used money market or T-bill interest rates. When these were not available, I used policy or discount rates. For i^*, I used Euro Area interest rates for the eight countries that track the euro, and US interest rates for the five countries that track the US dollar.

Table 8: Regression Results for 5 Balkan Countries, 1999-2015

Country Variables	(1) HRV	(2) MKD	(3) ALB	(4) ROM	(5) SRB	Median	(6) BGR	(7) ZAF
Constant	0.00	0.00	-0.00	0.00**	0.00**	**0.00**	-0.00	0.01**
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*		*(0.00)*	*(0.00)*
EMP	0.22**	0.05	0.18	0.24	0.19	**0.19**	0.00	0.67***
	(0.09)	*(0.04)*	*(0.14)*	*(0.18)*	*(0.12)*		*(0.01)*	*(0.22)*
$\varepsilon_{USD/SDR}$	-0.05	0.02	0.19	0.57**	0.29	**0.19**	0.00	0.04
	(0.14)	*(0.10)*	*(0.17)*	*(0.28)*	*(0.23)*		*(0.03)*	*(0.38)*
$\varepsilon_{EUR/SDR}$	0.76***	0.93***	0.83***	1.24***	1.32***	**0.93**	1.03***	0.54*
	(0.09)	*(0.08)*	*(0.14)*	*(0.26)*	*(0.17)*		*(0.03)*	*(0.28)*
$\varepsilon_{GBP/SDR}$	0.07	-0.03	0.07	0.20**	0.09	**0.07**	-0.00	0.24
	(0.05)	*(0.05)*	*(0.07)*	*(0.09)*	*(0.11)*		*(0.02)*	*(0.21)*
Observations	183	203	174	172	146	**174**	204	204
Adjusted R^2	0.63	0.76	0.49	0.44	0.53	**0.53**	0.95	0.08

Notes: Columns (1)-(7) estimate equation (1) in the main text of the paper. The dependent variable is the percentage change in the country's exchange rate with the SDR. EMP is defined in equation (3) in the main text of the paper. $\varepsilon_{USD/SDR}$ is the percentage change in the US dollar's exchange rate with the SDR. The remaining independent variables are defined similarly for the euro and the British pound. Robust standard errors are reported in parentheses. ***, **, * denote statistical significance at the 1%, 5%, 10% level, respectively.

Table 9: Regression Results for 3 Central European Inflation Targeters, 1999-2015

Country Variables	(1) CZE	(2) HUN	(3) POL	Median	(4) BGR	(5) ZAF
Constant	-0.00	0.00	0.00	**0.00**	-0.00	0.01**
	(0.00)	*(0.00)*	*(0.00)*		*(0.00)*	*(0.00)*
EMP	-0.17	0.08	0.17	**0.08**	0.00	0.67***
	(0.12)	*(0.15)*	*(0.18)*		*(0.01)*	*(0.22)*
$\varepsilon_{USD/SDR}$	-0.23	-0.00	0.10	**0.00**	0.00	0.04
	(0.16)	*(0.26)*	*(0.35)*		*(0.03)*	*(0.38)*
$\varepsilon_{EUR/SDR}$	0.99***	1.30***	1.02***	**1.02**	1.03***	0.54*
	(0.12)	*(0.28)*	*(0.27)*		*(0.03)*	*(0.28)*
$\varepsilon_{GBP/SDR}$	0.19	0.25**	0.37**	**0.25**	-0.00	0.24
	(0.13)	*(0.10)*	*(0.16)*		*(0.02)*	*(0.21)*
Observations	202	196	204	**202**	204	204
Adjusted R^2	0.61	0.52	0.34	**0.52**	0.95	0.08

Notes: Columns (1)-(5) estimate equation (1) in the main text of the paper. The dependent variable is the percentage change in the country's exchange rate with the SDR. EMP is defined in equation (3) in the main text of the paper. $\varepsilon_{USD/SDR}$ is the percentage change in the US dollar's exchange rate with the SDR. The remaining independent variables are defined similarly for the euro and the British pound. Robust standard errors are reported in parentheses. ***, **, * denote statistical significance at the 1%, 5%, 10% level, respectively.

Table 10: Regression Results for the Dollar Bloc, 1999-2015

Country Variables	(1) BLR	(2) MDA	(3) RUS	(4) TUR	(5) UKR	Median	(6) BGR	(7) ZAF
Constant	0.01***	0.00	0.01***	0.01	0.00*	**0.01**	-0.00	0.01**
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*	*(0.00)*		*(0.00)*	*(0.00)*
EMP	0.12	0.17	0.63***	1.01	0.32*	**0.32**	0.00	0.67***
	(0.28)	*(0.18)*	*(0.22)*	*(0.73)*	*(0.17)*		*(0.01)*	*(0.22)*
$\varepsilon_{USD/SDR}$	0.90**	0.36	0.56*	1.10**	1.31***	**0.90**	0.00	0.04
	(0.41)	*(0.26)*	*(0.30)*	*(0.49)*	*(0.20)*		*(0.03)*	*(0.38)*
$\varepsilon_{EUR/SDR}$	0.48	-0.05	0.51	1.01**	0.21	**0.48**	1.03***	0.54*
	(0.42)	*(0.16)*	*(0.34)*	*(0.42)*	*(0.24)*		*(0.03)*	*(0.28)*
$\varepsilon_{GBP/SDR}$	-0.27**	-0.19**	0.39**	0.37	0.66***	**0.37**	-0.00	0.24
	(0.12)	*(0.10)*	*(0.18)*	*(0.24)*	*(0.25)*		*(0.02)*	*(0.21)*
$\varepsilon_{RUB/SDR}$	0.65***	0.21**			0.04	**0.21**		
	(0.14)	*(0.08)*			*(0.09)*			
Observations	126	191	190	158	156	**158**	204	204
Adjusted R^2	0.59	0.18	0.13	0.07	0.43	**0.18**	0.95	0.08

Notes: Columns (1)-(7) estimate equation (1) in the main text of the paper. The dependent variable is the percentage change in the country's exchange rate with the SDR. EMP is defined in equation (3) in the main text of the paper. $\varepsilon_{USD/SDR}$ is the percentage change in the US dollar's exchange rate with the SDR. The remaining independent variables are defined similarly for the euro, the British pound, and the Russian ruble. Robust standard errors are reported in parentheses. ***, **, * denote statistical significance at the 1%, 5%, 10% level, respectively.

