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Montenegro's Unilateral Euroization

Arslan Razmi*

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Abstract

Unilateral euroization is underexplored even in comparison to unilateral dollarization (taken to mean the adoption of the US dollar as legal tender). This paper attempts to partly fill this gap in the literature by investigating the case of Montenegro, which is one of the two countries that have unilaterally adopted the euro as the legal tender. Montenegro's limited monetary policy options make the nature of business cycles important. The evidence presented here suggests that Montenegro has a low degree of synchronization, limited structural similarity, and weak trade integration with the Eurozone. Moreover, there is limited evidence for endogenous structural assimilation following euroization. The case for currency union is weak for Montenegro and appears to be defensible only on grounds of policy credibility.

JEL classifications: F15, F45, E32, E52

Key words: Montenegro, euroization, dollarization, currency union, optimal currency areas.

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1 Introduction and Background

In an insightful analysis of increasing official dollarization in the 1990s and early 2000s, Edwards (2001) found it remarkable that "this rather drastic piece of advice - giving up the national currency - is being dispensed on the bases of very limited empirical and historical evidence." The dearth of empirical and historical evidence is, if anything, even more glaring in the case of countries that unilaterally euroized in recent years. An obvious underlying reason is the infancy of the euro itself. The fact that, unlike the United States, the Eurozone lacks a fiscal or banking union that help stabilize output within the currency area, makes analysis trickier. Moreover, the unusual circumstances accompanying the unilateral euroization by Montenegro and Kosovo, including a civil war and the Great Recession, make it challenging to gauge the consequences of euroization. This paper attempts to investigate Montenegro's euroization within the limitations imposed by these constraints.

After unilaterally adopting the Deutsche Mark for two years, Montenegro officially and unilaterally euroized in 2002, adopting the euro first as a parallel legal tender, and then as the only legal tender. The main motive appears to have been the need to establish monetary stability following bouts of high/hyper inflation in the preceding decades.[1] To date there are no official ties or agreements between Montenegro and the European Central Bank approving the use of the euro as an official currency and while Montenegro was given candidate status for European Union membership in 2010, the path to Eurozone membership is still unclear.[2]

This paper investigates the evolution of the Montenegrin economy since the adoption of the euro and political independence. I explore both monetary and real sector developments in order to analyze the potential consequences of unilateral dollarization for Montenegro, especially in the years following the Eurozone crisis. In particular, I examine the degree of Montenegrin integration with the rest of the Eurozone, and compare it with other economies in the region. The severity and duration of the Eurozone crisis, especially in the PIIGS (Portugal, Spain, Ireland, Italy, and Spain) has given a new lease of life to interest in common currency issues. This is a good time to take stock in the Montenegrin context.

To give a preview of the main conclusions, I find that while Montenegro is likely to have benefitted from importing policy credibility, the Montenegrin economy is only weakly synchronized with the Eurozone, and by some measures, has become less so over time. Euroization has helped little in this regard. The lack of exchange rate flexibility and monetary autonomy may therefore be quite costly.

The organization of the rest of this paper is as follows. Section 2 briefly discusses the broad issues involved and the literature relevant to them. Section 3 then analyzes the degree of structural symmetry that exists between Montenegro and the Eurozone in a regional context. Section 4 narrows the focus to issues of monetary independence, followed by Section 5 which looks at other measures of Montenegrin integration with the Eurozone as these have evolved since independence. Finally, Section 6 concludes.

[1] See Fabris et al. (2004) and Winkler et al. (2004).

[2] As a practical matter, the European Union has outlined a 3-step procedure for the monetary integration of candidate countries. The applicants are required to first join the European Union (EU), then become a part of the exchange rate mechanism (ERM 2), and, as a final step that follows satisfaction of the Maastricht convergence criteria, join the Economic and Monetary Union (EMU), i.e., the Eurozone.

2 The "Big Picture" Issues

The choice made by Montenegrin policy makers can be broken down into two steps: (1) the adoption of a fixed exchange rate regime vis-á-vis the Euro area, and (2) the unilateral adoption of the euro as legal tender. While step 2 can be seen as the most extreme form of exchange rate fixing, it does raise subtly different issues in the absence of a common fiscal authority that oversees transfers, and the lack of a banking union and a lender of last resort. In particular, due to its more binding nature, joining a monetary union renders renders more salient the role of asymmetries in economic conditions.

A substantial body of literature now addresses the pros and cons of dollarization.[3] The advantages often cited include increased microeconomic efficiency (the liquidity services and network externalities provided by a single currency circulating over a wider area), reduced transaction costs, the elimination of currency risk and speculative attacks, enhanced policy credibility when it comes to inflation, development of the banking system, lower risk premia on sovereign bonds, reduced real interest rates, and increased trade linkages with other members of the monetary union. Disadvantages include the obvious and dramatic loss of monetary autonomy, the absence of seignorage gains, lack of access to the exchange rate as a stabilizing tool in response to economic shocks, reduced room for the functioning of a domestic lender of last resort, and, as a flip side to the credibility argument, the voluntary limiting of the ability to use the inflation tax in exceptional circumstances.

The context in which a country enters a monetary union matters. Joining a currency union is likely to pose problems in the presence of asymmetric shocks *and* nominal rigidities. This was recognized early on by the pioneering work of Mundell (1961) and others, who pointed out that a common currency is optimal if either: (1) countries are exposed to symmetric shocks, or (2) if shocks are asymmetric, feasible adjustment mechanisms exist to ensure stabilization. The mechanisms could take the form of factor mobility, wage and price flexibility, and fiscal transfers (Mundell (1961)), integration of trade in goods and services (McKinnon (1963)), or a highly diversified economic structure that helps dilute and absorb the effects of shocks (Kenen (1969)).

While the criteria that are typically seen to shape the decision to enter into a monetary union are often a focal point of discussion, whether or not these criteria are endogenous is itself a matter of controversy. For example, Frankel and Rose (1998), and earlier in a major report, European Commission (1990) argue that monetary integration may foster trade. Rose and Stanley (2005) provide a meta-analysis that concludes that currency union increases trade by 30-90 percent. Trade integration, the argument goes, will increase intra-industry trade, foster business cycle synchronization and reduce exposure to asymmetric real shocks. Meeting the preconditions for the introduction of a foreign currency, therefore, may be much less important as an *ex-ante* concern. A different point of view, associated with Krugman (1993), is captured by the so-called "Krugman specialization hypothesis," which raises the possibility that closer trade integration will undermine synchronization among the countries in the monetary union. This view, which is based on trade theory, hypothesizes that reduced transaction costs through integration will lead countries to become more specialized in sectors in which they have a comparative advantage. An implication is that integration will increase the likelihood of union members experiencing sector-specific asymmetric shocks.

[3] See, for example, Borensztein and Berg (2000), Winkler et al. (2004), Minda (2005) and Schuler (2005).

3 Is Policy Independence an Issue for Montenegro?

The loss of monetary autonomy that results from adopting a foreign currency as legal tender gains importance to the extent that a country is structurally different from the currency area, and therefore requires unique policy responses to shocks. How important is this issue in the Montenegrin context? Let's start by taking a look at some basic measures of Montenegro's integration with the Eurozone.[4] Table 1 provides the raw (unconditioned) correlations of inflation ($Inflation$), GDP growth (GDP), GDP per capita growth ($GDPPC$), gross national income growth (GNI), GNI per capita growth ($GNIPC$), and the ratio of foreign direct investment to GDP (FDI/GDP). The period covered begins from Montenegrin independence to the latest year for which data are available. The correlations are generally quite high for Montenegro, ranging between 0.78-0.87, with the exception of the FDI to GDP ratio.

