MACROECONOMIC HOMOGENEITY WITHIN MERCOSUR: AN OVERVIEW

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Resumen: La existencia de similitudes en los ciclos económicos se considera una condición necesaria para la armonización de políticas e instituciones entre países involucrados en un proceso de integración económica. Este trabajo se ocupa del comportamiento macroeconómico de los países del Mercosur durante los últimos veinticinco años, con tres objetivos. Primero, determinar si las fluctuaciones económicas de los países del Mercosur han tenido un comportamiento similar respecto a duración, intensidad y momento de concurrencia. Segundo, evaluar la reacción de las economías a sacudidas en la demanda y oferta; ejercicio que se realiza sólo para Argentina y Brasil. Tercero, estudiar la simultaneidad de las fluctuaciones económicas entre los cuatro países.

Abstract: Similar business fluctuations are considered a necessary condition for the harmonization of economic policies and institutions within countries involved in an economic integration process. This paper deals with the macroeconomic performance of Mercosur countries during the last twenty five years. Its aim is threefold. First, to determine whether the economic fluctuations of Mercosur countries had a similar behavior according to their duration, intensity and timing. Second, to evaluate the reaction of the economies to demand and supply shocks; an exercise which is made only for Argentina and Brazil. Third, to study simultaneously the economic fluctuations of the four countries.

1. Introduction

Similar business fluctuations are considered a necessary condition for the harmonization of economic policies and institutions within countries involved in an economic integration process. Therefore, the analysis of the symmetries and asymmetries comparing their economies constitutes an element to determine the degree of uniformity in some fundamental characteristics, and also to predict the likely outcome of the integration process. In particular, the identification of the characteristics of the economic disturbances, and the underlying mechanisms that propagate them, will play an important roll in such analysis.[1]

This paper deals with the macroeconomic performance of the Mercosur countries (Argentina, Brazil, Paraguay and Uruguay) during the last twenty five years. Its aim is threefold. First, to determine whether the economic fluctuations of the Mercosur countries had a similar behavior according to their duration, intensity and timing. Second, to evaluate the reaction of the economies to demand and supply shocks; an exercise which is made only for Argentina and Brazil.[2] Finally, to study simultaneously the economic fluctuations of the four countries.

The paper is organized as follows. Section 2 examines the individual economic experiences of the countries, considering the gross domestic product (GDP) and its components, exports and imports; and the effects of the terms of trade on the external sector. Section 3 reviews the effects of monetary shocks on the economies. Section 4 deals with the simultaneity of fluctuations among the four countries. Finally, section 5 contains the conclusions as may be applied to the feasibility in coordinated macroeconomic policy.

Statistical data were obtained from *Anuarios Estadísticos para América Latina y El Caribe*, which provide consistent information for the 1970-1994 period. The information was stated in constant prices. This procedure, though not difficult to follow, presents distortions when applied for long periods of time, due to changes in the structure of the economies, and to some particularities of the statistical techniques.[3]

[1] It is not the purpose of this to study the effects coming fron the homogeneous behavior originated by the economic integration process itself.

[2] Due to the availability and reliability of the data.

[3] See Mena (1995) for the difficulties that appears when obtaining series from a group of years.

The main shortcoming of the analysis comes from the fact that it does not include sufficient economic theory; therefore, it may rather be considered a statistical exercise based on the regularities observed during the studied period. A second shortcoming comes from the omission of the economic policies each country has followed.

2. Economic Characteristics of the Mercosur Countries

2.1. *Fluctuations of the* GDP

The first step is to identify short-run economic fluctuations of GDP, separating them from its growth trend. Traditionally, the common practice was to assume the hipothesis that aggregate economic variables were subject to a waving around a motion uniform long-term trend (Burns and Mitchell, 1946). This point of view was confirmed by the success of Solow's neoclassical model of economic growth, that explained the rate of economic growth of real variables in terms of exogenous factors, such as population and technological change.