III. IS EXCHANGE RATE STABILITY IN CESEE NATURAL OR SUPER-NATURAL?

The statistical analysis of Section II reveals that most of the countries in CESEE track closely the euro or the dollar. This section considers several possible explanations for this phenomenon.

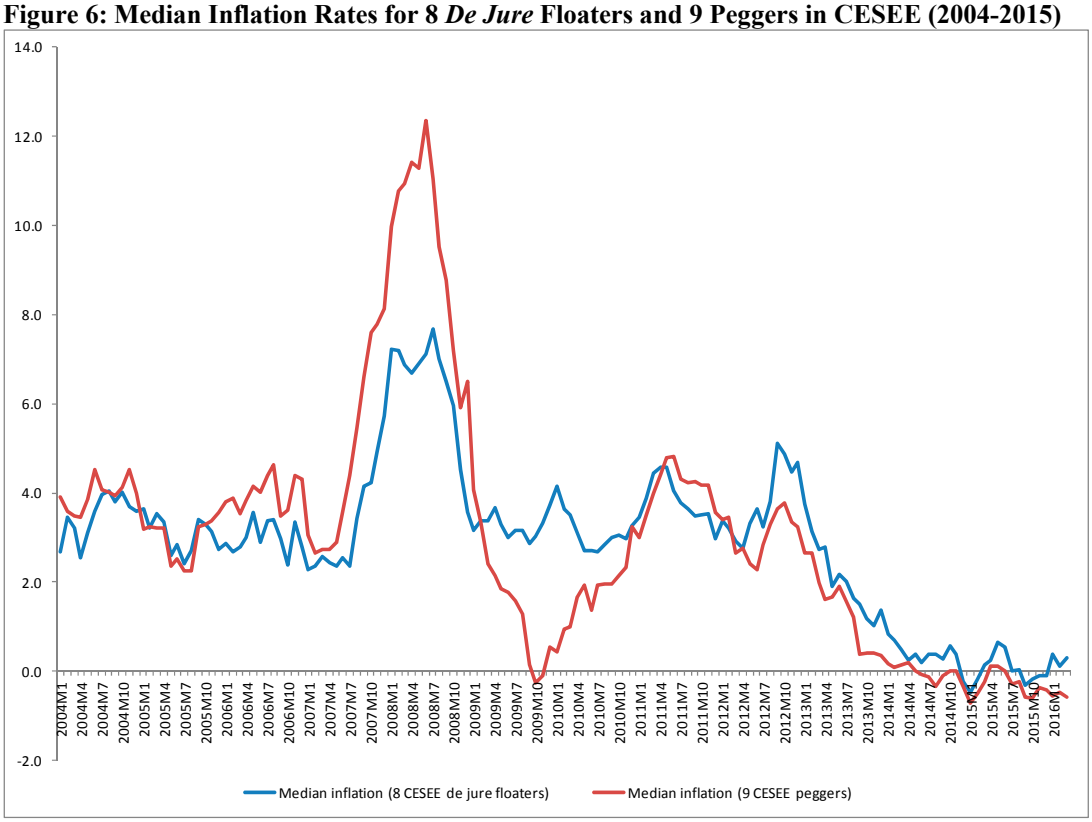
A. Is exchange rate stability a natural manifestation of inflation targeting?

Various empirical studies indicate that small open economies have high exchange rate pass-through (ERPT). In other words, the price level in these countries is more sensitive to exchange rate fluctuations. Given higher ERPT, the monetary authorities will pay special attention to the exchange rate and will try to stabilize it, even if the ultimate policy objective is an inflation target. In other words, in a country with high exchange rate pass-through, an inflation-targeting framework might be observationally equivalent to limited exchange rate flexibility.

However, that argument does not seem to apply for the 8 CESEE countries which key on the euro. Figure 6 plots their median inflation rate and compares it to the median inflation rate of 9 CESEE countries which have abandoned the exchange rate as a tool for macroeconomic adjustment (Bosnia and Herzegovina, Bulgaria, Estonia, Kosovo, Latvia, Lithuania, Montenegro, Slovakia, and Slovenia). There is a clear contrast in inflation performance in the run-up to the global financial crisis and in its immediate aftermath, when the 8 countries with floating exchange rates experienced somewhat less volatile inflation rates. More recently, however, there has been surprisingly little difference in median inflation outcomes between the two groups. The 8 CESEE *de jure* floaters have consistently undershot their inflation targets. In this recent episode, inflation-targeting is not observationally equivalent to limited exchange rate flexibility, and these 8 countries appear to have

chosen exchange rate stability over their inflation targets.