For comparison purposes, Table 1 also presents correlations for other countries, including former Yugoslav republics (Bosnia and Herzegovina, Macedonia, FYR, Romania, Serbia, and Slovenia).[5] The correlations generally tend to be high across the board. Not surprisingly, given that it is already a member of the Eurozone, Slovenia exhibits the highest correlation as far as GDP and GDP per capita are concerned, although this is not true for inflation. Also, Serbian GDP and GDP per capita exhibit the lowest correlation – although still positive and substantial – with the corresponding Eurozone aggregates. This again is not surprising since, as we will see shortly, the Serbian dinar fluctuated the most against the euro during this period. In other words, Serbia is an exception among these countries in not pegging tightly to the euro. It is also interesting to note that unlike GDP and GDP per capita, the correlation of GNI and GNI per capita is much lower for Bulgaria, Macedonia (FYR), and Bosnia and Herzegovina compared to Serbia. This may have to do with factor incomes, in particular wage and profit income remittances.[6] Finally, the correlation of the foreign direct investment to GDP ratio, substantially negative for most countries (with the unsurprising exception of Slovenia), is almost zero for Montenegro. There is no sign of FDI diversion from the Euro area to Montenegro.

One should note that the high correlations seen across the board between individual countries and the Eurozone in Table 1 likely reflect the global nature of the downturn in economic conditions starting with the financial crisis in 2008. I therefore turn next to a more formal exercise to analyze the synchronization of Montenegrin shocks with the Euro area. A widely approach to evaluating the business cycle synchronization between a country and a currency union consists of analyzing the correlation between supply and demand shocks.[7] This, in turn, builds on the structural vector autoregression (SVAR) framework for identifying shocks developed by Blanchard and Quah (1989), and is based on the well-known aggregate supply and aggregate demand (AS-AD) model. Since the technical details are easily available,[8] here I focus on the conceptual points and the analysis.

The Blanchard and Quah decomposition starts with an infinite order moving average (MA) representation of a bivariate SVAR. The effects of demand and supply disturbances are measured for two macroeconomic variables: (1) real output, and, (2) prices. Fluctuations in these variables, in other words, are assumed to be due to supply and demand shocks. Since both variables are generally non-stationary, I(1), processes, these are defined in first differenced form. Supply shocks

[4] Throughout the paper, the terms Eurozone and Euro area are used interchangeably.

[5] The status of Kosovo remains undecided.

[6] It is interesting that, of all the countries in the sample, Serbia has had the largest proportional (and positive) difference between GDP and GNI over this period.

[7] See, for example, Bayoumi and Eichengreen (1992) and Brixiová et al. (2010).

[8] See, for example, Jurgutyte (2006).

Table 1: Correlations between individual country annual aggregates and the Eurozone over the period 2006 - 2016. Source: Author's calculations based on WDI

	Inflation	*GDP*	*GDPPC*	*GNI*	*GNIPC*	*FDI/GDP*
Bosnia and Herz.	0.88	0.75	0.73	0.44	0.40	-0.47
Bulgaria	0.79	0.87	0.83	0.45	0.41	-0.61
Croatia	0.84	0.87	0.88	0.84	0.85	-0.58
Macedonia, FYR	0.38	0.76	0.72	0.33	0.29	-0.59
Montenegro	**0.78**	**0.87**	**0.85**	**0.79**	**0.79**	**-0.02**
Romania	0.88	0.74	0.67	0.62	0.54	-0.79
Serbia	0.76	0.64	0.61	0.55	0.53	-0.32
Slovenia	0.63	0.93	0.91	0.88	0.86	0.17

are assumed to have permanent effects on output and the price level, while demand shocks have permanent effects only on the latter variable, i.e., the long-run aggregate supply curve is assumed vertical.[9] The effect on output, therefore is decomposed into permanent and temporary effects. In addition, the framework imposes three other restrictions, two involving the variances of structural shocks that are set equal to one, and a final one that comes from the covariance of the reduced VAR residuals (the unobserved structural residuals are assumed to be orthogonal).

Table 2 summarizes the results. Positive correlations indicate supply or demand shock synchronization while the magnitudes capture the extent of such synchronization. The sample is constrained by the fact that quarterly real GDP data for Montenegro is available only for the period starting from the first quarter of 2011. I use the consumer price index (CPI) to calculate price inflation. Based on the Akaike Information Criteria, I specify a maximum lag length of 4 quarters for Montenegro. For purposes of comparison, I also present similar results for several other former Yugoslav republics including Croatia, Serbia, and Slovenia (recall that the latter is already a member of the Eurozone, and has been so since 2007). A lag length of four was uniformly chosen in order to preserve the symmetry of the specification across countries.[10]

While there is no agreed threshold beyond which a country is considered sufficiently synchronized with the currency union to become a member, Table 2 underlines the low correlation of shocks between Montenegro and the Eurozone. With a supply correlation of 0.109 and a demand shock correlation of 0.025, Montenegro displays much lower synchronization than Slovenia and Croatia.[11] Not surprisingly, Serbia yields the lowest correlation for supply shocks among all the countries while Slovenia, a Eurozone member throughout the period, yields the highest demand correlation. It is interesting to note that supply side shocks are much more synchronized than demand side

[9] The identifying assumption that demand shocks do not have permanent effects is a strong one, especially in the context of our study that uses post Eurozone crisis data. Recent literature suggests that hysteresis can be a major factor that hampers recoveries from deep recessions and liquidity traps. Given the scope of this paper, however, I follow the standard practice in making this assumption.

[10] The LM tests for autocorrelation do not, with the partial exception of Slovenia, indicate serial correlation upto lag order 8 at the 5 percent level of significance.

[11] Considering the unique nature of the Montenegrin economy, especially the surge in activity due to summer tourism, I re-estimated the SVAR after using a dummy variable for the third quarter of each year. The results do not change noticeably.

shocks. While the impulse response functions (not included here) display appreciable volatility, it is reassuring that the exhibited patters are consistent with what one would expect from the aggregate supply-aggregate demand framework: namely, that while positive demand shocks initially raise both output and prices, supply shocks raise output and lower prices.[12]

How does Montenegro's synchronization compare to that reported by previous studies for other countries? The comparisons here, of course, have to be heavily qualified given that the period that the present estimates cover has been far from a typical one, especially in the wake of the Eurozone crisis and the continuing liquidity trap-like conditions. Given the Europe-wide nature of the crisis, any estimates based on post-crisis data are likely to be biased toward finding greater synchronization. With this caveat in mind, let's take a quick look at existing literature. Bayoumi and Eichengreen (1992) provide an early study of European Commission (EC) countries and their degree of business cycle synchronization (relative to Germany) compared to US regions (relative to the mid East region). The degree of synchronization that I find for Montenegro falls in the lower end of the range for EC countries, which in turn were much less synchronized than US regions.[13] Fidrmuc and Korhonen (2003) provide a set of estimates for synchronization between the Eurozone on the one hand, and individual euro area economies and Central and East European (CEEC) candidate countries on the other. They found that structural shocks were more asymmetric in EU candidate countries than those in the euro area. The numbers reported for Montenegro in Table 2 lie at the lower end of the spectrum compared to their estimates for euro area countries but compare favorably with several CEEC countries. However, as noted above, our estimate for Montenegro is likely to have been bloated by the Eurozone crisis.

In sum, the decomposition of Montenegro's shocks does not provide much evidence for business cycle synchronization with the Eurozone. This gives the issues of monetary policy autonomy and policy credibility added importance.