Nevertheless, the evidence suggests that economic growth rates do change over time, and most of the theories have rejected the hipothesis that those rates are constant. It is assumed that transitory changes (disturbances) modify the rate of economic growth. Once this assumption was accepted, economic literature admited the existence of a stochastic trend as a variable in modeling macroeconomic fluctuations (Beveridge and Nelson, 1981).

Lucas (1977) defines cyclical fluctuations as GDP deviations around its trend. However, since trend is not defined, two possibilities appear. The first one is to consider that GDP grows according to a deterministic constant trend; the second, according to a stochastic trend, where transitory shocks are automatically incorporated to the aggregate behavior of the variables and, therefore, give way to the calculation of alternative structural parameters.

The first test to be applied to the series is intended to determine whether the variable to be explained should be considered in terms of its level or in therms of its rate of growth. This is easily performed via a regression that includes past values among the exogenous variables. In case the coefficient of the lagged variable is not different from one, the

growth rate should be preferred (Enders, 1995). When this criterion was implemented to the logarithm of the GDP (lnGDP) for the four Mercosur countries, the coefficient was significantly different from one; therefore, the existence of trends and cyclical fluctuations could be inferred.

Adopting a deterministic trend implies that lnGDP is a linear function of time, because it considers a constant growth rate. During the 1970-1994 period, the average growth rate of GDP for Brazil, Paraguay, Argentina and Uruguay was 4%, 5.3%, 0.3% and 1.7%, respectively. Nevertheless, the behavior of the economies of Brazil and Paraguay during the eighties was quite different from that of Argentina's and Uruguay's. This problem can be dealt with by adding a dummy variable to the years of that decade. The dummy turns to be significant for the cases of Argentina and Uruguay, but adds little to the cases of Brazil and Paraguay. With this inclusion, the rate of growth for Argentina and Uruguay, without considering the eighties, changes to 1.3% and 2.9% respectively, significantly improving the explanation.

On the other hand, the introduction of a stochastic trend regards the movements in time series random in nature. In order to identify the cyclical fluctuations, the residuals are computed from a trend that is variable in time. These residuals could be obtained with the help of an Autoregresive Integrated Moving Average model (ARIMA). This procedure was applied to the four economies, albeit it seems more adequate to those of Brazil and Paraguay only (see appendix 1).

In short, the alternatives selected for the analysis are the deterministic trend, with a dummy variable during the eighties for the economies of Argentina and Uruguay; and the stochastic trend for the economies of Brazil and Paraguay.

Once the cyclical fluctuations were settled, the next step was to find their characteristics. Christodoulakis *et al.*, (1995) have suggested duration, volatility and persistence as the most important ones.

Table 1 shows the average duration (in years) of fluctuations in the four countries, given the detrended alternatives mentioned above. Important differences can be seen in the length of expansions: Argentina and Paraguay exhibit shorter expansions, while Brazil and Uruguay present longer ones. As far as recessions are concerned, they are similar in the four countries.

Since the GDP series —their individual components and the residuals— estimated from the trend exhibit a large variability, it seemed

Table 1
Characteristics of GDP Fluctuations

	Countries			
Type	*Argentina*	*Brazil*	*Paraguay*	*Uruguay*
Duration (years)				
Expansions	2.75	3.67	2.00	5.50
Contractions	2.50	3.00	3.50	3.33
Volatility[(a)]				
D	5.23	8.66	9.41	4.10
S	4.70	5.42	3.04	5.23
Persistence[(b)]				
t-1 D	-0.35	0.22	0.48	-0.19
S	-0.08	-0.31	0.13	-0.01
t-2 D	-0.01	0.53	0.71	0.19
S	-0.11	0.40	-0.28	0.04

Notes: (a) Standard Deviation (%) of estimated GDP following a deteministic trend (D) or a stochastic one (S). (b) Autocorrelation coefficient of GDP past values.

appropriate to complete the analysis of the duration of the fluctuation with that of the volatility, measured by the standard deviation of the cyclical component. The table also shows that such volatility is lower, when rather than a determinist tendency, a stochastic trend is included in the cases of Brazil and Paraguay. In contrast, regardless of the method adopted to detrend, the volatility is approximately the same in the cases of Argentina and Paraguay.

