

# A Cost-Benefit Analysis of a Monetary Union for MERCOSUR with Particular Emphasis on the Optimum Currency Area Theory?

Ralf Kronberger

## **ABSTRACT:**

Potential costs and benefits of a monetary union for the four MERCOSUR countries Argentina, Brazil, Paraguay and Uruguay are compared.. Particular emphasis was put on the traditional and new approaches to optimum currency area theory which were reviewed and analyzed with respect to their validity for less developed economies. Based on these insights 7 theses have been developed and thereafter were tested empirically, as far as empirical material was available. Evidently MERCOSUR will not start negotiating a treaty on a MERCOSUR monetary union à la Maastricht tomorrow. The necessary institutional framework is de facto non-existent. Further the member countries have shown little willingness of monetary cooperation in the past. Nonetheless, the creation of a single MERCOSUR currency could serve as political lubricant for deepening integration. Such a deepening of the integration process could go hand in hand with sound and coordinated macroeconomic management which in turn could lead to more stability and increased credibility in the region.

JEL: E32, E42, F36

## Table of Contents

<b>Table of Contents .....</b>	<b>III</b>
<b>List of Tables .....</b>	<b>IV</b>
<b>List of Figures.....</b>	<b>V</b>
<b>1 Introduction.....</b>	<b>1</b>
<b>2 The Benefits of a Common Currency.....</b>	<b>3</b>
2.1 Welfare Gains by Policy Coordination.....	3
2.2 Network Externalities .....	5
2.3 Growth and Monetary Union.....	5
2.4 Growth and Financial Development.....	6
<b>3 The Costs of a Common Currency .....</b>	<b>9</b>
3.1 Exchange Rate Considerations in the Context of the OCA Theory.....	9
3.2 Optimum Currency Area Theory .....	11
<b>4 Empirical Analysis of MERCOSUR .....</b>	<b>30</b>
4.1 Avoiding a Beggar-Thy-Neighbor Policy.....	30
4.2 The Effectiveness of Exchange Rate Devaluations.....	37
4.3 Differences in Productivity and the Real Exchange Rate.....	38
4.4 Symmetry of Recent External Shocks to Latin American Economies .....	39
4.5 Traditional OCA Criteria and the Optimality of MERCOSUR .....	44
4.6 Endogeneity of OCA Criteria.....	65
4.7 Exchange Rate Rules, Price Level Stability, and Political Convergence.....	66
<b>5 Concluding Remarks .....</b>	<b>72</b>
<b>Bibliography.....</b>	<b>75</b>

## List of Tables

Table 4-1: Annual growth rates of the MERCOSUR countries .....	39
Table 4-2: Behavior of selected variables in MERCOSUR during the Mexican crisis .....	42
Table 4-3: Behavior of selected variables during the South East Asian and Russian crisis .....	43
Table 4-4: Correlation of quarterly $DGDP_{Arg}$ , $DGDP_{Bra}$ , $DGDP_{Ugy}$ .....	47
Table 4-5: Correlation matrix of $\Delta\bar{z}$ .....	52
Table 4-6: Correlation matrix of $c$ .....	52
Table 4-7: Argentina: Immigrants from bordering countries .....	53
Table 4-8: Adjustment coefficients indicating stock market integration in MERCOSUR.....	61
Table 4-9: Summary of tests on financial integration in Latin American countries.....	62
Table 4-10: Degree of legal central bank independence in Argentina, Brazil and Uruguay from 1972 to 1989.....	68
Table 4-11: Degree of real central bank independence in Brazil and Uruguay.....	69
Table 4-12: Degree of legal central bank independence of the Argentinean central bank in 1989 and 1992.....	70
Table 4-13: Real degree of central bank independence in Argentina and Brazil in 1996 .....	71

## List of Figures

Diagram 3-1: Typology of shocks requiring differentiated responses per country.....	12
Diagram 3-2: Real disturbance in a static Mundell-Fleming model.....	14
Diagram 4-1: Brazil: Evolution of the real/US dollar exchange rate adjusted for the CPI.....	32
Diagram 4-2: Argentina: Change of GDP and industrial production 1997-1999 .....	33
Diagram 4-3: Brazil: Change of GDP and industrial production 1997-1999 .....	33
Diagram 4-4: External trade of Argentina and Brazil with the rest of the world .....	34
Diagram 4-5: Argentinean imports from Brazil 1998/99.....	34
Diagram 4-6: Brazilian share in Argentinean imports.....	35
Diagram 4-7: Argentinean exports to Brazil.....	35
Diagram 4-8: Brazilian share in Argentinean exports .....	36
Diagram 4-9: Monthly bilateral trade balance Argentina-Brazil.....	36
Diagram 4-10: MERCOSUR: Development of international reserves minus gold (11.d).....	41
Diagram 4-11: MERCOSUR: Development of log difference of real domestic credit (32) .....	43
Diagram 4-12: MERCOSUR: Development of seasonally adjusted industrial production.....	44
Diagram 4-13: Beveridge-Nelson decomposition of the Argentinean GDP .....	49
Diagram 4-14: Beveridge-Nelson decomposition of the Brazilian GDP .....	50
Diagram 4-15: Beveridge-Nelson decomposition of the Uruguayan GDP.....	51
Diagram 4-16: Argentina: Log of unemployment and real average wages .....	54
Diagram 4-17: MERCOSUR: Averages wage indices in US \$ deflated by US CPI.....	55
Diagram 4-18: Brazil and Uruguay: Covered interest rate differential (60c.f-60c).....	57
Diagram 4-19: Brazil and Uruguay: Covered interest rate differential (60p.f-60p).....	58
Diagram 4-20: Degree of openness: Intra- and extra-MERCOSUR trade as share of GDP .....	64
Diagram 4-21: Intra-industry trade: Brazil/Argentina /MERCOSUR (+2) .....	64