As earlier discussed, some of the literature has argued that the extent of symmetry of shocks is itself endogenous, and evolves with the degree of trade and monetary integration. Unfortunately, I cannot test the endogeneity hypothesis in our context given the lack of data availability for a longer time period for Montenegro. However, I will approach this question indirectly in Section 5 by analyzing the evolution of other relevant variables over the past decade.

Table 2: Blanchard-Quah decomposition, 2011:Q1-2017:Q3. Source: Author's calculations based on IMF's International Financial Statistics database.

	Supply	Demand
Montenegro	0.109	0.025
Croatia	0.592	0.193
Slovenia	0.591	0.452
Serbia	-0.260	0.342

[12] Serbia is the only exception. In this case, demand shocks appear to initially lower output while supply shocks raise prices.

[13] Interestingly, Bayoumi and Eichengreen (1992) also generally found greater supply-side than demand-side symmetry.

4 Monetary Autonomy and Policy Credibility

The previous section suggested asymmetry of shocks between Montenegro and the Eurozone. This makes the availability of stabilization policy options important. Perhaps the most commonly cited cost of joining a monetary union, or for that matter adopting a fixed exchange rate, is the loss of monetary autonomy. The idea, of course, goes back to the famous open economy impossible trilemma. This section looks at the degree to which Montenegrin interest rate behavior and broader macroeconomic direction has been influenced by the decision to unilaterally euroize.

While Montenegro has adopted the euro as legal tender, it is by no means the only country in the region that operates under an essentially fixed exchange rate regime. Based on monthly data for the period 2000-18, Table 3 uses the coefficient of variation to show the volatility of various regional currencies against the euro.[14] Except for Serbia and Romania, which operate managed floats, the other currencies have barely fluctuated against the euro. This is not surprising since some of these countries (Bosnia Herzegovina and Bulgaria) operate currency boards while others plan to join the exchange rate mechanism (ERM II) and then eventually the Eurozone, and use the euro as a nominal anchor. We should, therefore, expect Serbia in particular to have more monetary autonomy than the other countries in the region.

Table 3: Variation of nominal exchange rate over the period Jan. 2000 to February, 2018. Source: Author's calculations based on Eurostat

	Mean	Coefficient of Variation
Bulgarian lev	1.954	0.002
Croatian kuna	7.462	0.018
Romanian leu	3.852	0.184
Denar (FYR Macedonia)	61.335	0.004
Serbian dinar	96.126	0.214
Bosnia and Herz. convertible mark	1.956	0.000

We will shortly turn to the issue of whether or not Montenegro has experienced lesser monetary autonomy, as measured by comovement and cyclicity of interest rates, compared to other regional countries. Before we do that, however, let's briefly turn to the question of why a country would compromise its monetary independence. Advocates of fixed exchange rates present several arguments, including the advantages of borrowed policy credibility in the form of lower inflation and lower interest rates. Moreover, the absence of exchange rate flexibility and a lender of last resort, and the inability to monetize deficits are likely to discipline policy makers into more vigilance when it comes to constraining fiscal behavior and current account deficits. What does the picture look like for Montenegro?

Figure 1 presents the inflation differentials from the Eurozone, based on the CPI over the period 2000-16.[15] The latter half of this period, of course, has been characterized by extremely low inflation across the advanced economies. While Montenegrin inflation remained high relative to the Eurozone, the differential did generally fall over the period. However, this is also true

[14] The coefficient for Montenegro obviously is zero. I use the coefficient of variation here in order to better compare different currencies which have very different mean values.

[15] CPI inflation yields a similar picture but the available series is shorter for Montenegro.

for Serbia and Romania (not shown), which operate a managed float, and where the differential actually fell from a much higher level. Thus, while there was convergence it was not limited to the fixed exchange rate cases.

How does the picture extend to other measures of policy discipline such as fiscal policy and the external account balance? According to IMF (2017), Montenegro ran a primary fiscal deficit of about 3.6 percent in 2015 and 2016, and an overall deficit of about 6 percent. As Figure 2 illustrates, a much greater area of concern has been the continuous current account deficit, which has ranged from a high 13 percent to a whopping almost 50 percent during this period. The figure underlines the fact that much of this deficit has been financed by foreign direct investment inflows (a large part of which went to the real estate, construction, banking, energy, and tourism sectors). Unilateral adoption of the euro has not yet forced the hand of policy makers to take measures to dramatically constrain external account imbalances.

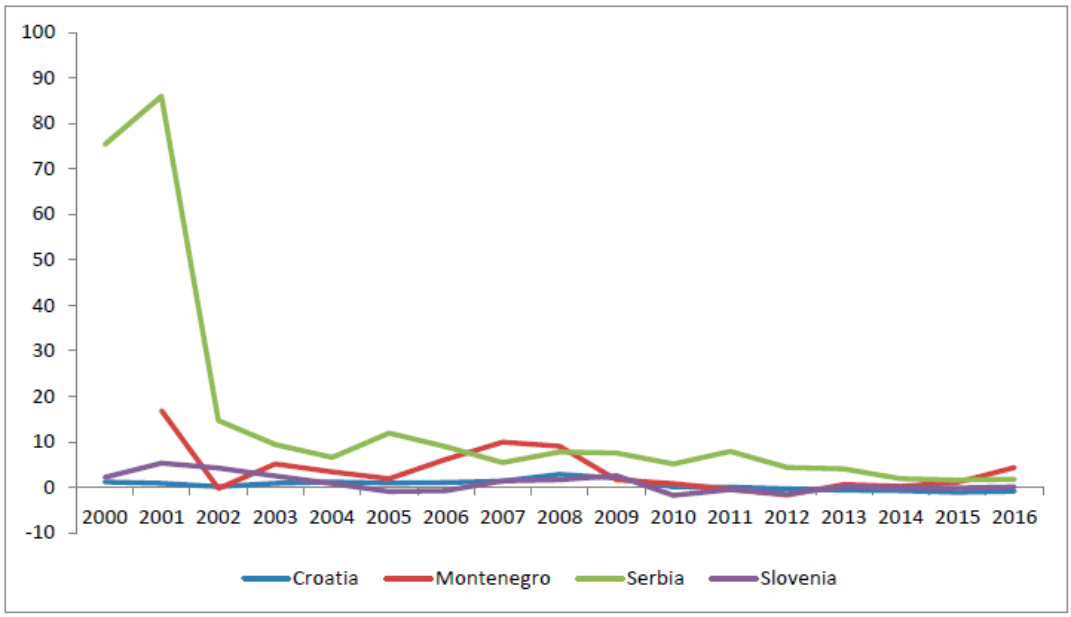

Figure 1: Inflation differentials between countries and the Eurozone. Source: Author's calculations based on WDI

One approach to evaluating the effect of Eurozone monetary policy on Montenegrin lending conditions would be to estimate the degree of interest rate pass through from the extremely short-run rates that policy makers directly target into the interest rates on longer maturity transactions. To do so, I use an autoregressive distributed lag approach with quarterly data. I specify the ADL(p,q) model as follows:

$$\Delta rr_{i,t} = \alpha + \beta_1 \Delta pr_{i,t-1} + \beta_2 \Delta pr_{i,t-2} + \beta_3 \Delta pr_{i,t-3} + \gamma_1 \Delta rr_{i,t-1} + \gamma_2 \Delta rr_{i,t-2} + \gamma_3 \Delta rr_{i,t-3} + \varepsilon_{i,t} \quad (1)$$

where rr is the domestic interest rate for country i (on new loans to non-financial corporations for maturities of up to 1 year), pr is the Eurozone short-run rate (the Euro Overnight Index Average

