Is Mercosur an optimum currency area?

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Abstract

We find that generalized purchasing power parity does not hold for Mercosur, and thus that the South American trade group does not constitute an optimum currency area. We also find that the role of the United States cannot be neglected in the region, and that high short run volatility of real exchange rates is accompanied by slow adjustment processes of between 2 and 16 years (PPP puzzle).

JEL classification: F31, F36

Keywords: Generalized purchasing power parity, optimum currency area, Mercosur, PPP puzzle

1. Introduction

In an optimum currency area (Mundell, 1961) efficiency is maximized if the area shares a single currency. One rationale behind the creation of the euro, for instance, is that the individual countries of Europe do not each form an optimum currency area, but that Europe as a whole does. Even if the fundamental economic variables determining real exchange rates are nonstationary (Da Silva, 2002), and then the real rates are nonstationary, the fundamentals can still be sufficiently integrated, as in a currency area. Here the real rates will share common trends (Enders and Hurn, 1994). The existence of at least one cointegration vector in a set of national economies' nonstationary series suggests both an optimum currency area and generalized purchasing power parity (G-PPP). Our purpose in this paper is to check whether Mercosur (the South American trade group) is an optimum currency area in that sense.

The idea of G-PPP was pioneered by Enders and Hurn (1994), who apply it to Pacific Rim countries. The G-PPP was rejected and they found the Pacific Rim nations not to constitute an optimum currency area. Rather, each country has its own real rate influenced by the larger trading partners. Enders and Hurn (1997) also tested the G-PPP to the G7 countries. They found one cointegration vector at the 5 percent significance level, which means that those countries' real exchange rates seem to be linked by a single long run equilibrium relationship, and a shock to any one rate is likely to affect the long run values of the others. Liang (1999) found that the G-PPP holds for China, Hong Kong, Japan, and the United States, and then that those countries constitute an optimum currency area. Bernstein (2000) tested the G-PPP for the euro area and found that the null of noncointegration cannot be rejected. However he also found that Germany and the United Kingdom affect the other countries' real exchange rates. Lee (2003) found that Australia, New Zealand, and Japan comprise an optimum currency area, but this is not so of Australia, New Zealand, and the US. And Kawasaki and Ogawa (2006) found that East Asia countries fail to constitute an optimum currency area.

As for Mercosur, the southern cone customs union was founded by Argentina, Brazil, Paraguay, and Uruguay in 1991. Its original intent was to implant European-style integration and to stand for open trade and regional integration led by the private sector. In 1996 it committed itself to 'the full respect of democratic institutions'. Yet summits of Mercosur are usually devoted to rhetoric and to small steps toward achieving economic integration. As a result, Mercosur has been trouble-plagued. Venezuela became a full member of Mercosur in July 2007. Venezuela's membership expanded Mercosur to 250m people and $1.1 trillion of GDP. The admission of Venezuela is a challenge to Mercosur's identity because Venezuelan president Chavez's desire is to forge a united hemispheric geopolitical 'resistance' to the US. There is a risk that Venezuela's political goals might undermine the objective of economic integration. Yet there are economic benefits of cooperation with Venezuela as well. Some of Venezuela's oil is already flowing to south, and the country can become the hub of a regional energy network. Argentina and Brazil invited Bolivia to join the group, but nationalist president Morales would strengthen anti-Americanism. Thus Mercosur is becoming an 'anti-imperialist political block', and Fidel Castro remarked that a 'social Mercosur' will 'change the world'. A deal between Mercosur and the US, already unlikely, now looks even more so.

Brazilian president Lula observed that ‘neither the US nor Brazil is making the FTAA (Free Trade Area of the Americas) a priority’. In a recent poll, 64% of Argentines, 57% of Brazilians, 53% of Mexicans, and 51% of Chileans said they had a ‘mainly negative’ view of American influence. The current multilateral mess in trade could sharpen the European Union’s appetite for a deal with Mercosur, but this also seems elusive thanks to the EU’s resistance on reducing farm subsidies. Uruguay sought permission from Mercosur to sign separate trade agreements, principally with the US. If that is not forthcoming, Uruguay could leave the group. Mercosur’s membership would then shrink back to four.