It is obvious that the volatility of the economy depends on the selection of trend, thus the importance of the previous decision to assign a stochastic trend to Brazil and Paraguay, and a deterministic one to the other two countries.

In addition, table 1 presents the persistence of the fluctuations in each economy with respect to past experiences. Given their short-term duration, the choice of two annual lags seems adequate. The temporal autocorrelations are in general quite small, in some way confirming the selected trends for the economy of each country. In the cases of Brazil and Paraguay, some persistence is perceived in the (small) values for both trend alternatives. There is no persistence in the case of Argentina, due probably to the short length of the cyclical fluctuations; and so in the case of Uruguay, without apparent explanation.

2.2. *Temporal Correlations among GDP, its Components and the Terms of Trade*

Temporal correlations between GDP, its components and other relevant series are generally accepted in economic theory. Moreover, they give information on the relationship among these variables, since the GDP not only has its own cyclical fluctuations, but also originates fluctuations in related variables. These relationships are registered by the cross-correlations among variables, and may show fluctuations taking place before, at the same time, or after the fluctuations in GDP.

Later, section 4 will examine these correlations, to determine the existence of these relationships, comparing the four countries, as well as their uniform characteristics, differences and simultaneity. Since there is a high degree of discretion in accepting or rejecting a particular relationship in view of the correlations, the theoretical relevance is considered, rather than its statistical significance (though recognizing that the latter is a condition for the former).

In the case of consumption, there is a consensus among economists that it depends on GDP, whichever functional form it may take. Table 2 exhibits this relationship in the Mercosur countries. Although it is not the purpose of this paper to measure tendencies or elasticities, high correlations are found in individual countries. Nevertheless, when the temporal persistence is analyzed, the correlations drop substantially after two lags in the cases of Argentina and Uruguay; perhaps because their economies, as was mentioned before, lack long-run characteristics.

Economic theory has claimed that the investment component of GDP depends on the changes (not the level) of production. However, one should not expect a one-way connection between the two variables (output and investment), since different forces are working at the same time. The results (table 2) show that the correlations are non-existent in the case of the Argentine economy, which has had lower and unstable growth; moderate in the case of Brazil; and high in the two other countries (Paraguay and Uruguay), where the disaggregated figures are less credible.

On the external sector, the relationship between exports and GDP is positive and highly significant, with the exception of Argentina. The relationship between imports and GDP is positive as anticipated, since they depend mainly on the level of activity.

A very difficult matter is to assess the influence of the terms of trade, and consequently, the relative price of tradable goods, on exports, imports and output. Its influence on GDP, if the country is a net exporter, should be positive, no matter whether the terms of trade are affected by a secular tendency or not. Nevertheless, this does not seem to happen, since there is no correlation for Argentina, and the one for Brazil and Uruguay is negative.

Negative correlations between exports and the terms of trade, exist in three of the four countries. A possible explanation to this fact is that better prices are used to lower exports and to increase domestic consumption, in order to achieve a constant inflow of foreign currency. On the other hand, when the volume of imports is taken into account, negative correlation values were seen —as expected— only in Argentina and Uruguay, along with a significant positive correlation in Brazil.

Table 2

Temporal Relationships among Economic Variables[a]

Relations	*Argentina*	*Brazil*	*Paraguay*	*Uruguay*
Consumption (t)/				
GDP (t)	0.906	0.995	0.992	0.931
GDP (t-1)	0.459	0.860	0.874	0.780
Investment (t)/				
GDP (t)		0.586	0.945	0.521
GDP (t-1)		0.538	0.806	0.443
Exports (t)/				
GDP (t)	0.631	0.887	0.901	0.922
GDP (t-1)	0.433	0.797	0.815	0.768
Imports (t)/				
GDP (t)	0.593	0.580	0.857	0.920
GDP (t-1)		0.492	0.767	0.773
GDP (t)/				
Terms of Trade (t)		-0.837	-0.697	-0.663
Terms of Trade (t-1)		-0.700	0.719	-0.585
Exports (t)/				
Terms of Trade (t)	-0.866	-0.752	0.768	-0.677
Terms of Trade (t-1)	-0.833	-0.705	0.702	-0.625
Imports (t)/				
Terms of Trade (t)	-0.398		0.459	-0.488
Terms of Trade (t-1)	-0.447		0.549	0.466

(a) Cross correlations statistically significant.