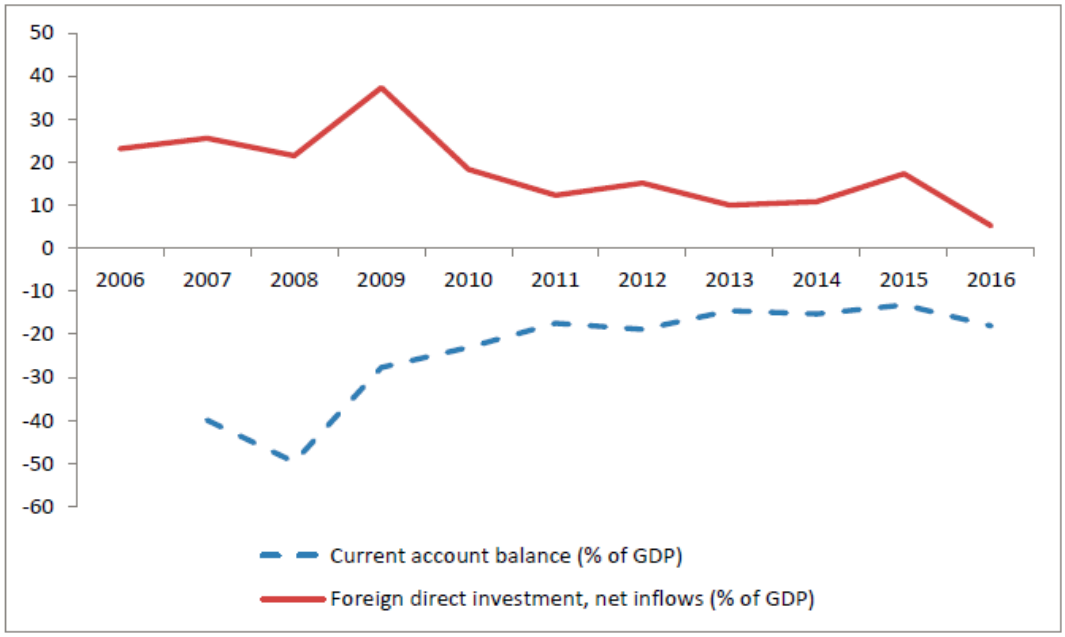

Figure 2: Evolution of current account and foreign direct investment. Source: WDI

or EONIA rate), t is a time index, ε is the error term, which is assumed to be independent and identically distributed, and Δ is the difference operator (so that the associated terms are specified in first differences). Note that I do not include the contemporary value of EONIA rate on the right hand side because of the high frequency, monthly nature of the data.

Table 4 presents the results for Montenegro, the Eurozone, Croatia, and Serbia. Since the sample covers the period including and following the Eurozone crisis, the estimates are likely to be affected by the atypically and consistently low interest rates that have prevailed in the Eurozone for most of this period. Keeping in mind this important caveat, Eurozone short-run interest rate changes appear to pass-through quite rapidly; the once-lagged response of longer-maturity interest rates is positive, and with the exception of Serbia, statistically significant.

The two right most columns present the calculated longer-run pass-through estimates.[16] As expected, the pass-through of short-run Eurozone interest rates into the Euro area interest rates are positive and statistically significant. The positive sign holds for Montenegro and Croatia as well, although these are not significant (which may be due to low variance, as noted above). The positive sign is expected, of course, since one country has euroized while the other runs a tight peg. Interestingly, the only country that does not yield positive pass-through is the one that independently manages a float.

Considering that interest rates differ significantly, both in their mean levels and degrees of variation, across these countries, I also provide standardized coefficients in the last column. These coefficients are the point estimates of the coefficients standardized by multiplying by the standard

[16] These long-run coefficients are calculated using the expression: $\frac{\sum_{j=1}^{3} \beta_{t-j}}{1-\sum_{j=1}^{3} \gamma_{t-j}}$.

deviation of the dependent variable and dividing by the standard deviation of the regressor. As expected, the highest standardized coefficient is associated with the Euro area. The standardized pass-through is positive although much smaller for Montenegro and Croatia.

In sum, and keeping in mind the caveats mentioned earlier, the analysis here is largely in line with our theoretical expectations. The country that appears to exhibit the greatest degree of monetary autonomy is Serbia with its managed float.

Short-run interest rate policy is typically designed to respond to changes in economic conditions in a countercyclical manner, although the weights assigned to different objectives differ across time and countries. How does ECB interest rate policy behave in response to business cycle changes, and more importantly from our perspective, how does this facilitate or hinder cyclical management in euroized Montenegro? Here I attempt to provide some admitedly preliminary answers. I compare Taylor-type policy reaction functions for the Eurozone, Montenegro, and Serbia. Specifically, I explore the response of the key ECB policy rate (Δpr) to lagged monthly changes in CPI inflation (Δp) and real GDP growth (Δy) using the following specification:

$$\Delta pr_{i,t} = \alpha + \delta_1 \Delta pr_{i,t-1} + \beta_2 \Delta p_{i,t-1} + \beta_3 \Delta p_{i,t-2} + \gamma_1 \Delta y_{i,t-1} + \gamma_2 \Delta y_{i,t-2} + \varepsilon_{i,t} \tag{2}$$

If policy is anticyclical, the β and γ coefficients will be positive. The ECB will respond to a rise in real GDP growth or inflation by raising short term rates.

Table 5 presents the results. The short-run coefficients are always positive (although generally not significant), with the exception of twice-lagged inflation for Serbia. The last four columns provide the longer-run coefficients. The only statistically significant coefficient is that for real GDP growth in the Eurozone. Thus, while ECB policy has been anti-cyclical for both the Eurozone and Montenegro, the effect is statistically meaningful only for the Eurozone.[17] Moreover, not surprisingly, ECB policy has been much more sensitive to output changes in the Eurozone, as seen from the larger coefficient for ECB growth than for Montenegrin growth. While, this is not unexpected given that ECB policy is targeted at conditions in the Eurozone, it does raise concerns about the cost of unilateral euroization.

Given the lack of a counterfactual, pre-euroization Montenegro, I follow Sokic and Fabris (2013) in trying to indirectly investigate the benefits of retaining some monetary autonomy. In order to do so, I utilize data on changes in the key National Bank of Serbia policy interest rate in response to economic conditions. The lower quarter of Table 5 summarizes the results. The coefficients for Serbia are now much more statistically significant, although still not so at conventional levels. With this qualifier in mind, notice that the Serbian policy rate now displays countercyclical behavior; the long-run coefficients for both inflation and output are now positive unlike the case where I used the ECB key policy rate. Consistent with Sokic and Fabris (2013) , the results indicate that Serbian policy makers reacted much more strongly to inflation changes than to output changes.

In sum, while the ECB interest rate policy has been directed towards Eurozone conditions, with a weaker pass-through into Montenegrin interest rates, and negative pass-through into Serbian interest rates, the National bank of Serbia directed policy toward Serbian conditions. Taken together, these estimates suggest that euroization may have hindered the ability of Montenegrin policy makers to react in a stabilizing manner to fluctuations in economic circumstances.

[17] Sokic and Fabris (2013), which, to the best of my knowledge provides the only existing estimates for Montenegro, found that the ECB monetary policy had been acyclical with respect to inflation and anticyclical with respect to output growth (both coefficients were positive but only the latter was statistically significant). However, this study covered an earlier time period, i.e., 2002-11.