Previous work on Mercosur roughly suggests that it is still a mirage. Hallwood *et al.* (2004) examined the case for either a Latin American monetary union (Argentina, Brazil, Chile, Uruguay, and Venezuela) or monetary union with the US through official dollarization. Using VAR techniques they found that macroeconomic shocks are so highly asymmetric in Latin America and between Latin American countries and the US as to make monetary union or official dollarization questionable. This contrasts with Fratianni (2004) and Alexander and Von Furstenberg (2000), who argued that Mercosur members are more suited to creating a common currency than to adopting the US dollar. This is so because Mercosur is a larger trading partner for all Mercosur members other than Brazil. The endogenous optimum currency area hypothesis of Frankel and Rose (1998) asserts that there is a positive association between trade intensity and business cycle correlation. Yet empirical evidence suggests that this hypothesis ought to be set aside (Hallwood *et al.*, 2004; Ahumada and Martirena-Mantel, 2001; Licandro-Ferrando, 2000). Intraregional trade in Mercosur is still modest, thanks mainly to the low openness of the Argentine and Brazilian economies (Machinea, 2004). The Brazilian economy can be considered more relatively diversified than Argentina's (Barenboim, 2004) and, as a result, less prone to big asymmetries of shocks (Kenen, 1969; Calderon *et al.*, 2007). But increasing intra-Mercosur trade is unlikely to make it more suitable for monetary union because macroeconomic shocks between the countries and between them and the US do not become more symmetric (Hallwood *et al.*, 2004). This contrasts with the experience of the European countries (Bayoumi and Eichengreen, 1994).

The rest of the paper is organized as follows. Section 2 will present data. Section 3 will analyze the data. And Section 4 will conclude.

2. Data

We took quarterly data from 1970Q1 to 2006Q3 for the Mercosur countries, namely Argentina, Brazil, Paraguay, Uruguay, and Venezuela as well as the United States, considered as the benchmark country. The series of consumer price index and average dollar price of the Mercosur currencies were taken from the IMF's International Financial Statistics. We took CPIs rather than wholesale price indices because the latter are missing for Argentina and Paraguay for the entire sample period. Yet we could replicate our results using CPIs for Argentina and Paraguay together with WPIs for the other countries (not shown).

The series of real exchange rate were built according to $e_{i,t} = \ln\left((s_{i,t} \times \mathrm{CPI}_t^*)/\mathrm{CPI}_{i,t}\right) = s_{i,t} + p_t^* - p_{i,t}$, where $e_{i,t}$ is the natural log of the real exchange rate in country i at time period t, $s_{i,t}$ is the nominal exchange rate (dollar price of country i's currency), $p_{i,t}$ is a country i's natural log of the consumer price index, and p_t^* is the US consumer price index. Figure 1 displays the real exchange rates. A first look suggests nonstationarity in the rates.

3. Analysis

Table 1 presents the results of unit roots tests. Dickey-Pantula (DP) (1987) tests suggest that the series do not present two or more unit roots. Augmented Dickey-Fuller (ADF) (1979, 1981) and Phillips-Perron (PP) (1988) tests both suggest that the null of unit root cannot be rejected for the series. Elliott-Rothenberg-Stock (ERS) (1996) tests (that are more appropriate for slow adjustment processes) were also performed for the cases where the autoregressive parameter in the ADF tests fell above 0.9. The null of unit root was rejected for Argentina, Venezuela (5 percent significant), and Uruguay (10 percent significant). Overall the unit root tests did not provide evidence of rejection of the null of nonstationarity of the series at one percent.