3. Monetary Disturbances

Heretofore, the analysis has been aimed to the characteristics of output fluctuations, as if they were produced by a single shock. However, a more rich description could be made by distinguishing how the GDP responds to different shocks. For this purpose it is possible to consider the course of a time series, of GDP in this instance, as formed by the sum of transitory short-run shocks and permanent long term-ones. In this way, one can separate fluctuations around the trend, between those coming from factors producing permanent changes and those that operate only during a given period of time, allowing the GDP to return to its normal values.

This method requires changes to be explained by the incorporation of shocks influencing directly GDP, and an additional variable that also influences GDP, but is subject to its own shocks. It is a common practice to associate the latter to monetary policies (demand shocks) which have a transitory nature, because they are due to the stiff behavior of economic agents or other minor causes. Permanent shocks, in contrast, are shocks on aggregate supply and their effects remain for ever.

In particular, it has been suggested that positive demand shocks increase inflation and output in a transitory way, without raising GDP to higher level from the capacity of the economy. On the other hand, positive supply shocks permanently increase output, while inflation might be reduced temporarily (Blanchard and Quah, 1989). Monetary shocks can be measured by the difference between the rate of inflation and the rate of changes in the adequate monetary stock.

The exercise has been made for Argentina's and Brazil's GDP (Enders, 1995). A provisional analysis, leaving aside the hyperinflationary periods experienced by each country, and assuming the shock only falls in the same period, indicates that Argentina's GDP has been affected primarily by supply shocks, whereas it was demand shocks that affected Brazil's GDP in a decreasing way (see appendix 2). This conclusion agrees with the intuitive notion on the behavior of these economies in the past, giving basis for a future detailed research.

4. Simultaneity of GDP Fluctuations among the Mercosur Countries

An analysis of GDP expansion and contraction periods, experienced by the four economies, shows a number of coincidences. The question here would be what is the expected number of coincidences. If the fluctuations were happening simultaneously, the number of years should be equal to that of the years analyzed, whereas if the fluctuations were in opposite directions, the number should be zero; thus, it is reasonable to think that half the number of periods corresponds to a random situation. Since the number of years is 25, the latter value would be 12.

Table 3 records the number of coincidences in GDP fluctuations for every pair of countries. This number is relatively high in the case of Argentina and Brazil, indicating that their economies have followed a quite uniform path. The fluctuations of Paraguay's economy register a low correspondance with the rest, while these of Uruguay's seem to be independent.

Table 3
Simultaneity of Economic Fluctuations (years)

Countries	*Argentina*	*Brazil*	*Paraguay*
Brazil	21		
Paraguay	15	14	
Uruguay	12	11	15

However, this analysis focuses only in the number of years when conditions were similar, disregarding the relative size of such fluctuations. This difficulty can be overcome by looking at the temporal correlation of economic fluctuations. The data included in table 4 give the temporal characteristics of the fluctuations in each country, as well as their correlations with the other economies. These figures, in general, confirm the basic measure mentioned before.

The data show that the fluctuations in each individual country were correlated with those lagged one period, like in the case of Argentina and Uruguay (0.49 and 0.64, respectively), although this relationship is lost when computing two lags. In the cases of Brazil and Paraguay, on the contrary, they are poorly correlated with those of previous years.