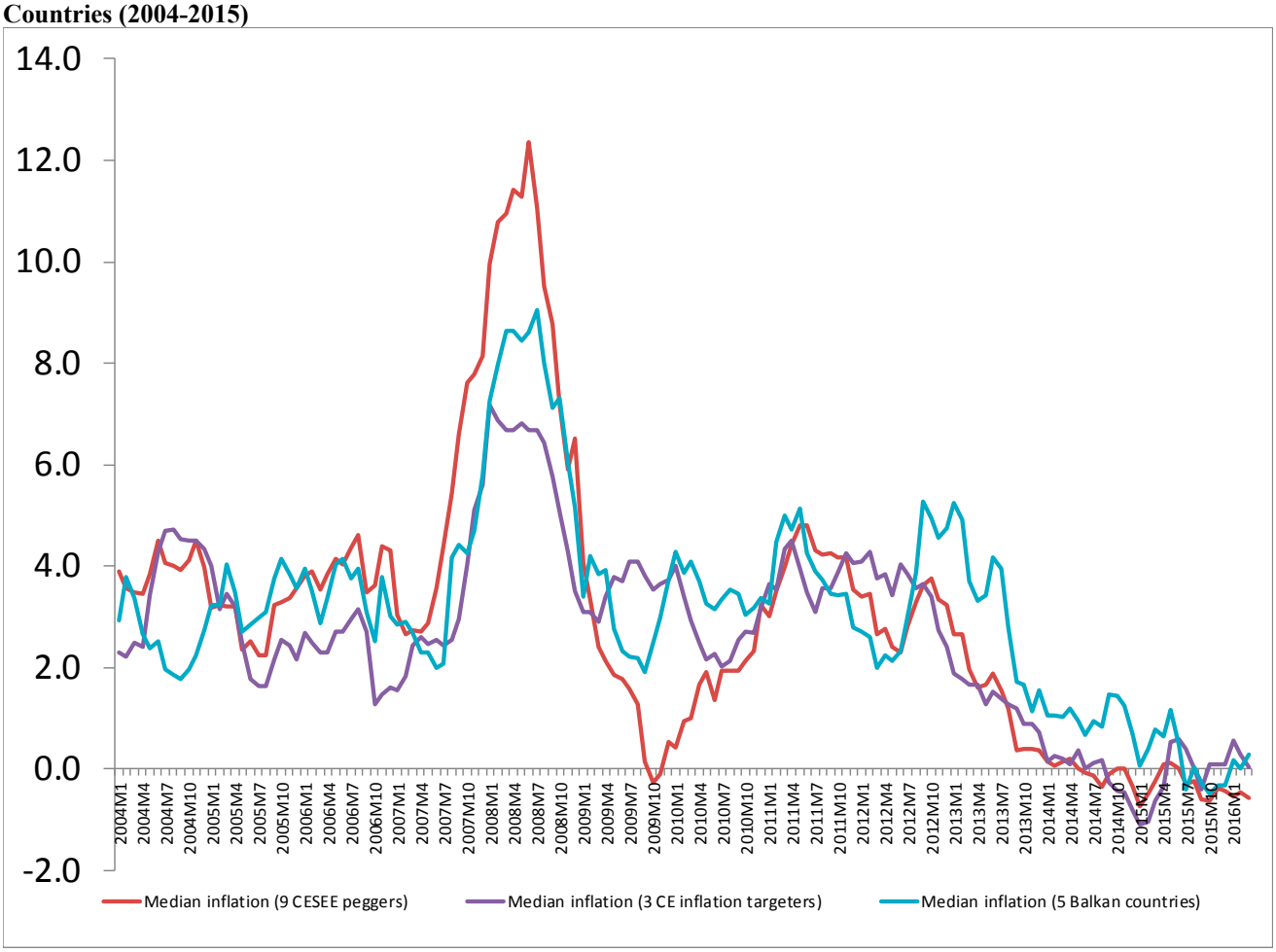
Figure 6: Median Inflation Rates for 8 *De Jure* Floaters and 9 Peggers in CESEE (2004-2015)



Source: IMF's IFS database.

Figure 7 breaks up these 8 countries into two groups: 5 Balkan countries and 3 Central European inflation targeters. Once again, there is a meaningful difference in their inflation performance in the run-up to the global financial crisis and in its immediate aftermath, along predictable lines. And once again, more recently there has been surprisingly little difference in median inflation outcomes among the three groups in Figure 7.

Figure 7: Median Inflation Rates for 9 CESEE Peggers, 3 Central European Inflation Targeters, and 5 Balkan Countries (2004-2015)

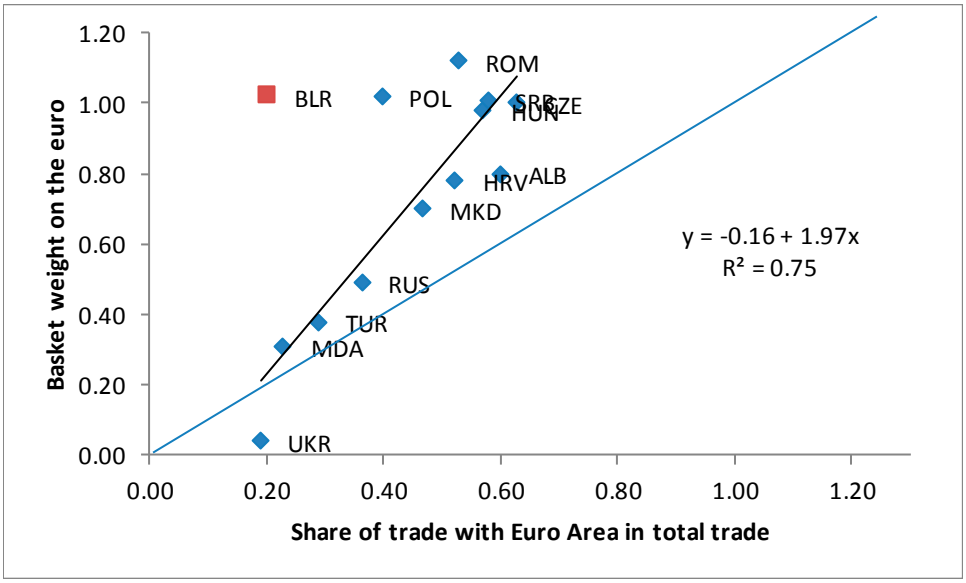


Source: IMF's IFS database.

B. Is exchange rate stability a consequence of trade integration?

This section investigates whether the extent to which the 13 CESEE countries track the euro and dollar makes sense, given the currency structure of their external trade. Figure 8 below shows that countries that traded a lot with the Euro Area also tend to track the euro quite closely. The figure illustrates clearly the existence of a euro and a dollar bloc in CESEE. The countries in the CESEE dollar bloc lie close to the 45-degree line (with the exception of Belarus, an outlier), so the amount of attention they pay to the euro roughly matches the Euro Area's importance as a trading partner. However, all countries in the CESEE euro bloc lie above the 45-degree line, so the euro's weight in their exchange rate regimes exceeds the Euro Area's trade share.