Table 4: Pass-Through of the EONIA rate into one year lending rates, 2008M1:2018M2. Sources: Monthly data from Eurostat, National bank of Serbia, Croatian National Bank, and Central Bank of Montenegro

Dependent variable: *Δrr_t (change in one year lending rate to non-financial institutions)*												Long-run	
Country	Obs.	Constant	Δpr_{t-1}	Δpr_{t-2}	Δpr_{t-3}	Δrr_{t-1}	Δrr_{t-2}	Δrr_{t-3}	Adj. R^2	St. Error	Prob(F-stat)	Δrr	Standardized
Euro Area	50	**-0.024**	**0.406**	0.068	0.232	-0.200	0.114	0.043	0.081	0.035	0.143	**0.677**	**0.632**
		(0.007)	(0.028)	(0.692)	(0.209)	(0.230)	(0.485)	(0.779)				(0.036)	
Croatia	71	-0.118	**5.322**	-2.693	2.686	**-0.662**	**-0.572**	**-0.385**	0.354	0.817	0.000	2.030	0.078
		(0.279)	(0.091)	(0.408)	(0.258)	(0.000)	(0.000)	(0.001)				(0.210)	
Montenegro	70	-0.089	**3.814**	-2.934	0.751	**-0.728**	**-0.282**	-0.134	0.389	0.571	0.000	0.761	0.040
		(0.260)	(0.086)	(0.192)	(0.643)	(0.000)	(0.057)	(0.250)				(0.582)	
Serbia	69	**-0.468**	0.185	-3.107	**-5.844**	**-0.763**	**-0.492**	**-0.269**	0.368	0.668	0.000	**-3.473**	**-0.142**
		(0.000)	(0.943)	(0.248)	(0.031)	(0.000)	(0.001)	(0.027)				(0.023)	

*p-values in parentheses. Coefficients that are significant at conventional levels (i.e., at least 10 percent) appear in boldface

Table 5: Cyclical properties of ECB policy rates. Sources: Eurostat, National bank of Serbia, and Central Bank of Montenegro

Dependent variable: Δpr_t (ECB key interest rate)												LR coefficient		Standardized	
Country	Obs.	Obs.	Constant	Δpr_{t-1}	Δp_{t-1}	Δp_{t-2}	Δy_{t-1}	Δy_{t-2}	Adj. R^2	St. Error	Prob(F-stat)	Δp	Δy	Δp	Δy
Euro Area	109	109	**-0.021**	**0.272**	0.078	0.232	0.000	0.012	0.211	0.087	0.000	0.426	**0.015**	0.025	**0.390**
			(0.029)	(0.001)	(0.962)	(0.885)	(0.971)	(0.375)				0.892	0.008		
Montenegro	80	80	-0.017	0.105	2.652	0.231	0.000	0.001	-0.028	0.076	0.727	3.223	0.001	0.190	0.036
			(0.192)	(0.377)	(0.202)	(0.913)	(0.998)	(0.898)				0.269	0.799		
Serbia	109	109	-0.009	**0.360**	0.764	-1.558	-0.001	0.003	0.168	0.089	0.000	-1.242	0.002	-0.108	0.044
			(0.392)	(0.000)	(0.531)	(0.199)	(0.867)	(0.763)				0.596	0.790		
Dep. variable:	Δpr_t (National Bank of Serbia key interest rate)														
Serbia		109	**-0.138**	**0.321**	**10.363**	-0.828	0.002	0.024	0.136	0.401	0.001	14.047	**0.039**	0.241	0.192
			(0.011)	(0.001)	(0.064)	(0.881)	(0.955)	(0.520)				0.175	0.178		

*p-values in parentheses. Coefficients that are significant at conventional levels (i.e., at least 10 percent) appear in boldface

This section has provided suggestive evidence so far that Montengro's monetary policy has been constrained by its euroization, both in terms of the transmission and appropriateness of monetary policy in response to output fluctuations. Has this affected Montenegro in ways that we would expect from economic theory? Standard open economy theory would predict that, in the absence of monetary flexibility, external shocks will translate into greater real volatility. Furthermore, the lack of exchange rate flexibility would shift the burden of real exchange rate adjustment to domestic prices. Since joining a currency union implies importing, to a lesser or greater extent, the policy credibility of the union, the expected effect on the level of inflation would be to lower it. Finally, fixing the exchange rate would be expected to introduce volatility in foreign exchange reserves and monetary aggregates as the monetary authorities attempt to keep conditions consistent with the fixed exchange rate.

Are these expectations in line with the Montenegrin experience? A look at Table 6 helps explore this question. Unfortunately we cannot run a pre- and post-treatment in this case given that Montenegro adopted the euro even before its independence, and hence there is no pre-euroization data. For comparison purposes, I, therefore, provide the corresponding statistics for Montenegro and Serbia. It is clear that volatility (as measured by the standard deviation) of GDP and GNI growth, both nominal and real, has been greater for Montenegro. Regarding inflation, while the average level has been lower in Montenegro, volatility has been higher. Finally, the volatility of broad money growth and foreign exchange reserves, the latter both in levels and as a proportion of external debt) have also been higher in Montenegro.[18] These outcomes are in line with theoretical expectations. There is one interesting exception however. The average growth rate of GDP and GNP have been higher for Montenegro. This is in contrast to some existing literature that generally finds that countries with fixed exchange rates experience, on average, lower growth and inflation. The sample size here – two countries – is of course too small to draw broader conclusions.[19]

5 Endogeneity of Structural Evolution and Other Aspects

As mentioned earlier in Section 2, one of the criteria typically utilized to gauge the case for currency union is the degree of trade integration. Integration may itself, of course, follow from joining a common currency area. Given our earlier findings of lack of symmetry between Montenegin and Eurozone shocks, and the suggestive evidence surrounding constraints on monetary policy, could one still make a strong case for Montenegro joining the Eurozone on the grounds that increased symmetry will follow membership? While the fact that Montenegro only recently became independent, and that it has experienced no regime other than euroization since then affects the possible depth of our analysis, I nevertheless attempt a preliminary exploration in this section. I find that Montenegro presents an interesting picture in that it appears to have become *less* integrated with the Euro area over the last decade.

Consider first Table 7, which presents the average annual exports from Montenegro over the periods 2006-11 and 2012-16, and underlines the fact that most of Montenegro's exports – around two-thirds of the total – are classified as services. Moreover, this share has increased over time. The other striking observation that emerges is that the share of the Euro Area in Montengro's exports has *declined* dramatically from an average of 47 percent to 21 percent over the years! The share of

[18] In the case of the level of foreign exchange reserves, I provide the coefficient of variation rather than the standard deviation, given the large differences in averages involved compared to the other variables, which are either ratios or in growth rate form.

[19] See, for example, the well-known study by Edwards (2001).

Table 6: Macroeconomic volatility over the period 2006 to 2016. Source: Author's calculations based on WDI

	Montenegro		Serbia	
	Average	St. Dev.	Average	St. Dev.
GDP Growth	2.89	4.49	1.66	2.97
GDP Per Cap. Growth	2.77	4.50	2.15	2.98
GNI Growth	1.45	3.83	0.37	2.25
GNI Per Cap. Growth	1.33	3.85	0.87	2.28
Real GDP Growth	0.03	0.04	0.02	0.03
Real GNI Growth	0.01	0.04	0.00	0.02
Broad Money Growth	22.68	43.53	15.89	12.85
Inflation	4.50	4.57	6.73	3.27
FX Reserves	592998158	0.24*	13379130114	0.14*
FX Reserves to External Debt	27.69	10.81	41.96	6.04

* Coefficient of variation

the other major trading partner for Montenegro, that is, Serbia, on the other hand, has remained stable. Finally, although not shown in the table, Montenegrin exports of goods have steadily declined in *absolute* terms from about 550 million dollars in 2006 to about 360 million dollars in 2016. The decline was marked around the turbulent period of 2009-11, when the Eurozone crisis hit, following which Montenegrin exports are yet to recover. Imports, on the other hand, have grown steadily over this period from 1.8 billion to 2.3 billion dollars, implying that the trade balance in goods has been significantly negative. I expand on these observations below.