# 1 Introduction

The Treaty of Asuncion, the founding document of the Common Market of the South (MERCOSUR), was signed in 1991 by the four member states Argentina, Brazil, Paraguay and Uruguay. The transition of the customs union took five years and from the economic point of view was extraordinarily successful in its initial stage. Despite marked skepticism by many economists, MERCOSUR intra-trade doubled within this period. At that time MERCOSUR seemed to be the most successful integration project of several decades. In order to keep the momentum of the integration process on 27 April 1997 the Argentinean and the Brazilian president of state, Carlos Menem and Enrique Cardoso, expressed their intention of establishing a single currency for MERCOSUR by 2012. They clearly had in mind the European Economic and Monetary Union as a model for MERCOSUR. So far, this description would look like a linear development toward a monetary union of MERCOSUR.

However, the Brazilian maxi-devaluation in 1999 and the economic downturn in Argentina from 1997 on until the time of writing forced the two large MERCOSUR economies to concentrate on other economic policy fields. Monetary disintegration seemed to take place. Brazil abandoned an asymmetrical band with the dollar (Bacha, 1997). The Argentina currency board was weakened, first, by the introduction of an official commercial exchange rate weighted by the dollar and the euro (Kronberger, 2001b); second, the “*arbolitos*” (Bazzan, 2001) appeared back on the street that were exchanging pesos against dollars on the black market. Nonetheless, disintegration with the dollar does not mean that there is not a monetary union option for MERCOSUR. On the contrary, monetary disintegration with the dollar could enable monetary rapprochement between the MERCOSUR countries that seemed somewhat unrealistic due to the fact, that Argentina and Uruguay showed a high degree of dollarization and the other two MERCOSUR countries did not.

Several works have already been published that tackle the question whether MERCOSUR is apt for a common currency by using the traditional approach to optimum currency area theory. For the analysis indicators like the symmetry of shocks, the degree of trade openness, simplified measures of seignorage, elasticities between trade and GDP, etc. were applied empirically. Unsurprisingly more often than not it was concluded that MERCOSUR does not form an optimum currency area. This work aims at adding some crucial points to the rather superficial mainstream discussion, which in consequence may lead to fundamentally differing conclusions. These crucial points were the taking into account the aspects of developing/emerging countries, the findings of the ‘*new*’ optimum currency area and an extensive empirical analysis.<sup>1</sup>

Potential benefits and costs of the creation of a single currency of less developed member states will be compared. Optimum currency area theory will be reviewed and, importantly, analyzed for its validity for less developed economies. Based on these insights 7 theses have been developed that thereafter were tested empirically, as far as empirical material was available. Assumedly benefits of a common currency are even more difficult to grasp for developing/emerging economies than for developed economies. Welfare gains by policy coordination can be important, although rather within than outside the monetary union. If dynamic integration gains are analyzed the question has to be permitted whether prior development of the national economies offers more potential for dynamic gains than economic integration itself. On the cost side it is asked whether devaluations are really effective in

---

<sup>1</sup> See Kronberger(2001a,pp. 114) on a discussion what dollarization could mean for the creation of a common currency other than the dollar in (partly) dollarized economies.

developing/emerging countries. Are they effective short-term or long-term? Traditional optimum currency area is critically reviewed. Theoretically as well as empirically the traditional optimum currency area theory leaves many questions unanswered. When the 'new' optimum currency area theory is brought into play it cannot be dismissed that MERCOSUR may become an optimum currency area in the future. Trade integration might make the cycles of the MERCOSUR countries converge. The creation of common political institutions and respective common rules would likely lend a common MERCOSUR currency increased credibility, though there is a long way to develop these institutions.

Some of the posed questions could not always be given concrete answers. Certainly it was always intended to provide as concrete and as detailed answers as possible. Sometimes approximations or even speculations about future development had to serve as answers. Nonetheless the latter were instrumented with the purpose of tackling interesting and also important issues for the involved policy makers.