Figure 8: Estimated Basket Weight on the Euro over 2010-2015 versus Share of Trade with Euro Area in Total Trade over 2010-2014 for 13 CESEE Countries



Source: IMF's DOTS database.
Note: Share of trade is defined as the weighted average of import and export shares. Basket weight on the euro is an estimate of β_3 in equation (1). Belarus was excluded from the OLS estimation as its basket weight on the euro is a statistically insignificant outlier.

A fair criticism of Figure 8 would be that by focusing on trade with the Euro Area, it understates the euro's importance in global trade. Many countries outside the Euro Area peg to the euro or invoice their exports in euros (particularly in CESEE). Table 11 below tackles this criticism by looking at the correlation between each country's nominal effective exchange rate (NEER) and the dollar-euro exchange rate over 2010-2015. NEERs are based on trade weights, by construction.[11] If the euro's weight in a CESEE country's exchange rate regime is "just right," that is, it equals its trade weight (broadly defined to also include trading partners whose currencies are tracking the euro), we would expect the country's NEER to stay roughly constant over time. Therefore, its correlation coefficient with the dollar-euro exchange rate should be zero. On the other hand, if we found that correlation coefficient to be positive, that would mean that the country's NEER tends to appreciate precisely when the euro strengthens against the dollar. That would be evidence that the euro's weight in the country's exchange rate regime is higher than its trade weight (broadly defined). Vice versa, if we found that correlation coefficient to be negative, that would mean that its NEER tends to appreciate precisely when the dollar strengthens against the euro, suggesting that the dollar's weight in the country's exchange rate regime is higher than its trade weight.

Table 11 presents the correlation coefficient between the monthly rate of change in the dollar-euro exchange rate and the monthly rates of change of the NEERs of 13 CESEE countries over 2010-2015. For 6 out of 8 countries in the CESEE euro bloc, that correlation is both positive and statistically significant, using a simple *t* test. Following the logic above, that means these countries place a weight

[11] $NEER \equiv E_1^{\frac{Trade_1}{Total\,Trade}} E_2^{\frac{Trade_2}{Total\,Trade}} \dots E_N^{\frac{Trade_N}{Total\,Trade}}$
Note that NEER calculations use weights based on trade in goods, so NEERs exclude other important components of the current account such as trade in services or remittances.

on the euro in their *de facto* exchange rate which regimes exceeds its trade weight (broadly defined). The only exceptions are Albania and Croatia whose correlation coefficients are statistically insignificant, indicating that the weight they place on the euro is close to the euro's trade weight. For 2 out of 5 countries in the CESEE dollar bloc (Moldova and Turkey), the correlation coefficients are both negative and significant, indicating that the dollar's weight in their *de facto* exchange rate regimes exceeds its trade weight (broadly defined). For the remaining three countries (Belarus, Russia, Ukraine), the correlation coefficients are not statistically significant. Overall, most of these countries (8 out of 13) appear the stabilize their exchange rates with the euro or the dollar to an extent inconsistent with merely stabilizing their NEERs.

Table 11: Correlation between Monthly Changes in Country's NEER and Dollar-Euro Exchange Rate (2010-2015)

Country	Correlation coefficient
CESEE euro bloc	
Albania	-0.05
Croatia	0.18
Czech Republic	0.39***
Hungary	0.31***
Macedonia	0.23*
Poland	0.43***
Romania	0.43***
Serbia	0.35***
CESEE dollar bloc	
Belarus	0.00
Moldova	-0.26**
Russia	0.02
Turkey	-0.28**
Ukraine	-0.19

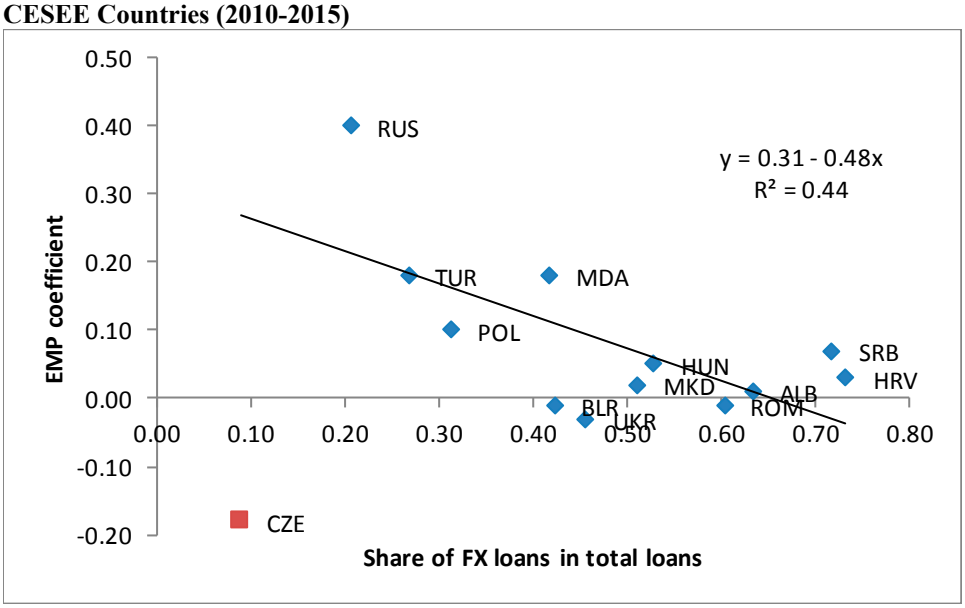
Source: IMF's INS and IFS databases.
Note: ***, **, * denote statistical significance at the 1%, 5%, 10% level, respectively, using a simple *t* test.