Table 7: Evolution of exports by composition and major destination - 5 year averages. Source: Author's calculations based on IMF DOTS and UN COMTRADE

	Exports (billions of US$)		
	Goods	Services	Total
2006-2011	0.54	1.06	1.61
2012-2016	0.42	1.33	1.76

	Shares of Goods exports		
	Eurozone	Serbia	Croatia
2006-2011	0.47	0.23	0.03
2012-2016	0.21	0.26	0.10

Table 8 compares, in a bit more detail, the Montenegrin experience with other Yugoslav Republics, recent Balkan entrants to the EU (Bulgaria and Romania), and recent entrants to the Eurozone (i.e., the Baltic republics). The table indicates that, as is typical of small open economies, trade constitutes a large proportion of Montenegrin GDP. At more than 100 percent, trade as a

proportion of GDP is much greater for Montenegro than the average value for the Eurozone (around 80 percent). Only Slovenia and Estonia report higher values. Less expected is the finding that this proportion has sharply declined from an average of 130.6 percent just before the Eurozone crisis (i.e., over 2006-08) to 102.1 percent over 2014-16. This trend, which is the opposite to that for the Eurozone in general (where the average increased from 77 percent to 84 percent) and virtually all the other countries listed in the table,[20] is in line with our earlier finding of falling exports, and makes Montenegro stand out as an outlier. The proportion for Serbia, by contrast, increased from about 82 percent to 102 percent, and for Croatia from about 85 percent to 94 percent.

Consistent with the trend suggested by the previous table, Table 8 also indicates that the proportion of trade in services as a proportion of GDP increased dramatically for Montenegro between 2006 and 2016. Indeed, while a similar change occurred in several other countries, at almost 18 percentage points the magnitude of the shift is by far the largest for Montenegro.

Table 8: Total trade and trade in services (as a percentage of GDP) averaged over 2006-08 and 2014-16. Source: Author's calculations based on WDI

	2006-08		2014-16	
Country	Trade	Trade in Services	Trade	Trade in Services
Bosnia and Herz.	89.3	13.6	88.7	12.2
Bulgaria	119.6	26.5	127.6	25.0
Croatia	85.4	29.4	94.1	32.9
Estonia	136.6	34.8	156.5	44.4
Euro area	77.0	17.7	84.3	23.2
Latvia	96.2	23.8	121.1	27.2
Lithuania	120.4	19.7	153.3	28.2
Macedonia, FYR	103.4	21.2	113.1	25.8
Montenegro	**130.6**	**25.3**	**102.1**	**42.9**
Romania	71.9	14.1	83.1	16.5
Serbia	81.7	11.2	102.7	22.9
Slovenia	133.4	20.9	145.3	25.6

Table 9 helps focus more on optimum currency area-related concerns. Here we look at the degree of trade integration as measured by the share of total exports and imports from each country that are destined to and from the Eurozone and the European Union at large (recall McKinnon (1963)). Again, the numbers present an interesting picture. First of all, contrary to what one would expect from the endogeneity hypothesis proposed by Frankel and Rose (1998), the share of exports going to the Eurozone have not increased significantly in Estonia or Slovenia, countries that joined the Eurozone earlier during this period.[21] That this may in part be due to the Eurozone crisis is supported by the fact that this proportion declined in most of the countries. The same trend applies to the share of goods trade (exports plus imports) as a whole rather than exports. Several countries, including the two early joiners saw their shares either fall (by more than 13 percent in the case of Slovenia), or not rise by much. Overall, the support for the endogeneity hypothesis is hardly

[20] Bosnia and Herzegovina is the only exception but here the proportion remained almost unchanged.
[21] Slovenia became a member in 2007 while Estonia joined in 2011.

overwhelming here. Second, Montenegro again is an outlier. The share of its goods exports going to the Eurozone declined by about 40 percentage points and that of total trade with the Eurozone by about 43 percentage points! In order to check for whether this is simply due to trade diversion to the larger EU area, the table provides data for the latter. The picture is almost identically dramatic. The share of exports going to the EU fell by about 31 percentage points while the share of Montenegro's trade with the EU fell by about 34 points. The numbers are somewhat lower than the corresponding ones for the Eurozone, probably because the larger EU fared slightly better than the Eurozone in the years following the crisis, which cushioned the decline in Montenegrin exports to these countries. The decline in Montenegro's trade with the Eurozone and the larger EU countries nevertheless stands out, especially given that both Croatia and Serbia saw their shares increase. Given Montenegro's unilateral euroization, these developments are radically at odds with the endogeneity hypothesis.

Table 9: Trade with the Euro Area and the European Union as a proportion of total trade. Source: Author's calculations based on IMF DOTS

	Euro Area				European Union			
	2006		2016		2006		2016	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
Bosnia and Herz.	49.3	38.8	52.5	41.0	76.3	70.0	71.5	61.7
Bulgaria	50.1	47.0	47.0	45.5	62.4	61.4	65.6	66.0
Croatia	55.0	54.3	54.9	60.7	64.2	67.2	65.5	77.0
Estonia	44.4	55.3	46.4	57.9	65.2	74.5	73.9	81.8
Latvia	50.3	56.8	47.0	58.5	72.5	76.6	69.5	80.5
Lithuania	42.8	42.0	37.5	48.1	63.7	62.9	60.6	71.0
Macedonia, FYR	67.6	39.6	66.0	36.0	86.5	59.5	79.9	62.0
Montenegro	**58.2**	**39.1**	**18.6**	**35.4**	**68.2**	**51.8**	**37.7**	**48.2**
Romania	54.1	50.0	55.1	55.1	70.7	63.5	75.1	77.1
Serbia	47.6	31.3	43.5	41.5	66.5	48.9	66.2	62.8
Slovenia	53.8	66.7	50.8	53.3	77.1	82.3	75.4	70.9

In sum, trade as a proportion of GDP has declined while trade in services has sharply risen during the period of a little over a decade since Montenegro's independence. This has involved an *absolute* decline in the value of exports to the rest of the world since the Eurozone crisis. Moreover, unilateral euroization has surprisingly been accompanied by a declining share of trade with the other members of the currency union and with the larger European Union.

Thus far we have mainly focused on three issues, the extent of synchronization between shocks to Montenegrin and Eurozone economies, the degree of Montenegro's trade integration with the Eurozone, and the extent of loss of monetary autonomy for Montenegro and the macroeconomic impacts thereof. These aspects have implications for the magnitude of transaction cost savings and the extent to which policy can respond to shocks. But the loss of monetary policy may not be a major setback if the economy joining a currency union is diversified and similar in its production structure to the member countries. Another important criteria to judge the utility of Montenegro adopting the euro, therefore, is the extent of its similarity to the Eurozone. The rest of this section explores this issue in a bit more detail.

As a first pass, let's take a look at the extent of concentration or diversification of Montenegro's trade relative to the rest of the world as a whole. Table 10 illustrates period averages for Montenegro and comparator economies of: (1) the number of products exported and imported, (2) the concentration of exports and imports, and (3) the diversification of exports and imports. The number of products traded is captured at the three-digit SITC (Rev. 3) level. UNCTAD measures the concentration index as a Herfindahl-Hirschmann Index (HHI), based on the following expression:

$$H_j = \frac{\sqrt{\sum_{i=1}^{n} \left(x_{ij}/X_j\right)^2} - \sqrt{1/n}}{1 - \sqrt{1/n}};\ H_j \in [0,1]$$

where x_{ij} is the value of export (or import) for country j and product i, $X_j = \sum\limits_{i=1}^{n} x_{ij}$ is the sum of exports (or imports) of product j for country i, and n is the number of products (SITC Revision 3 at 3-digit group level). An index value closer to 1 indicates that a country's exports or imports are highly concentrated in a few product lines.