Table 4

Correlations among GDP Fluctuations

Countries		*Argentina*				*Brazil*				*Paraguay*				*Uruguay*			
	Lags	*0*	*-1*	*-2*	*-3*	*0*	*-1*	*-2*	*-3*	*0*	*-1*	*-2*	*-3*	*0*	*-1*	*-2*	*-3*
Argentina	0	1.00				0.38	0.07	0.00	-0.15	0.16	-0.19	-0.31	0.06	-0.20	-0.34	-0.40	-0.20
	-1	0.49	1.00			0.39	0.37	0.16	0.07	0.52	0.17	-0.17	-0.24	-0.29	-0.20	-0.42	-0.35
	-2	-0.01	0.42	1.00		0.38	0.36	0.41	0.18	0.42	0.52	0.21	-0.16	-0.09	-0.26	-0.24	-0.41
	-3	-0.04	0.01	0.46	1.00	0.13	0.21	0.26	0.39	0.23	0.40	0.52	0.18	0.13	-0.01	-0.27	-0.30
Brazil	0					1.00				0.50	-0.05	-0.17	0-08	-0.25	-0.41	-0.23	-0.04
	-1					-0.05	1.00			0.32	0.53	0.11	-0.06	-0.31	-0.30	-0.37	-0.14
	-2					0.33	0.05	1.00		0.10	0.38	0.45	0.15	0.00	-0.36	-0.35	-0.31
	-3					0.07	0.41	0.09	1.00	0.07	0.15	0.30	0.48	0.38	0.33	-0.22	-0.36
Paraguay											1.00				-0.39	-0.20	-0.39
	-1									0.18	1.00			-0.06	-0.42	-0.24	-0.18
	-2									-0.27	0.16	1.00		0.36	0.00	-0.36	-0.28
	-3									0.12	-0.20	0.09	1.00	0.38	0.22	-0.05	-0.35
Uruguay	0													1.00			
	-1													0.64	1.00		
	-2													0.19	0.62	1.00	
	-3													-0.19	0.11	0.62	1.00

The correlations of GDP fluctuations for the same period (present and past) exhibit a positive and high value between Brazil and Paraguay (0.50; 0.53; 0.45; 0.48), and also a positive but a lower one between Argentina and Brazil (0.38; 0.37; 0.41; 0.39). Uruguay maintains a negative correlation with Paraguay, Brazil and Argentina; though significantly lower in the last two cases.

It is important to observe what happens when the current fluctuation in one country is considered with the fluctuation in the rest of the countries lagged one period. The figures for Brazil show a positive correlation with Argentina (0.39; 0.36; 0.26), and with Paraguay a higher one (0.52; 0.52; 0.52); whereas Uruguay shows a negative correlation with Argentina (-0.29; -0.26; -0.27). The correlation for Paraguay with respect to Brazil is positive (0.32; 0.38; 0.30), and with respect to Uruguay negative (-0.20; -0.24; -0.28). Finally, a negative correlation of -0.41 exists between fluctuations in Brazil and Uruguay.

The table also shows smaller correlations when more than one lag period is considered, meaning an absence of close relations among the economies.

In short, economic fluctuations experienced in Brazil appear to be related to what has recently happened in Argentina, and viceversa. Paraguay's fluctuations seem to be correlated to Argentina's and Brazil's economic performance; whereas there is a simultaneous negative correlation with Uruguay. The economic conditions in Uruguay have a negative simultaneous correlation with Brazil.

5. Applicability of Uniform Macroeconomic Policies

The economic fluctuations of the four countries during the last quarter of the century are highly variable and not time uniform. As a consequence, the possibility of the Mercosur countries to follow successfully common macroeconomic policies, or to coordinate the ones that may be accorded, would be difficult to predict. Nevertheless, one may conclude:

First, there is a lot of discretion in the separation of short-run fluctuations of GDP from its growth trend, which was rather heterogeneous in the different countries.

Second, when expansions and contractions are compared within countries, their duration is variable and their degree of persistence is small.

Third, the relationship between output and each of its components, with the exception of consumption, seems to be poor.