C. Is exchange rate stability a product of liability dollarization?

Many CESEE countries suffer from pervasive dollarization (or euroization). A high percentage of all loans and deposits in the banking system is FX-denominated. In addition, there is a sizable currency mismatch on the balance sheets of the government, non-financial companies, and households. While assets and income streams are typically denominated in domestic currency, a significant amount of liabilities is denominated in euros or dollars. A depreciating exchange rate increases the domestic-currency value of liabilities and eats into net worth. Therefore, depreciations are associated with financial distress or even bankruptcy, not with export-led growth which is the benign outcome emphasized in textbook models. In published empirical work, liability dollarization is the variable with the most robust statistical association to "fear of floating:" countries with the highest fraction of foreign-denominated liabilities are the least likely to float. Examples include Hausmann, Panizza, and Stein (2001), Kliatskova and Mikkelsen (2015), and Ebeke and Azangue (2015).

Figure 9a below confirms this results for the sample of CESEE countries over 2010-2015.[12] There is a strong negative relationship between the degree of dollarization/euroization in the banking system, as measured by the share of FX loans in total loans, and the estimated EMP coefficient (with EMP defined as in equation (2)). The higher the degree of loan dollarization/euroization, the lower the estimated degree of exchange rate flexibility. There is a similar but substantially weaker relationship for deposit dollarization/euroization (Figure 9b). While exchange rate stability does appears to be driven by liability dollarization, the latter is not a *natural* driver of the former. Rather, liability dollarization provides a good reason why pursuing exchange rate stability is a sensible policy choice.

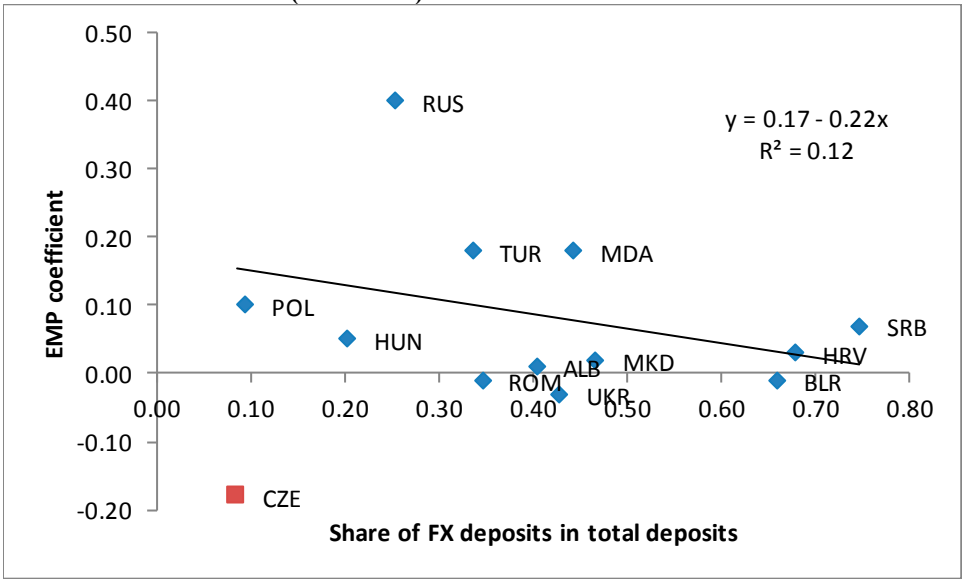
Figure 9a: Estimated EMP Coefficient versus Share of FX Loans in Total Loans for 13 CESEE Countries (2010-2015)



Source: Author's estimates, EBRD data, IMF's IFS database.
Note: The Czech Republic was excluded from the OLS estimation as its EMP coefficient is an outlier.

[12] Given the evidence presented in Figures 3-5 of evolving exchange rate regimes, this section focuses on the post-crisis period (2010-2015), to minimize problems caused by structural breaks.

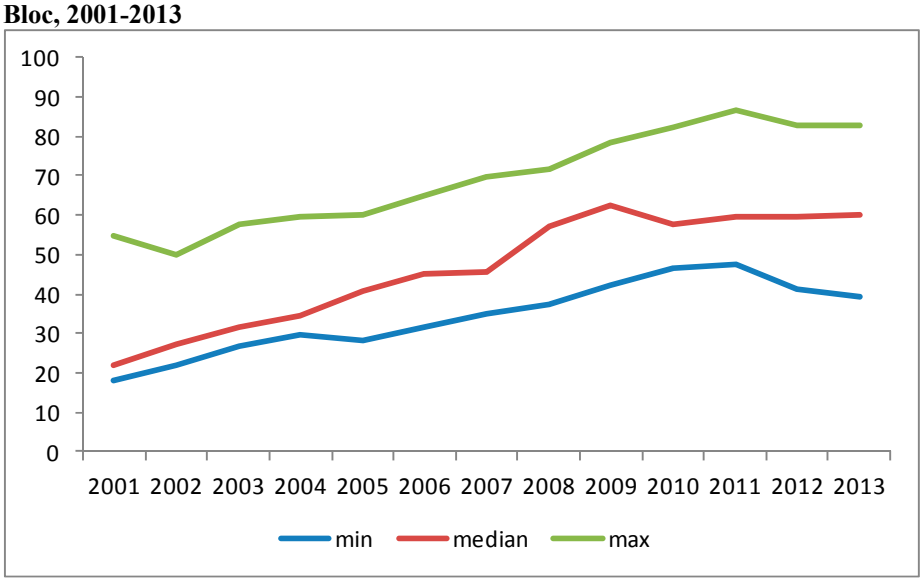
Figure 9b: Estimated EMP Coefficient versus Share of FX Deposits in Total Deposits for 13 CESEE Countries (2010-2015)



Source: Author's estimates, EBRD data, IMF's IFS database.
Note: The Czech Republic was excluded from the OLS estimation as its EMP coefficient is an outlier.