Finally, UNCTAD computes the diversification index by measuring the absolute deviation of the trade structure of a country from world structure. Specifically,

$$S_j = \frac{\sum_i |x_{ij} - x_i|}{2};\ S_j \in [0,1]$$

where x_{ij} denotes the share of product i in total exports or imports of country j, while x_i is the share of product i in total world exports or imports. The higher the index, the greater the degree of divergence relative to the world economy.

For purposes of comparison, I present similar data for other regional countries. Some salient observations emerge from the numbers. First, the number of active product lines on the export side are much lower for Montenegro in comparison to other countries, even the relatively land-locked ones like Bosnia and Herzegovina. Moreover, the number of export lines has been quite stable over the years. Second, Montenegrin exports are much more concentrated than those from other regional economies. That Montenegrin exports are concentrated is not a surprise, given its size. However, Montenegrin exports are dramatically more concentrated even in comparison with other small regional economies such as Macedonia, FYR and Bosnia and Herzegovina. Montenegro really

is an outlier in this dimension, although less so than a decade ago (the index has declined from an average of 0.42 in 2006-08 to 0.24 in 2013-16. Third, Montenegro's export basket scores higher than any other regional economy in the divergence of its export structure from the world norm. Fourth, and rather unsurprisingly, the differences on the import side are generally much less stark than those on the export side. Taken together these numbers reflect the exceptional concentration and narrowness of Montenegrin export structure.

Table 10: Various Indexes of merchandise export concentration and diversification. Source:Author's calculations based on data from UNCTADstat

	Exports				Imports			
	2000-05	2006-08	2009-12	2013-16	2000-05	2006-08	2009-12	2013-16
Number of Products								
Bosnia and Herz.	190.7	216.0	221.0	220.8	239.8	243.3	246.5	247.8
Bulgaria	228.5	238.0	242.8	243.3	240.7	250.7	250.0	251.8
Croatia	228.8	234.0	232.5	238.3	248.0	250.0	248.8	248.5
Montenegro	-	109.0	116.5	108.3	-	220.0	218.3	219.5
Romania	229.5	239.7	241.0	243.3	245.0	249.3	248.0	248.3
Serbia	-	241.0	241.5	245.0	-	250.0	248.5	249.3
Slovenia	229.5	237.7	237.0	240.5	248.7	251.3	249.8	249.5
Macedonia (FYR)	175.0	192.7	197.3	200.5	229.8	238.7	237.3	238.8
Concentration								
Bosnia and Herz.	0.17	0.13	0.11	0.10	0.06	0.08	0.07	0.06
Bulgaria	0.11	0.14	0.12	0.10	0.15	0.12	0.11	0.09
Croatia	0.13	0.12	0.11	0.07	0.08	0.08	0.08	0.07
Montenegro	-	0.42	0.37	0.24	-	0.09	0.09	0.08
Romania	0.13	0.10	0.09	0.10	0.07	0.07	0.06	0.06
Serbia	-	0.09	0.07	0.10	-	0.08	0.12	0.11
Slovenia	0.11	0.13	0.16	0.15	0.06	0.07	0.11	0.11
Macedonia (FYR)	0.17	0.20	0.18	0.20	0.17	0.11	0.10	0.11
Diversification								
Bosnia and Herz.	0.65	0.63	0.61	0.60	0.41	0.39	0.35	0.35
Bulgaria	0.50	0.49	0.44	0.46	0.35	0.30	0.29	0.31
Croatia	0.50	0.45	0.45	0.46	0.27	0.24	0.26	0.29
Montenegro	-	0.70	0.71	0.70	-	0.45	0.44	0.44
Romania	0.55	0.44	0.42	0.42	0.33	0.26	0.26	0.27
Serbia	-	0.55	0.53	0.51	-	0.28	0.33	0.34
Slovenia	0.47	0.47	0.47	0.46	0.30	0.31	0.29	0.31
Macedonia (FYR)	0.65	0.66	0.62	0.67	0.40	0.40	0.40	0.45

So far we have explored the extent to which Montenegro's trade structure resembles the rest of the world. Our main interest, however, is in the issue of euroization, and in that context, the more interesting basis for evaluation is the Eurozone rather than the world. Table 11 provides such a comparison for economic structures. Again, I provide information for Montenegro and several other regional economies as well as recent Eurozone entrants (i.e., the Baltic states). The period spanned covers 2000-16, and I report averages for sub-periods. The statistics that I employ are the commonly used Bray-Curtis and modified Finger-Kreinin indexes. The former, which varies between 0 and 1, measures the extent of dissimilarity between the economic structures of countries j and k, and is constructed as follows:

$$d_{jk} = \frac{\sum_{i=1}^{N} |y_{ij} - y_{ik}|}{\sum_{i=1}^{N} (y_{ij} + y_{ik})}$$

where y_{ij} is the share of sector i in country j's value-added, y_{ik} is the corresponding share for the Eurozone, and N is the total number of sectors. The greater the calculated value of the index, the higher the extent of dissimilarity between a country's economic structure and the Eurozone. In the limit, with $d_{jk} = 1$, the two countries are completely dissimilar in that there is no overlap between their structures of production. The calculations are based on 10 sectors covering both goods and services (see the footnote to Table 11 for a detailed list of the sectors).

The modified Finger-Kreinin index varies between 0 and 100, and is calculated as follows:

$$f_{jk} = \min(y_{ij},\, y_{ik})$$

An index value of 100 indicates the greatest extent of structural similarity between the economies. The two indexes largely convey a similar picture. According to the Bray-Curtis index, Montenegro has one of the most dissimilar economic structures relative to the Eurozone among regional economies. However, Lithuania, in spite of having recently joined the Eurozone, continues to have an equally dissimilar structure. The Finger-Kreinin index indicates that Montenegro has the lowest extent of similarity with the Eurozone economy over the entire time period. Notice that the two indices have been quite stable for Montenegro, the former varying between 0.18 and 0.19 over the period 2006-16, and the Finger-Kreinin index varying between 69.6 and 70.9 over the same period. There does not seem to be much evidence of endoneous growth of structural similarity following the adoption of the euro. Notice also that Estonia, Latvia, and Slovenia, i.e., all the Eurozone members with the exception of Lithuania, display a much higher degree of similarity of economic structure with the Eurozone.

Table 11: Bray-Curtis and Finger-Kreinin Indexes of Similarity to the Eurozone 19 (based on the share of GDP of 10 sectors). Source:Author's calculations based on Eurostat

	Bray-Curtis index				Finger-Kreinin index			
	2000-05	2006-08	2009-12	2013-16	2000-05	2006-08	2009-12	2013-16
Estonia	0.10	0.10	0.09	0.09	80.40	80.17	81.03	80.45
Croatia	0.09	0.10	0.08	0.09	79.05	78.60	80.85	79.70
Latvia	0.14	0.13	0.12	0.12	77.47	77.53	79.25	78.18
Lithuania	0.15	0.17	0.19	0.20	75.90	74.47	73.28	72.13
Romania	0.19	0.19	0.21	0.15	72.37	72.10	70.50	75.45
Slovenia	0.09	0.09	0.08	0.09	81.10	80.47	81.73	79.80
Montenegro	**-**	**0.18**	**0.18**	**0.19**	**-**	**69.60**	**70.85**	**69.40**
Macedonia (FYR)	0.19	0.16	0.15	0.17	70.68	73.60	74.95	73.75
Serbia	0.20	0.13	0.14	0.15	70.45	75.53	74.53	73.43
Bosnia and Herz.	-	0.13	0.13	-	76.30	75.03	76.35	76.07

*The 10 sectors include: (1) Agriculture, forestry and fishing, (2) Industry (except construction), (3) Construction, (4) Wholesale and retail trade, transport, accommodation and food service activities, (5) Information and communication, (6) Financial and insurance activities, (7) Real estate activities, (8) Professional, scientific and technical activities; administrative and support service activities, (9) Public administration, defence, education, human health and social work activities, and (10) Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies.