## 2 The Benefits of a Common Currency

Monetary unions are frequently evaluated with emphasis on the cost side of their creation. The early optimum currency area literature concentrates almost exclusively on the analysis of the cost of a monetary union. More recent optimum currency area (OCA) literature revises many of the findings, as far as costs are concerned (compare 3.2.3). The benefits of monetary union to date have received limited attention. Economic theory as well as empirical evidence leave much to be desired in many fields of optimum currency area theory. Further, on the benefit side OCA theory often disregards aspects found in the more general microeconomic theory on money.<sup>2</sup>

The objective of this chapter is to briefly review benefits of the establishment of a common currency. If particularities applying to less industrialized economies are of importance, they will be pointed out, for example, reduced depth of financial markets, a less efficient financial sector of developing/emerging countries in general, which in turn might result into a relatively larger growth potential, or reduced network and credibility effects. This section comprises four subsections: (1) welfare gains of policy coordination which are very difficult to determine empirically (2) Network externalities and monetary union. (3), Implications of the new growth theory for the creation of a monetary union. Specifically the possible effects of financial development on growth – since transactions cost in developing countries are elevated – are of interest. This is due to the fact that financial markets in developing/emerging economies tend to be less efficient and thus, theoretically allow for a relatively higher growth potential by possibly catching up to the efficiency standards of more developed industrialized economies.

### 2.1 Welfare Gains by Policy Coordination

As soon as two economies are analyzed that are linked by trade and/or capital flows economic interdependence can be observed. The use of a policy instrument in one country may have welfare implications for the other country. Cases exist where the coordination of policies might improve welfare for the participating countries. This relationship can either be of a relatively symmetrical nature (interdependence) or of an asymmetrical nature (dependence). At least two approaches for economic analysis of this problem exist. (1) A two- or more-country model is set up and the management of their policy instruments and its effect(s) on the respective economy(ies) is (are) analyzed.<sup>3</sup> (2) A more strategic approach is applied by game theoretical considerations. The authorities (policy makers) aim at maximizing their social welfare function. The welfare function depends positively on the fulfillment of the objectives. Furthermore, the welfare function is conditioned by the economic system and by other countries' policy management.<sup>4</sup> Whatever approach is used information about the economic model, the welfare function has to be known in order to reap welfare gains by coordination. The

---

<sup>2</sup> E.g. Niehans(1980) elaborated a treatise on monetary theory. Inter alia, this work reconciles micro- and macroeconomic theory.

<sup>3</sup> Assume a two country model with one internal and one external policy objective per country. In total they have four instruments (assume government expenditure and the interest rate) at their disposal. If the target is an equilibrated balance of payments, it has to be balanced for both countries. Thus, four instruments are at disposal and only three targets are present. If there are  $n$  countries and  $n-1$  countries have their balance of payments in equilibrium the  $n$ th country will also find its balance of payments in equilibrium without having done anything. The remaining target could then be defined by common consensus.

<sup>4</sup> Compare Hamada(1974), the seminal work in game theory.

players will rarely dispose of this information in real world. Nonetheless, two cases can be identified, where by the fact of creating a monetary union will help to avoid competitive, and thus possibly harmful, policies between member countries. (1) Competitive devaluations (beggar-thy-neighbor policy) are ruled out by the simple fact of an existing single currency. (2) Within the monetary union speculative attacks can be avoided.<sup>5</sup>

(1) The first argument has been used frequently in the context of the creation of European Economic and Monetary Union. Sectoral interests will press hard – or already did so in the European Community – for the avoidance of disproportionate exchange rate swings (competitive devaluations).<sup>6</sup> Both, importers and exporters have a strong interest in maintaining favorable (or at least stable) relative prices.

(2) The second argument– speculative attacks within the monetary union can be ruled out - is rather hypothetical for a small monetary union largely dependent on foreign capital. Assume four relatively small countries forming a monetary union, whose joint GDP does not even represent a fourth of the GDP of the important economic players as, for instance, the USA. Moreover, these other important economic players are the most important foreign investors in the monetary union. It is thus more than questionable that speculative attacks between member states of the monetary union will have played an important role before forming the monetary union.

A single monetary policy of a monetary union, however, is not equal to a coordinated monetary policy between a group of economies. If the various members of a monetary union are characterized by a different financial market structure of the single members, by varying regulations in the national financial markets, a single monetary policy might prove not to be optimal for all members of a monetary union.

**THESIS 1: A common currency avoids beggar-thy-neighbor policies in terms of competitive devaluations vis-à-vis other monetary union members. The maxi-devaluation of Brazil in January 1999 caused considerable economic cost for the rest of MERCOSUR, that by the theoretical existence of a common currency, could have been avoided.**

---

<sup>5</sup> Compare Bofinger(1993, pp. 144) and Ishiyama(1975, p. 362)

<sup>6</sup> Compare Eichengreen(1996, p. 2)

## 2.2 Network Externalities

Yet in the early microeconomic theory of money it was recognized that as the number of monies increases its exchange becomes less convenient and more expensive and thus its utilities decrease, from the individual as well as from the national point of view. Already Mill(1894) recognized *“So much barbarism, however, still remains in the transaction of most civilised nations, that almost all independent countries choose to assert their nationality by having, to their own inconvenience and that of their neighbors, a peculiar currency of their own“*

The increased size of a currency area is assumed to reap scale economies not only with respect to transaction holdings for non-banks and within the production function of banks<sup>7</sup> but also the utility of money will increase in general. In the context of the more recent optimum currency area theory, Dowd and Greenaway (1993, pp. 1180) considered network effects of money. Network effects of the respective money will not be existent to their full extent on day zero of the introduction of a new currency, but have to evolve over time (since it is a dynamic process). Money is assumed not to be neutral and as result will create externalities.<sup>8</sup> Network effects might lead agents to decide whether to hold a particular currency or not. The utility of the particular currency increases with its public good characteristics. The utility of the currency is dependent on the number of other agents using the same currency or as Brunner and Meltzer (1971) put it: *“The marginal cost of acquiring information about the properties of any asset does not vary randomly within a social group and declines as the frequency with which the group uses a particular asset increases.”*

Even though the use of a particular currency might result advantageously due to its increased network qualities, an agent formerly holding a less advantageous currency will face switching costs when changing from one currency to the other. Non-institutionalized switching – that is, economic agents switching to the use of another currency regardless of whether national authorities allow it<sup>9</sup> or not - tends to occur only in the face of an increasingly unstable environment.