We also performed Zivot-Andrews (1992) unit root tests, which track structural breaks. Thanks to the series' volatility, it is difficult to know whether a break occurs in either intercept or trend. So Table 2 displays all the possible cases. Only for Venezuela the null of unit root with structural break was rejected at 5 percent for the series with intercept and joint change in intercept and trend. The break occurred in the fourth quarter of 1986. In the fourth quarter of 1982, Brazil and Uruguay shared a real shock, which hit Paraguay in the first quarter of 1984. Also, the shock in the first quarter of 1985 in Brazil may have triggered the fourth quarter of 1986's Paraguayan shock. Brazil's shock in the second quarter of 1989 seems to have caused a fluctuation in Argentina's series in the second quarter of 1990. Overall the effect of Brazilian shocks on the others reflects Brazil's role of major trading partner.

Table 3 presents the results of Perron (1997) tests for two innovation outliers (IO1 and IO2) and one additive outlier (AO). Only for Argentina the null of unit root with break was rejected for the IO1 and IO2 at 5 percent. Brazil and Paraguay shared a real shock between the second quarter of 1982 and the fourth quarter of 1983. Brazil's shock in the fourth quarter of 1991 hit Uruguay in 1992. These also reflect Brazil's influence.

For G-PPP to hold one would expect at least one stationary linear combination of the various bilateral rates between the members of a currency area (Enders and Hurn, 1994). Here we performed cointegration tests through two types of models: (1) restricted deterministic linear trend (RDLT), and (2) deterministic linear trend (DLT). The former just considers one intercept in the deterministic linear trend, and the latter takes into account both intercept and time trend. Table 4 shows the results of bivariate cointegration analysis. Only for Argentina-Uruguay and Brazil-Paraguay the null of noncointegration was rejected at one and 5 percent respectively. For those couples of countries the cointegration vectors were also significant (Tables 5 and 6). Yet the trend parameters were nonsignificant and then we did not consider the DLT model. To Argentina-Uruguay the coefficients of adjustment speed of between 2 and 2.5 years were also significant (though of only 5 percent). To Brazil-Paraguay only the coefficient for Paraguay was significant (5.2 years for the adjustment to complete). The adjustment for Argentina-Uruguay was even faster than the usual finding of between 3 and 5 years, which is dubbed in literature 'the PPP puzzle', i.e. the difficult conciliation between high short run volatility of real exchange rates and their slow adjustment process. Figures 2 and 3 show the cointegration relationships.

Then we took ‘core’ Mercosur and included Venezuela afterward. (Chile and Bolivia presented stationary series and then could not even be considered in the cointegration analysis.) Table 7 shows trace and max statistics for Argentina, Brazil, Paraguay, and Uruguay. In both RDLT and DLT models one cointegration vector was detected at the one percent significance level (Table 8). Figure 4 shows the cointegration relationship for those models. Parameter estimates of β employing Johansen (1988) technique were significant for the DLT model. And the Schwarz criterion pointed to the selection of the DLT model. The sum of the coefficients of the cointegration vectors departed from zero in both models, which means that the US cannot be left out from analysis. Mercosur countries depended on the US fundamentals. However the coefficients of adjustment speed for Argentina, Brazil, and Paraguay were nonsignificant. The adjustment process was faster for the DLT model. Overall we conclude that G-PPP does not hold for core Mercosur.

As for Argentina, Brazil, Paraguay, Uruguay, and Venezuela, both the trace and max statistics detected the presence of one cointegration vector for the RDLT model (5 percent significant). For the DLT model the null of noncointegration was rejected only in the max statistics (Table 9). Parameter estimates are presented in Table 10. In both models the estimates of the coefficients of the cointegration vector for Paraguay and Venezuela were nonsignificant (and none of the models could be selected by Schwarz criterion). The coefficients of adjustment speed that were significant presented a low absolute value, thereby suggesting high persistence in real exchange rate reversion (especially in the RDLT model). Such high persistence spans from 4.3 to 16 years and is shown in Figure 5. As can be seen, real exchange rate persistence is even higher in Mercosur than in the usual findings of the PPP puzzle. Thus G-PPP does not hold for 'full' Mercosur. It is not an optimum currency area. This confirms previous suspicions (De Grauwe, 2005). Yet weakening the case for Mercosur does not strengthen the case for the FTAA because the Americas are also unlikely to constitute an optimum currency area (Karras, 2003).