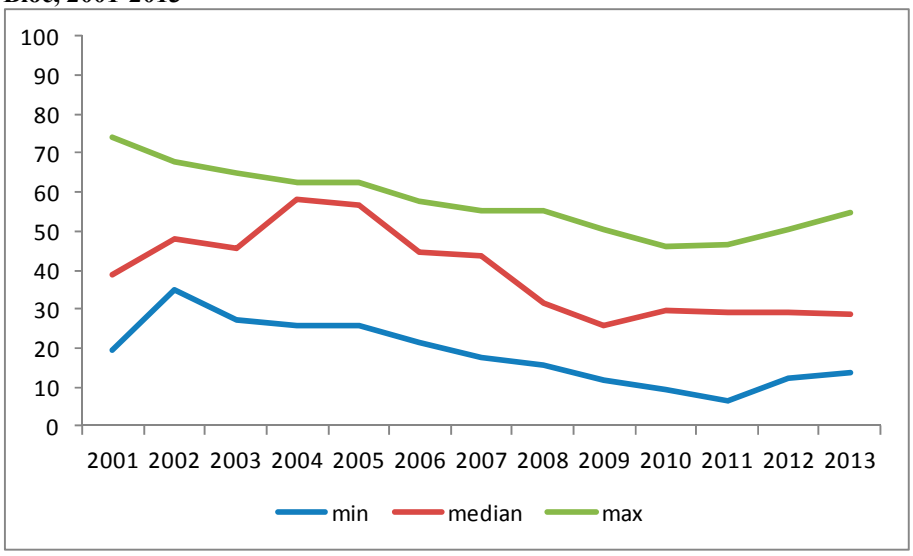
Figures 10a and 10b below report data on the euro's and dollar's shares in the public and publicly guaranteed (PPG) external debt of five countries in the CESEE euro bloc (Albania, Hungary, Macedonia, Romania, and Serbia). These were the countries for which data were available in the World Bank's Global Development Finance (GDF) database. As you can see, the euro's share drifted up significantly, from a median of around 20 percent in 2001 to a median of around 60 percent in 2013. At the same time, the dollar's share gradually decreased, from a median of around 40 percent in 2001 to a median of around 30 percent in 2013.

Figure 10a: Euro's Share in PPG External Debt for Five Countries in CESEE Euro Bloc, 2001-2013



Source: WB's GDF database.
Note: The countries included are Albania, Hungary, Macedonia, Romania, and Serbia.

Figure 10b: Dollar's Share in PPG External Debt for Five Countries in CESEE Euro Bloc, 2001-2013



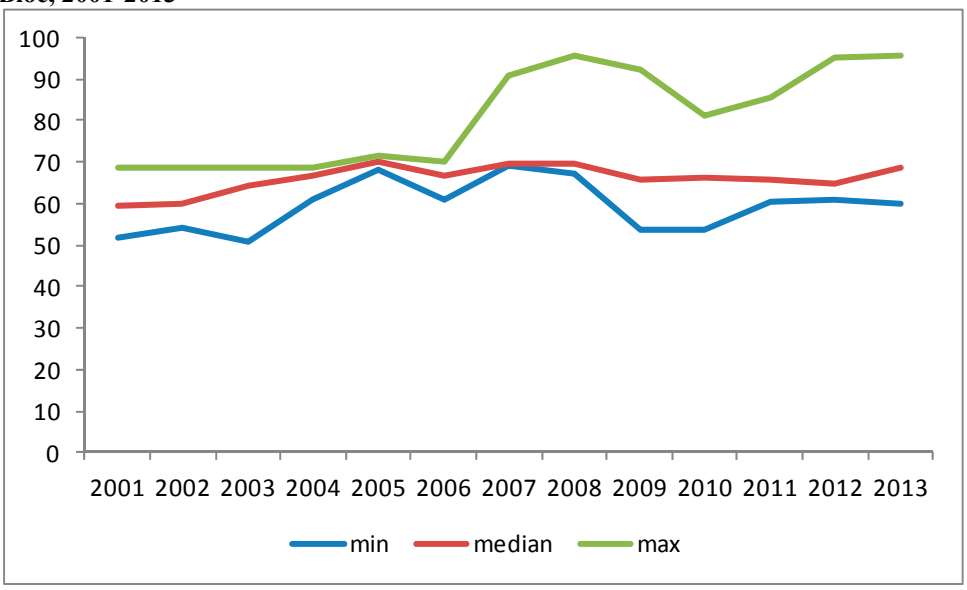
Source: WB's GDF database.
Note: The countries included are Albania, Hungary, Macedonia, Romania, and Serbia.

Figures 11a and 11b below report data on the dollar's and euro's shares in the public and public guaranteed (PPG) external debt of four countries in the CESEE dollar bloc (Belarus, Moldova, Turkey, and Ukraine) over 2001-2013.[13] The dollar's median share has gone up over time from a median of around 60 percent in 2001 to a median of around 70 percent in 2013. The euro has fallen

[13] Data for Russia were not available in the World Bank's GDF database.

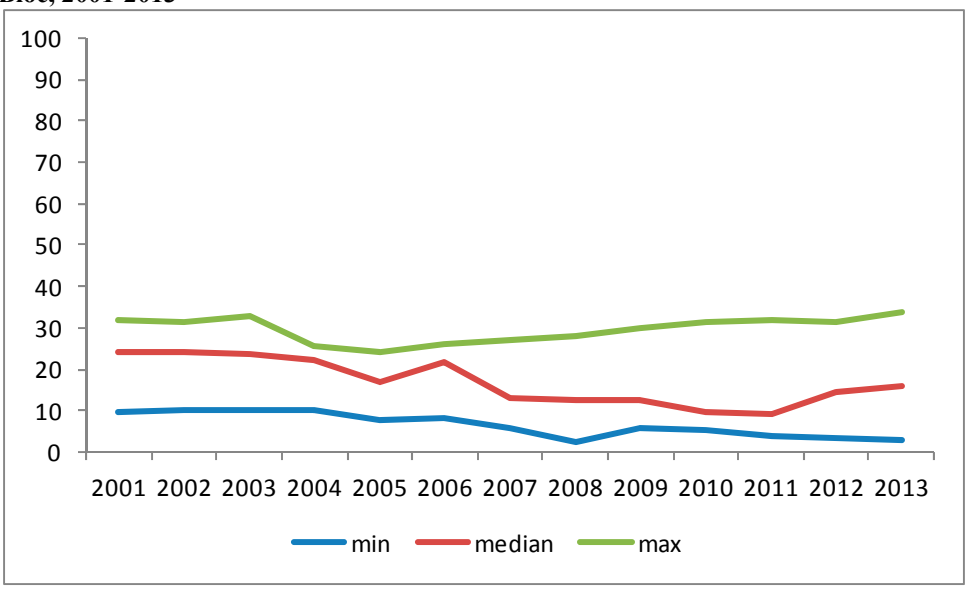
from a median of around 25 percent in 2001 to a median of around 15 percent in 2013.