## 2.3 Growth and Monetary Union

Network externalities are relatively subtle and difficult to account for. Economic growth as a result of monetary integration does convey a simple outcome, despite the fact that growth theory represents a controversial field of economic theory. Baldwin(1991) identifies five main channels which foster economic efficiency in an economic and monetary union and consequently may have beneficial effects on output growth:

- (1) Elimination of transaction costs
- (2) Improved allocation of common market capital
- (3) Intensified cross-border competitive pressures
- (4) Higher efficiency of corporate ownership
- (5) Increased output as a result of reduced and converged inflation rates

---

<sup>7</sup> Compare Niehans(1980, p. 130). Theoretically it is relatively demanding to integrate scale economies of monetary transactions into a general theory of money.

<sup>8</sup> For an extensive treatment of money externalities see Caravelis(1994, pp. 190).

<sup>9</sup> The institutional aspect should not be underestimated. Even though it is easy to switch the currency in the private sector, the authorities may insist on receiving tax payments and may affect transfers in the domestic currency despite its perceived utility.

The static gains will have immediate welfare effects whereas dynamic gains will materialize over time. With growth theory these dynamic gains can be grasped. Baldwin estimates medium-term growth by the means of the traditional growth theory (neo-classical growth model). Constant returns to scale are assumed. Liberalization will induce capital formation over time through the channels enumerated before. Thus, an initial efficiency gain will be enforced by an increased capital stock which, in consequence, will lead to a higher per capita GDP growth than the static efficiency gains alone. Nevertheless, the traditional growth model does not explain for lasting growth effects. The induced capital formation does not have a permanent effect on growth, since the steady-state growth rates of per capita output, capital and consumption are not altered.<sup>10</sup> The neo-classical growth model "will not provide explanations of the determinant of long-run per capita growth" (Barro and Sala-i-Martin, 1995, p. 19).

On the contrary, endogenous growth models allow for accelerating growth. Returns are no longer diminishing. An extra unit of capital raises output independently from the capital-labor ratio. The overall level of efficiency now affects the per-capita-GDP growth permanently. Crucial to the endogenous growth model is the inclusion of scale economies. These scale economies can be reaped through research and development (R&D) investments of individual firms, who thus maintain their leading edge over their rivals or through external economies of scale.<sup>11</sup>

## **2.4 Growth and Financial Development**

The preceding section dealt with growth stimulation through a monetary and economic union. Several channels promoting growth were assumed. Considering developing countries and an integrational scheme, which is not as advanced as the European Economic and Monetary Union the above presented model would seem unrealistic. Sticking to the conjecture that financial development is triggered by government, pertinent active policy measures would have to be undertaken, for instance, the facilitation of a legal environment apt to liberalization and deepening of the financial market preceding the introduction of a single currency.<sup>12</sup> However, starting with the assumption of underdeveloped financial markets in developing countries the growth potential in the long run - when introducing a single currency in a final stage - could be even larger than in developing countries.<sup>13</sup> Nonetheless, it is left open to which extent a single member of the integration scheme would be able to foster growth by national financial efficiency augmenting measures alone and to which extent additional growth would be attributable to the creation of monetary union.

In developing/emerging economies banks play the most important role in the financial

---

<sup>10</sup> The neo-classical growth model conjectures diminishing returns on capital. Additional output per worker will decrease with a rising capital-labor ratio. As increased investment is equal to postponed consumption additional output growth at a certain point will not suffice to maintain investment. The capital-labor ratio will return to its initial level.

<sup>11</sup> See EG Kommission(1990, pp. 86), De Grauwe(1992, pp. 71) or Barro and Sala-i-Martin(1995) which graphically analyze the differences between the two growth models concerned.

<sup>12</sup> Some authors, inter alia, Bencivenga and Smith(1991, p. 196) take financial development as an exogenous factor, which is determined by legislation and government.