Fourth, if a simple distinction is done, for the cases of Argentina and Brazil, between supply and demand disturbances to incorporate modifications in monetary policies, wide discrepancies appear. However, they seem to vanish after being subject to hyperinflationary processes.

Finally, the simultaneous relationships are different in time and size between countries, although one should notice a significant correlation pattern between the two largest economies in the region, those of Argentina and Brazil.

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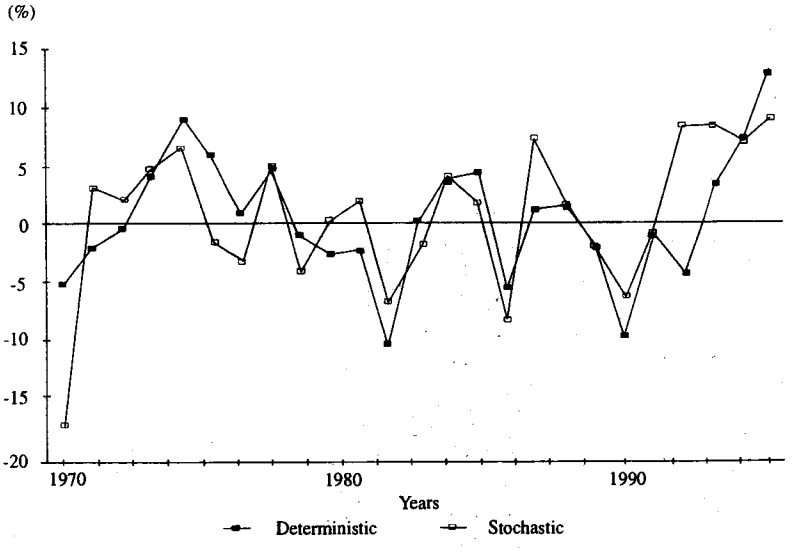
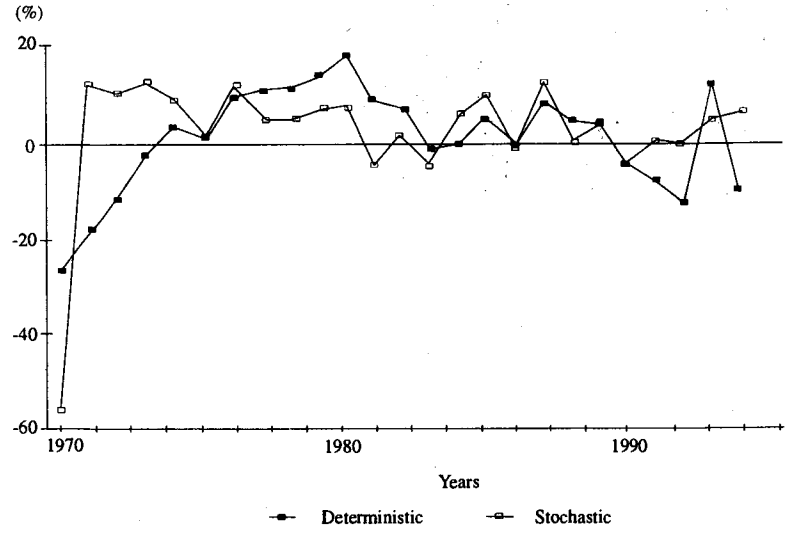
Appendix 1