Figure 11a: Dollar's Share in PPG External Debt for Four Countries in CESEE Dollar Bloc, 2001-2013



Source: WB's GDF database.
Note: The countries included are Belarus, Moldova, Turkey, and Ukraine.

Figure 11b: Euro's Share in PPG External Debt for Four Countries in CESEE Dollar Bloc, 2001-2013

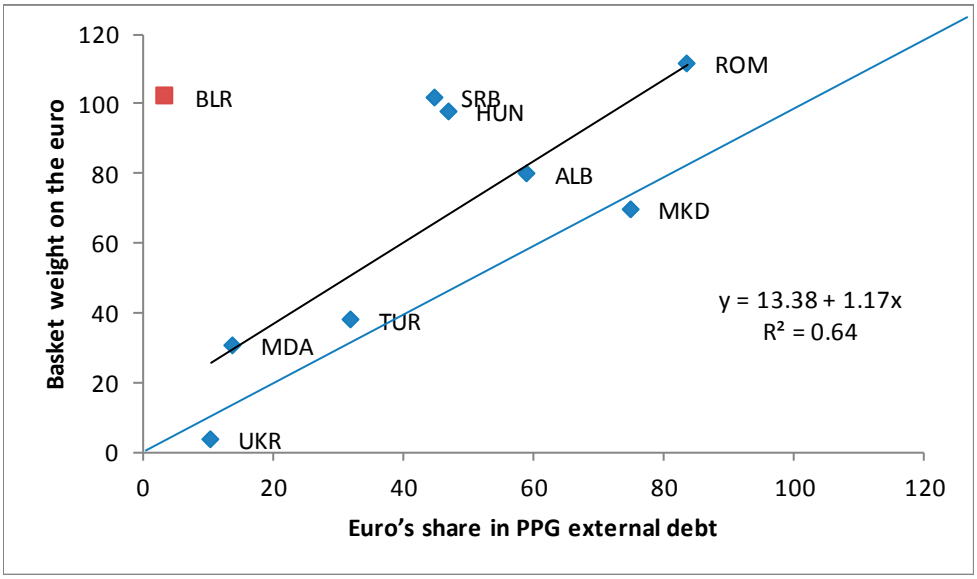


Source: WB's GDF database.
Note: The countries included are Belarus, Moldova, Turkey, and Ukraine.

Figure 12 below shows a clear positive relationship between the euro's share in PPG external debt and the euro's estimated weight in the exchange rate regimes of the 8 countries covered in Figures

10-11 (Belarus was excluded as an outlier). The countries in the CESEE dollar bloc lie close to the 45-degree line, so the amount of attention they pay to the euro roughly matches the euro's importance in their PPG external debt. However, the countries in the CESEE euro bloc typically lie above the 45-degree line, so the euro's weight in their exchange rate regimes exceeds the euro's share in their PPG external debt.

Figure 12: Estimated Basket Weight on the Euro over 2010-2015 versus Euro's Share in PPG External Debt over 2010-2013 for Nine CESEE Countries



Source: WB's GDF database.

Note: Basket weight on the euro is an estimate of β_3 in equation (1). Belarus was excluded from the OLS estimation as its basket weight on the euro is a statistically insignificant outlier.

Financial dollarization is usually driven by memories of past monetary instability that tend to be long and deep-rooted. Thus, while there is a compelling case to reduce dollarization and increase policy space, doing so can be difficult. A look at successful experiences shows that de-dollarization usually requires a credible and consistent package of policy measures implemented over many years. In addition to low and stable domestic inflation, financial de-dollarization requires the existence of a credible monetary anchor, overseen by a strong and independent central bank, and supported by fiscal policy. De-dollarization also requires supportive regulatory policies, which might include measures to develop domestic-currency financial markets or prudential requirements aimed at fully internalizing the costs of conducting business in foreign currency. Examples include currency-specific reserve, liquidity, or provisioning requirements; risk weights; deposit insurance rules; as well as rules limiting FX lending only to borrowers that are hedged, highly credit-worthy, or well-collateralized. See Belhocine *et al.* (2016) for further discussion.