<sup>13</sup> Molle(1997, p. 216) adds to efficiency gains reaped through a deeper financial market the following benefits:

- (1) With the increasing size of capital markets the disturbance risk tends to disappear.
- (2) Production conditions become more balanced since more enterprises gain access to financing facilities which allows for a more perfect competition within the common market.

sector, leaving the importance of equity or bond markets far behind. Fees and commissions, etc. charged the financial intermediation services are relatively high.<sup>14</sup> In fact these transaction costs are actually withheld from investment activities that would alternatively contribute to economic growth. Pagano(1993) provides the following formal framework. The simplest form of an endogenous growth model is assumed where aggregate output  $y_t$  is a linear function of the aggregate capital stock  $k_t$ .

$$y_t = Ak_t \quad (2-1)$$

Returns to scale are constant and returns to capital are not diminishing. Only a single good is produced which can be either consumed or invested. The invested good faces a rate of depreciation  $d$  Then gross investment can be written as:

$$I_t = k_{t+1} - (1 - d)k_t \quad (2-2)$$

As indicated in the first paragraph financial agents keep a fraction of savings equals to  $1 - m$  for their intermediation activities. The savings-investment equation becomes

$$ms_t = I_t, 0 < m < 1 \quad (2-3)$$

The steady-state growth rate takes the form

$$g = A \frac{I}{Y} - d = Am - d \quad (2-4)$$

Equation ( 2-4 ) elucidates three possible channels through which financial development might have an effect on economic growth:

(1) The saving rate could be stimulated though ambiguous effects can emerge. The availability of consumer credit might discourage households from saving hence exercising downward pressure on the saving rate. Moreover, the introduction of insurance markets - assuming risk-averse individuals - lowers the necessity of precautionary savings. Thus, the degree of risk aversion will determine whether saving activities increase or fall.

(2) Cost of financial intermediation might decrease ( $m$  increases) thus allocating a larger share of saving to investment. The fraction  $1 - m$  is absorbed by banks generating their income by spreads between borrowing and lending rates and sale and purchase of foreign exchange and by other financial agents as, for instance, brokers or dealers who charge commissions and fees. In addition, this fraction might also represent monopoly rents for the intermediaries or taxation in the form of transaction taxes.

(3) Finally, the marginal productivity of the capital stock  $A$  might augment. Contrary to the majority of the individual investors, financial intermediaries can use portfolio techniques to

---

<sup>14</sup> King and Levine(1993, p. 540) stress four functions which a developed financial system has to fulfil:

- (1) Evaluation of potential investment projects and their selection
- (2) Raising of the resources necessary to finance the selected projects
- (3) Facilitation of risk diversification to investors
- (4) Revelation of "the potential rewards to engaging in innovation, relative to continuing to make existing products with existing techniques"

mitigate risk of single investment projects thus improving the risk-return relationship.<sup>15</sup> Furthermore, financial intermediaries dispose of advantages in the collection of information with regard to the evaluation of alternative investment projects. In the absence of a sufficiently deep financial sector too much capital might be directed toward relatively unproductive liquid assets (Bencivenga and Smith, 1991, p. 197).

Even if financial development exercised downward pressure on the saving rate, still two channels would remain to outweigh this possible negative effect on growth. Either the reduction of large spreads between lending and borrowing rates typical for developing countries or/and provision of liquidity services to relatively risky investments which otherwise could not have been provided - omitting risk sharing - might well contribute positively to economic growth.

---

<sup>15</sup> Bencivenga and Smith (1991, p. 203) deduce from their 3-generations model that if agents are risk-averse the “*presence of competitive intermediaries*” leads to higher growth.

### 3 The Costs of a Common Currency

The costs of the creation of a common currency are frequently put into relation with the traditional approaches of optimum currency area (OCA) theory pioneered by Mundell(1961).<sup>16</sup> The approach of the latter infers from the absence of factor mobility between two regions, that a flexible exchange rate is needed for adjustment in the presence of an asymmetrical exogenous disturbance. In economic discussions the loss of the exchange rate instrument was often put forward as the main argument against monetary union. This approach however, faces several limitations worthy of some analysis: A flexible exchange rate will not always provide adjustment as required. Is the exchange rate really capable of effectively cushioning shocks? Will the exchange rate always move in the indicated direction? Does a link between the real exchange rate and productivity exist? Do devaluations always tend to be beneficial to output in developing/emerging economies?

Particular aspects concerning developing/emerging countries are referred to, in addition to the exchange-rate section. First, a typology of shocks is provided. It will become evident that traditional OCA theory only covers a more limited range of disturbances than is actually relevant (compare subsection 3.2.1). In particular, endogenous shocks resulting from bad macroeconomic management and subsequent stabilization attempts received little attention up to now. In subsection 3.2.2 prominent approaches to the traditional OCA theory are reconsidered. Their assumptions are shown, as well as their weaknesses. Findings of the 'new' OCA theory are presented in subsection 3.2.3. Some findings have substantially altered the way we look at the OCA theory as for instance, endogeneity which is now seen in a different context, as far as developing/emerging countries are concerned. A track record of asymmetrical endogenous policy shocks in developing/emerging countries indicates that a sound and continuous political and economic policy coordination represents a precondition for the successful establishment of a monetary union. Moreover, time inconsistency literature has shown that economic agents behave strategically. Accordingly, if devaluation expectations occur, devaluations are likely to be ineffective anyway.

#### 3.1 Exchange Rate Considerations in the Context of the OCA Theory

Traditional OCA theory emphasizes the cost of introducing a monetary union in terms of loss of the exchange rate instrument. Underlying assumptions relative to the working of the exchange rate are mistaken. Nonetheless, some economists are tempted to draw important conclusions from applying these traditional approaches without reviewing them carefully and critically.<sup>17</sup> Yet some economists still tend to adhere to traditional OCA theory approaches. The views about the functioning of the exchange rate in these approaches, however, are sometimes mistaken.