Table 12 extends the analysis to Montenegrin exports and imports. I use annual data from UN Comtrade, which provides information for the European Union as a whole rather than the Eurozone. Furthermore, I separately calculate the indexes for trade in goods (SITC Rev. 3, categories 0-9) and services (Extended Balance of Payments Services or EBOPS classification, 2002). Again, Montenegro's export structure is rather different from that of European Union countries. This holds for both goods and services. The average value of the Bray-Curtis index over 2013-15 was 0.6 for goods and 0.56 for services. The corresponding values of the Finger-Kreinin index were 39.9 and 43.9, respectively. Similarity increased somewhat between 2006-08 but has been stagnant since then. Not surprisingly, and less informatively, Montenegro is much more similar to the European Union on the import side than the export side.

Table 12: Indexes for similarity between Montenegrin and European Union exports and imports. Source: UN Comtrade

	Bray-Curtis Index		Finger-Kreinin Index	
	Exports	Imports	Exports	Imports
Goods (SITC 3)				
2006-08	0.69	0.16	31.24	83.76
2009-12	0.60	0.25	39.81	75.26
2013-15	0.60	0.25	39.93	75.12
Services (EBOPS)				
2006-08	0.59	0.31	41.00	68.63
2009-12	0.56	0.26	44.10	73.45
2013-15	0.56	0.30	43.86	70.08

Another measure of structural similarity is the Grubel-Lloyd Index of intra-industry trade, which is given by:

$$GL_{ij} = 1 - \frac{\sum_{k=1}^{n} |x_{ijk} - m_{ijk}|}{\sum_{k=1}^{n} (x_{ijk} + m_{ijk})}$$

where x_{ijk} is the export of industry k goods from country i to country j, while m_{ijk} are the corresponding imports. The index varies between 0-1, with a higher value representing greater intra-industry trade in goods. I employed SITC Rev. 2 data at the 2-digit level of disaggregation, which yields 68 sub-sectors. For comparison purposes, I provide data for three other former Yugoslav Republics (Serbia, Bosnia and Herzegovina, and Macedonia, FYR). While Montenegro's intra-industry trade has almost doubled starting from a low base, it is still the lowest by far among the economies reported. Given our previous findings about the concentration of Montenegrin production structure, this is hardly surprising. By way of comparison, Brixiová et al. (2010) calculated the Grubel-Lloyd index for Estonia, another small open economy, to be close to 0.3 in 2007, four years before joining the Eurozone. An older but more comprehensive study, Fidrmuc (2001), found an average index value of 0.44 in 1998 for trade between central and east European

countries (CEECs) and the European Union.[22]

Table 13: Grubel-Lloyd index of intra-industry trade in 2007 and 2015 with the EU. Source: Author's calculations based on UN Comtrade

	Bosnia and Herz.	Montenegro	Serbia	Macedonia, FYR
2007	0.43	0.08	0.44	0.30
2015	0.50	0.15	0.68	0.36

The overall finding that has emerged from our analysis reinforces the earlier finding from Section 3 of limited structural symmetry between Montenegro and the Eurozone. Moreover, the degree of similarity, and by implication the symmetry of shocks, does not seem to have increased following euroization. How have these structural differences translated into the aggregate behavior of the trade balance? Figure 3, which shows the evolution of the balance of goods trade and balance of services trade separately, for the period 2008-16, reveals an interesting picture. While the Eurozone has run a trade surplus in goods since the crisis, Montenegro has experienced a huge trade deficit averaging about 44 percent. And while Montenegro's surplus in services trade, which averaged almost 18 percent over the period, mitigated the overall trade deficit, the Eurozone ran a small surplus in services, averaging less than 1 percent. The figure, with the wide bands representing Montenegrin deficits (surpluses) in goods (services) trade bounding corresponding Eurozone plots from above and below eloquently highlights how differences in economic structure have transformed into differences in aggregate behavior.

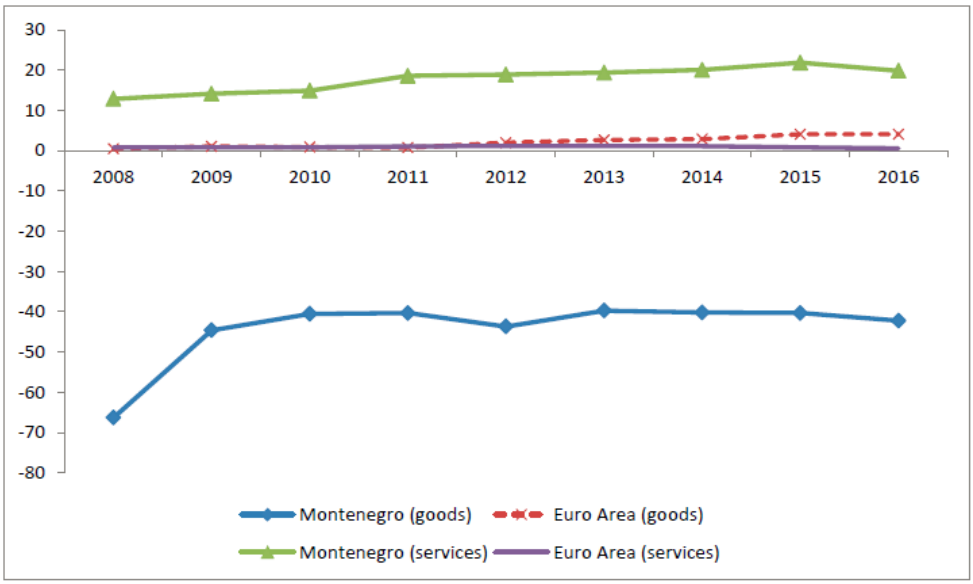

Figure 3: Trade balance (as a proportion of GDP) in goods and services, 2008-16. Source: UNCTADstats.

[22] I calculated this number from Table A2 of the paper.

6 Concluding Remarks

Relatively little research exists on the experience of the two countries that have unilaterally euroized. This paper has focused on Montenegro – a small open economy– in the context of the relevant optimum currency area issues. While Montenegro is likely to have benefitted from importing policy credibility through official euroization, the admittedly preliminary evidence that I present suggests that: (1) the Montenegrin economy is only weakly synchronized with the Eurozone, (2) this weak synchronization, in the absence of monetary autonomy or exchange rate-based stabilization mechanisms, raises the costs of currency union, and (3) there is little evidence that euroization has resulted in greater integration of the economy with the Eurozone. Indeed, if anything, Montenegro has become less integrated by some measures such as the share of Montenegro's merchandise exports destined for the Eurozone. Large current account deficits financed to a significant extent by FDI inflows directed towards the (largely non-tradable) real estate, banking, and construction sectors increases the salience of currency concerns. Recent experience has shown that membership of a currency union does not mitigate the threat posed by continuous and large current account deficits. While it is challenging, given the lack of adequate data, to evaluate the net benefits of currency union membership with any reasonable degree of precision, the absence of a lender of last resort, a fiscal union, or a voice in monetary policy, if anything, only serve to enhance these concerns.

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