4. Conclusion

Stationarity analysis pointed to nonstationary real exchange rates in Mercosur. This allows one to perform cointegration analysis to assess G-PPP. Our findings at first suggest that the null of noncointegration cannot be rejected for Mercosur. But one cannot jump to the conclusion that it constitutes an optimum currency area because most cointegration parameters were nonsignificant. Moreover the role of the US cannot be neglected because the sum of parameters in the estimates of the cointegration vector departed from zero. Incidentally we also found the PPP puzzle to hold for Mercosur and even higher real exchange rate persistence.

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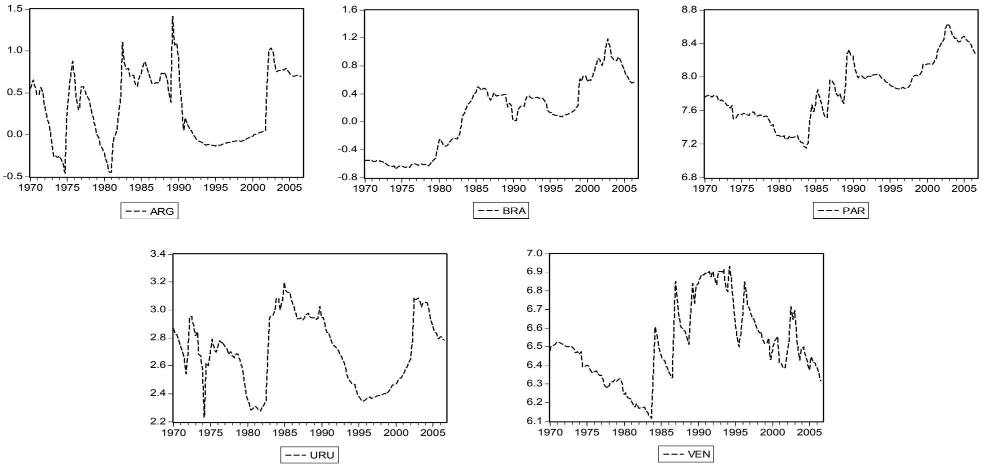

Figure 1. Real exchange rates against the US dollar for the Mercosur countries, 1970Q1–2006Q3

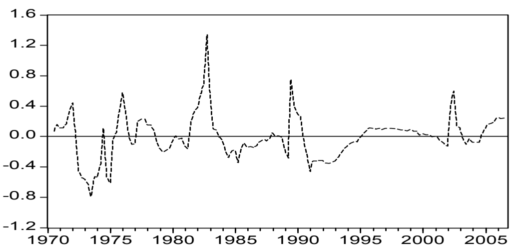

Figure 2. Cointegration relationship in the restricted deterministic linear trend model: Argentina and Uruguay

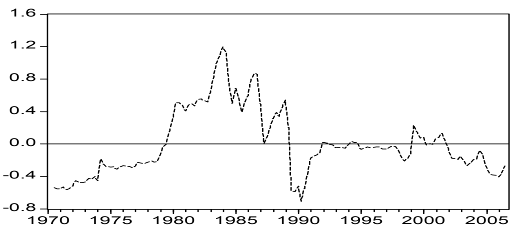

Figure 3. Cointegration relationship in the restricted deterministic linear trend model: Brazil and Paraguay