---

<sup>16</sup> Traditional OCA theory comprises the seminal work of Mundell(1961), McKinnon(1963), and Kenen (1967). These approaches are analyzed in 3.2.2.

<sup>17</sup> A monetary union for Mercosur became an issue when Argentina presided MERCOSUR in 1997. As a consequence, first works about MERCOSUR and OCA theory were presented. Some of these works are Giambiagi(1997), Lavagna and Giambiagi(1998), Licandro Ferrando (1998), Yeyati and Sturzenegger(1999a). Their focus had been primarily directed toward the traditional approaches to OCA theory without paying too much attention to underlying assumptions and often neglecting the new OCA theory.

In a static Mundell-Fleming (MF) model with perfect capital mobility as outlined in Gandolfo(1995, pp. 295) a monetary expansionary policy of an economy would induce a depreciation and consequently an improvement of the current account and an increase of output. Under these assumptions prices are rigid and therefore a change in the nominal exchange rate translates completely into a change of the real exchange rate. In a portfolio model under static expectations a link between the exchange rate and monetary equilibrium can be established. Such a model is more realistic, particularly in the Latin American context. The assumption of rigid prices (especially upwards) would not find too many advocates there. With respect to short term results the MF model and the portfolio balance approach are similar. Moreover, the portfolio balance approach comes up for one caveat of the MF model, it considers stocks and flows simultaneously. In the presence of monetary expansion output will not increase as much as in the MF model. Nominal depreciation will be accompanied by an increase in the price level, therefore the increase in the real monetary stock is limited and output will not increase as much under the MF model.

**THESIS 2: In the past devaluations of Latin American currencies often proved to be highly ineffective. Under the assumption that devaluations continue to be ineffective a single currency would not impose costs on the single member countries in terms of the loss of an adjustment instrument. Nonetheless, the Brazilian maxi-devaluation of January 1999 showed a relatively high degree of effectiveness.**

If the exchange rate is looked at from a long-term perspective – with particular emphasis on the real exchange rate - the distinction of two strands of exchange rate models is important: (1) The real exchange rate is determined by the relative price of imports to exports (Edwards, 1989). (2) The real exchange rate is – inter alia – determined by differences in productivity (Claasen, 1996, pp. 172). In a classical model productivity changes are translated fully into changes of the nominal wages. The real exchange rate remains unchanged. If, on the contrary, productivity changes have to be born out completely by a change in product prices, the real exchange rate has to adjust. For example a gain in labor productivity would result in a real appreciation.

De Gregorio and Wolf (1994) show that the truth probably lies somewhere in between the two extreme positions (productivity changes are fully transmitted to nominal wages versus productivity changes are fully transmitted to the product prices).<sup>18</sup> Hence, the possibility that productivity differences will influence the real exchange rate cannot be dismissed. Countries with considerable productivity growth differences joining a monetary or an exchange rate union might face costs, if they relinquish the exchange rate instrument. Suppose a positive supply shock caused by technological process in the tradable sector in Brazil. If productivity increases are fully transmitted to wages, workers - under the assumption that they are equally skilled - will move from the nontradable sector to the tradable sector until wages are equalized in both sectors. However, assuming higher income elasticity of the demand for nontradables than for the demand for tradables and an unchanged demand structure the price of nontradables will increase more than the price of tradables resulting in an appreciated real exchange.<sup>19</sup>

---

<sup>18</sup> They apply their simple static framework empirically to 14 OECD countries.

<sup>19</sup> However, the application of policies dampening aggregate demand (for example, a tight monetary policy) could at least reduce the upward pressure on nontradables, but at the expense of output growth in the short run (possibly in the long run too).

**THESIS 3: Differences in productivity combined with inflexible real wages might require the exchange rate instrument for adjustment over the long run. These preconditions apply to MERCOSUR.**

The assumption that productivity increases, are fully conveyed to nominal wage increases, is dependent on the nature of institutional arrangements. Usually the presence of strong unions and thus a strong bargaining power of labor is needed; that workers will take the full profit from growth of productivity. However, if a negative shock to productivity occurs and the unions use their bargaining power alike, and thus will not agree to a reduction of nominal wages, the whole adjustment burden has to be born out by product prices. This is a scenario which is common in many developing countries and in particular in many Latin American countries, where in the past powerful wage indexation mechanism had been in effect.<sup>20</sup>

## **3.2 Optimum Currency Area Theory**

### **3.2.1 Nature of Disturbances and the Exchange Rate**

Section 3.2.2 covers the old approaches to OCA theory. What these approaches have in common is that they remain rather unspecific about the nature of disturbances that affect a single or a group of economies. This section will offer a more general view of shocks and will hereby classify possible shocks. It will be shown which type of shock affecting an economy, renders the exchange rate instrument necessary for adjustment.