GDP Fluctuations

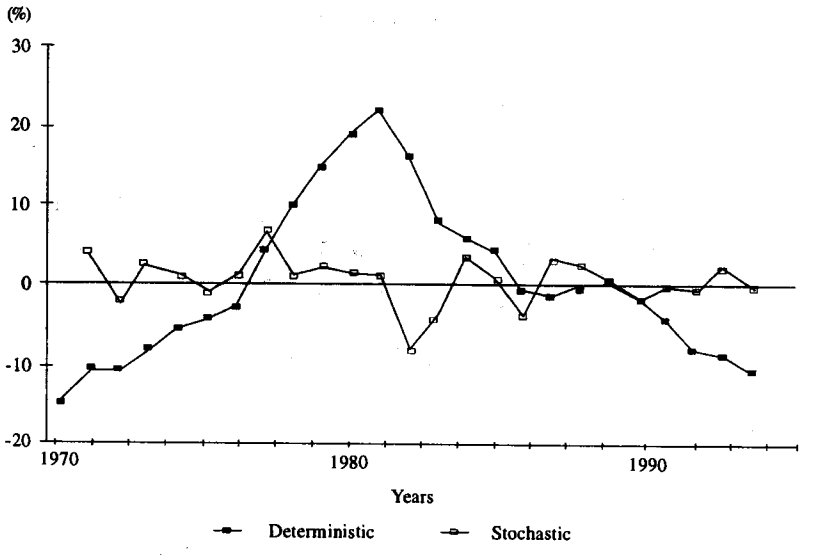
Argentina



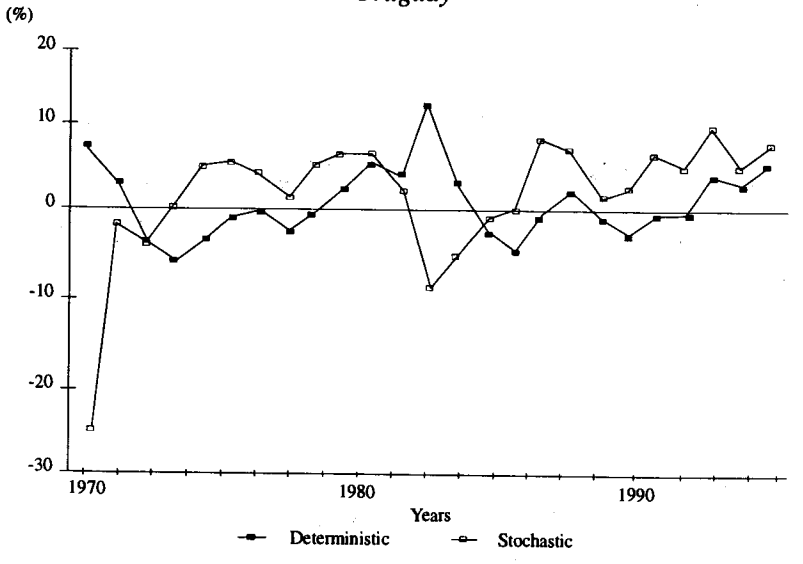
Brazil



Paraguay



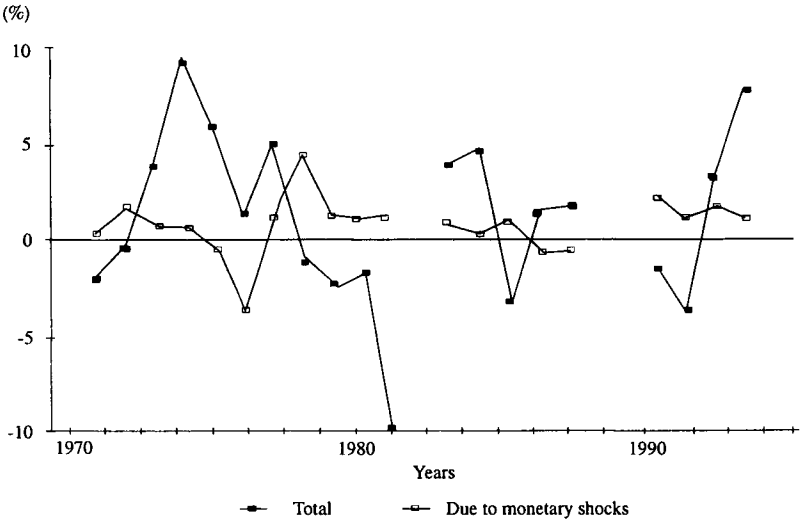
Uruguay



Appendix 2

Supply Shocks on GDP Fluctuations

Argentina



Brazil