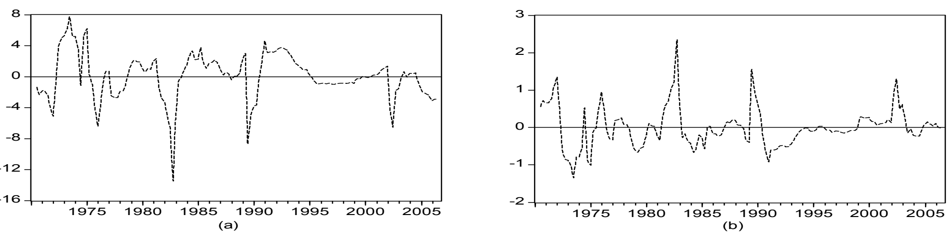

Figure 4. Cointegration relationship in both (a) the restricted deterministic linear trend model and (b) the deterministic linear trend model: Argentina, Brazil, Paraguay, and Uruguay

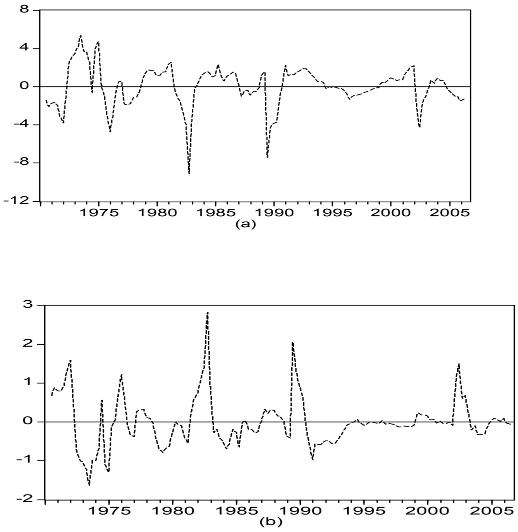

Figure 5. Cointegration relationship in both (a) the restricted deterministic linear trend model and (b) the deterministic linear trend model: Argentina, Brazil, Paraguay, Uruguay, and Venezuela

Table 1. Unit root tests

Country	Series with	DP	ADF	PP	ERS
ARG	Intercept	10.771	–2.340	–2.497	–2.168**
BRA	Deterministic Linear Trend	9.133	–2.022	–1.833	–2.032
PAR	Deterministic Linear Trend	8.005	–2.563	–2.529	–1.712
URU	Intercept	10.485	–1.949	–2.283	–1.728*
VEN	Intercept	9.833	–2.324	–1.688	–2.336**

* significant at 10%, ** significant at 5%

Table 2. Zivot-Andrews stationarity tests

Country	Series with			*t* Minimum Statistics	Date of Break
	Intercept	Trend	Intercept and Trend		
ARG	✓			–3.922	1990Q2
		✓		–2.661	1998Q1
			✓	–4.047	1990Q2
BRA	✓			–2.860	1982Q4
		✓		–2.523	1985Q1
			✓	–2.898	1989Q2
PAR	✓			–3.132	1986Q4
		✓		–3.046	1979Q2
			✓	–4.161	1984Q1
URU	✓			–2.823	1982Q4
		✓		–2.608	2001Q3
			✓	–2.851	1982Q4
VEN	✓			–5.167*	1986Q4
		✓		–3.340	1993Q1
			✓	–5.301*	1986Q4

* significant at 5%

Table 3. Perron stationarity tests

Country	Components of a Break			*t* Minimum Statistics	Date of Break
	Innovation Outlier 1	Innovation Outlier 2	Additive Outlier		
ARG	✓			–5.198*	1989Q1
		✓		–5.166*	1989Q1
			✓	–2.983	1999Q2
BRA	✓			–4.091	1982Q2
		✓		–4.047	1991Q4
			✓	–2.886	2006Q2
PAR	✓			–3.295	1976Q2
		✓		–3.811	1983Q4
			✓	–3.439	1976Q2
URU	✓			–3.879	1992Q1
		✓		–3.941	1992Q4
			✓	–3.205	2004Q4
VEN	✓			–3.717	1986Q2
		✓		–3.415	1986Q2
			✓	–2.263	1996Q2