Diagram 3-1 provides an outline of temporary disturbances, possibly requiring the exchange rate instrument for restoring internal and external equilibrium, for a group of two or more countries. As modeled in 3.2.2.1 a country suffering from an asymmetrical external shock, lacking alternative adjustment mechanisms, will most likely need the exchange rate instrument for adjustment in order to avoid pronounced decreases in output. But not only demand shifts as in 3.2.2.1 but also cyclical asymmetries could possibly render the discretionary use of the exchange rate instrument more optimal.

---

<sup>20</sup> One source where this argument can be found is Levi Yeyati and Sturzenegger (1999a). Moreover, to some extent this aspect will be dealt with in the empirical part of this work. (4.5.2.2).

### 3.2.1.1 Temporary Shocks

## Typology of temporary shocks

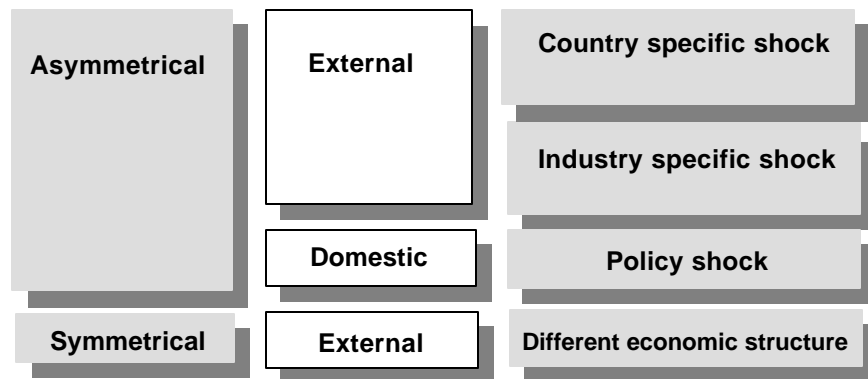


Diagram 3-1: Typology of shocks requiring differentiated responses per country

Changing from the aggregate level, to the sector level shows that if a specific industry in a hardly diversified economy or even in a diversified economy, where this sector is relatively large, is hit by a negative asymmetrical shock, the economy as a whole might be affected by this type of shock (compare 3.2.2.3). However, these disturbances do not necessarily have to be exogenous. Shocks can also be *'home-made'*. Assume the Argentinean authorities opted for a significant tax raise. Such a policy move would likely dampen overall demand, thus possibly having the same consequences as an exogenous demand disturbance requiring the exchange rate for adjustment. Similar effects could be produced by other policy areas, too. It has to be stressed, however, that policy shocks are controllable to a certain extent. Thus, the question has to be permitted whether they were desired from an overall point of view (Bergmann, 1995, p. 1254). In particular, in the context of developing or 'emerging' economies policy shocks are imposed comparatively more often by the means of stabilization programs accounting for significant variations in output.

But even symmetrical shocks might require differing policy responses. Suppose another oil shock would happen. Brazil imports significantly more oil than Argentina does, since the former possesses a relatively larger energy sector, and produces more oil. Suppose further, that Brazil uses energy as an input for its metal processing. The more expensive energy input would also increase the price of its industrial exports. In such a scenario a devaluation could render Brazil's exports less competitive.

**THESIS 4: The cost of a single currency will be lower, the more symmetrical the shocks to the member countries occur. Since the creation of MERCOSUR external shocks to the economies occurred rather symmetrically, except the effects of the Brazilian maxi-devaluation in January 1999, which can be viewed as endogenous shock.**

### 3.2.1.2 Permanent Shocks

Basically the types of shocks described before have been well covered in the old OCA theory. Nonetheless, a long-term perspective is needed to complete the picture. Seen from the view of classical economics the nominal exchange rate does not possess the ability to balance internal and external disequilibria, since in the long run money is neutral. Permanent shocks are

thus caused by structural problems requiring other policy responses than a change of the nominal exchange rate. Suppose Argentina faces a demand shock in its industrial sector because its products have become obsolete. Adjustment for this sector can hardly be eased by the means of an open capital account. For example, Brazilian banks would provide short-term loans for troubled Argentinean enterprise hoping that these enterprises would not default before the maturity of their debt (this would imply, for example, that the respective enterprises would have managed a fast and successful turn-around by introducing new products - compare 3.2.2.1.1). In such a case, default risk could be reduced by devaluation, thus, reducing the Argentinean product prices or alternatively structural changes as product innovation could be envisaged, which would probably be a mid- to long-term strategy.

It can be assumed that changes (shocks) in productivity are not fully transmitted to product prices. This is even more so, if a high degree of wage indexation prevails. In such an environment productivity changes are likely to cause changes in the real exchange rate. Ongoing real appreciation will therefore put increasing pressure on the nominal exchange rate requiring occasional devaluations.

All in all, a brief overview of real disturbances possibly requiring the exchange rate instrument for adjustment has just been presented. Nonetheless, it cannot be taken for granted that such shocks will definitely occur. If in the past the Argentinean dairy industry was hit by a negative exogenous demand shock stemming from Brazil, this must not necessarily be the case in the future. Historicist assumptions should thus be avoided.