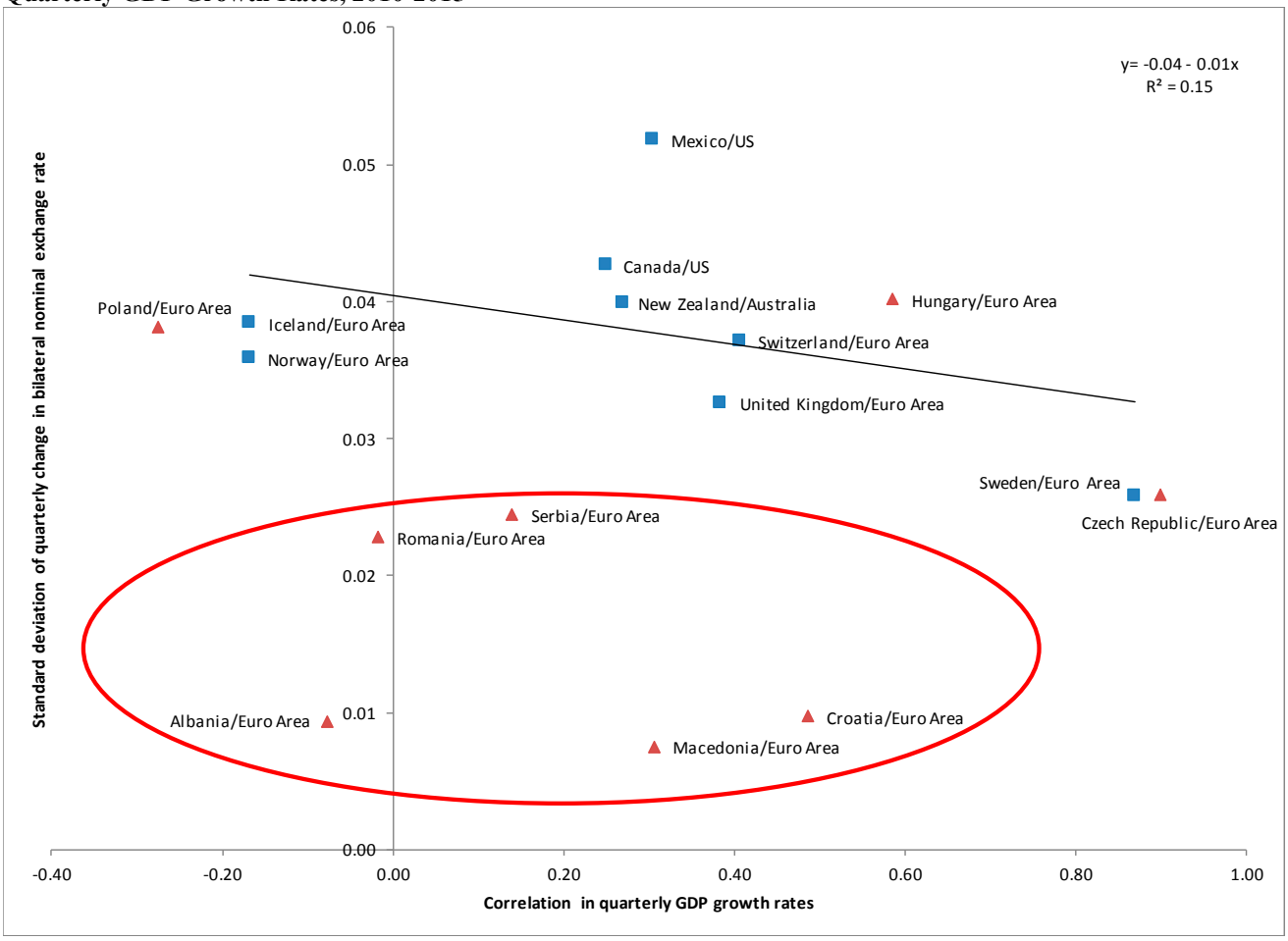
D. Is exchange rate stability the natural product of business cycle synchronization?

Another possible explanation is that the apparent exchange rate stability in CESEE might be the natural product of business cycle synchronization. For example, perhaps the eight current or aspiring EU members in the sample are so highly integrated with the Euro Area, that they are subject to

common shocks. Exchange rate stability with the euro would then be the natural product of economic integration.

To investigate this hypothesis, it would be instructive to compare the eight CESEE countries that track the euro to other countries with floating exchange rates which are tightly integrated with a larger neighbor. Iceland, Norway, Sweden, Switzerland, and the United Kingdom are examples of floaters that are highly integrated with the Euro Area. Canada and Mexico are highly integrated with the US, and so is New Zealand with Australia. Figure 13 below plots the standard deviations of the quarterly changes in the bilateral exchange rates of these countries (with the euro, US dollar, or Australian dollar, as appropriate) against the correlation of their quarterly GDP growth rates with the large neighbor's. The figure suggests that there is indeed a negative relationship between the two variables. In other words, the higher the degree of business cycle synchronization, the less volatile the bilateral nominal exchange rate, an intuitively plausible result.

Figure 13: Standard Deviation of Quarterly Change in Bilateral Nominal Exchange Rates versus Correlation in Quarterly GDP Growth Rates, 2010-2015



Source: IMF's IFS database.

If we add the eight CESEE countries that were found to track the euro closely, the three Central

European inflation targeters (the Czech Republic, Hungary, and Poland) lie fairly close to the regression line, indicating that for them exchange rate stability with the euro might indeed be the natural product of economic integration and business cycle synchronization. In contrast, the five Balkan countries (Albania, Croatia, Macedonia, Romania, and Serbia) lie significantly below the regression line. In other words, their exchange rates with the euro are substantially less volatile than one would expect based on the extent of their integration with the Euro Area. For these countries, exchange rate stability with the euro appears to be a conscious policy choice rather than a natural consequence of business cycle synchronization.

Of course, a simple scatterplot like the one in Figure 13 is not enough to settle the question of whether exchange rate stability with the euro is the natural product of economic integration and business cycle synchronization. While there are reasons to be skeptical, as discussed above, this remains an interesting hypothesis which could be explored in future research.

IV. CONCLUSION

This paper used the framework pioneered by Frankel and Wei (1994) and extended in Frankel and Wei (2008) to show that most CESEE countries with *de jure* floating exchange rate regimes have been tracking the euro or the US dollar quite closely in recent years. In other words, the exchange rate regimes of a majority of these countries can be approximated surprisingly well by a soft peg to a currency basket dominated by the euro or the US dollar. The extent to which each country's currency tracks the euro or the dollar is correlated with the currency structure of its external trade and finance. However, some countries appear to track the EUR or USD to an extent which appears inconsistent with inflation targeting or trade or financial integration. The phenomenon is particularly pronounced among the countries in the CESEE euro bloc, which may be deliberately gravitating around the euro in anticipation of eventually joining the Euro Area.

The analysis in this paper could be extended in at least three directions by future research. First, the question of whether exchange rate stability with the euro is the natural product of business cycle synchronization could be pursued further. Second and on a related note, future research could explore the role of financial integration in exposing CESEE to shocks similar to those in the Euro Area, and thus triggering exchange rate stability. Third, a Taylor Rule augmented with an exchange rate factor could be estimated to test the proposition that CESEE countries pursue exchange rate stability as a policy objective, above and beyond minimizing the output gap or achieving an inflation target.

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