* significant at 5%

Table 4. Bivariate cointegration analysis

		ARG	BRA	PAR	URU
BRA	λ_{trace}	0			
	λ_{max}	0			
PAR	λ_{trace}	0	1*		
	λ_{max}	0	1*		
URU	λ_{trace}	1**	0	0	
	λ_{max}	1**	0	0	
VEN	λ_{trace}	0	0	0	0
	λ_{max}	0	0	0	0

* significant at 5 %, ** significant at 1%

Table 5. Cointegration vector for Argentina and Uruguay

Country	Restricted Deterministic Linear Trend Model	
	Intercept = 3.818 [8.111]	
	α_i	β_i
ARG	–0.103 [–1.894]	1
URU	0.125 [5.317]	–1.527 [–8.806]
Total		–0.527
Schwarz Criterion	–2.962	

Table 6. Cointegration vector for Brazil and Paraguay

Country	Restricted Deterministic Linear Trend Model	
	Intercept = 12.248	
	α_i	β_i
BRA	0.013 [0.953]	1
PAR	0.048 [3.623]	–1.574 [–5.643]
Total		–0.574
Schwarz Criterion	–5.110	

Table 7. Trace and lambda max statistics

H_0	Restricted Deterministic Linear Trend		Deterministic Linear Trend	
	Trace Statistic	Lambda Max Statistic	Trace Statistic	Lambda Max Statistic
None	60.007**	33.666**	73.406**	40.696
Up to 1	26.342	17.379	32.710	17.446
Up to 2	8.963	6.996	15.265	8.352
Up to 3	1.967	1.967	6.913	6.913

** H_0 is rejected at 1%

Table 8. Cointegration vectors in the RDLT and DLT models

Country	Restricted Deterministic Linear Trend Model		Deterministic Linear Trend Model	
	Intercept = –27.006		Intercept = 4.226	
			Trend = –0.017 [–5.959]	
	α_i	β_i	α_i	β_i
ARG	0.011 [2.102]	–10.568 [–5.895]	–0.043	1.787 [6.223]
BRA	–0.001	1	–0.006	1
PAR	0.003 [1.640]	–1.457 [–1.168]	–0.017	0.761 [2.218]
URU	–0.011	15.382 [5.200]	0.071 [5.668]	–3.534 [–7,179]
Total		4.357		0.014
Schwarz	–7.846		–7.860	

Table 9. Trace and lambda max statistics

H_0	Restricted Deterministic Linear Trend		Deterministic Linear Trend	
	Trace Statistic	Lambda Max Statistic	Trace Statistic	Lambda Max Statistic
None	72.867*	36.066*	86.421	40.870*
Up to 1	36.801	20.562	45.551	22.567
Up to 2	16.239	7.952	22.984	10.305
Up to 3	8.286	5.349	12.680	7.819
Up to 4	2.938	2.938	4.861	4.861

* H_0 is rejected at 5%

Table 10. Cointegration vectors for Mercosur

Country	Restricted Deterministic Linear Trend Model		Deterministic Linear Trend Model	
	Intercept = 53.739		Intercept = 27.787	
			Trend = –0.036 [–4.152]	
	α_i	β_i	α_i	β_i
ARG	0.023 [3.115]	–7.885 [–6.100]	–0.050	2.252 [6.221]
BRA	–0.001 [–0.413]	1	–0.004	1
PAR	0.006 [2.075]	–0.215 [–0.203]	–0.015	0.683 [1.458]
URU	–0.015 [–4.487]	10.199 [4.970]	0.058 [5.429]	–4.067
VEN	0.002 [0.554]	–3.150 [–1.669]	–0.002	0.440 [0.825]
Total		–0.051		0.014
Schwarz Criterion	–10.373		–10.372	

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