### 3.2.1.3 Monetary Shocks

OCA Theory is widely associated with shocks originating from the goods market.<sup>21</sup> In the real world monetary shocks are common as well. In particular, in countries with less sound financial and monetary management, monetary shocks are an important source of disturbances. Leaving aside the assumptions of an emerging economy, as in the case of Argentina and Brazil, assume that the authorities are prone to use the instruments of inflation tax and devaluations excessively. In such a setting, where monetary shocks to the economy prevail, a fixed exchange rate will represent a more ideal instrument than the flexible exchange rate for stabilizing the economy.<sup>22,23</sup> In a Mundell-Fleming world, with perfect capital mobility, the nominal interest rate is given exogenously and assumed to be constant, which implies a constant expected rate of exchange rate depreciation. Consequently the fixed exchange rate is the appropriate tool for limiting shocks to the money market.

## 3.2.2 Predominantly Temporary Real Shocks

Under a flexible exchange rate regime monetary policy constitutes the optimal policy instrument in a Mundell-Fleming world in the short run. The consideration of the monetary policy instrument under a flexible exchange regime in a portfolio balance model under static and under rational expectations did not only establish a link between the price level and the exchange rate, but also demonstrated the phenomenon of exchange rate overshooting.<sup>24</sup> In addition, the introduction of rational expectations yielded the monetary policy instrument, in case of an anticipated monetary expansion, relative to the static MF model much less effective in

---

<sup>21</sup> This view goes back to the traditional approaches of the OCA theory as presented in section 3.2.2.

<sup>22</sup> Compare Buitert(1999a, p. 26).

<sup>23</sup> Ricci(1997, p. 34) formalized an OCA model where one criterion is the negative correlation of monetary disturbances.

<sup>24</sup> Advocates of fixed exchange rates allege the phenomenon of overshooting of introducing additional volatility into the exchange rate.

terms of output.<sup>25</sup> In the middle and in the long-term, other than temporary shocks, for instance, productivity differentials may create demand for adjustment. These findings should change the way traditional approaches to OCA theory are seen. The traditional approaches to OCA theory are presented in the following subsection.

### 3.2.2.1 A Temporary Demand Shift from Argentina to Brazil – The Mundellian Approach to OCA Theory

Assume a Mundell-Fleming world. There happens to be a demand shift away from Argentinean to Brazilian products (a negative real disturbance to the Argentinean economy). Again, perfectly mobile capital is assumed. Overall demand for Argentinean goods has decreased, which in turn will exert downward pressure on income and output. Reduced money demand will bring about a decrease in the domestic interest rate (the  $RR$  schedule – the goods market equilibrium - shifts to the left and theoretically the new equilibrium between the goods and the money market could be found at  $E'$ ). The interest differential will cause capital to flow out.<sup>26</sup> Balance of payments turns negative.  $E'$  lies south of the  $BB$  schedule – balance of payments equilibrium - that is identical to the foreign interest rate axis, and the exchange rate will depreciate. This depreciation will cause the  $RR$  schedule to move left again and restore equilibrium.

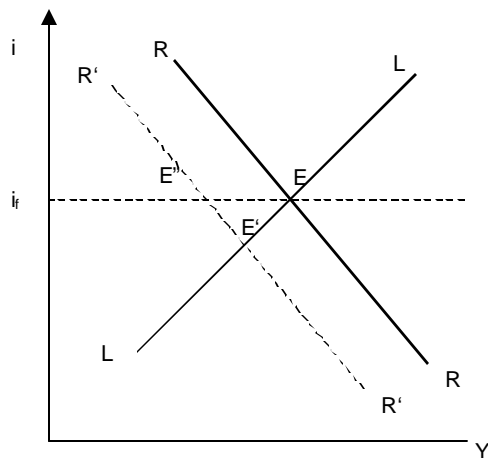


Diagram 3-2: Real disturbance in a static Mundell-Fleming model with perfect capital mobility under a flexible exchange rate regime

What would happen, if the exchange rate were fixed? Again, reduced money demand would lead to a decreased domestic interest rate provoking capital outflows. Monetary authorities would have to intervene by buying domestic currency. However, these interventions are only effective in the very short run without being able to maintain a lower interest rate for increasing the output. Thus, the monetary authorities have no control over the money stock (under the assumption of no sterilization). The  $RR$  schedule would shift to the left as a consequence of the shrunken real money base. Since the domestic interest rate cannot stay below the international interest rate and the current account balance cannot improve, output and income will be further reduced finding new equilibrium in  $E''$ .

A very similar setting served Mundell(1961) to develop his seminal approach to the OCA theory. Before addressing his approach the underlying assumptions will be presented:

<sup>25</sup> In developing/emerging countries devaluations may even prove to exert a depressing effect on output (compare – inter alia – Lizondo and Montiel, 1989; Agènor and Montiel, 1996, pp. 248).

<sup>26</sup> Because of the interest rate differential.

- Contrary to the MF model no distinction between the use of the monetary and fiscal policy instruments was made. He sees both instruments generally as one aggregate demand management.
- A flexible exchange rate always balances internal and external disequilibrium. The exchange rate instrument works efficiently, as well as, effectively.
- Wages and prices are rigid (like in the MF model).
- Factors like capital and labor are internally mobile and externally immobile.
- The three objectives of price stability, full employment and external balance have to be achieved simultaneously.
- No distinction between permanent and temporary shocks are made.

Mundell's approach to the OCA theory is as follows: Suppose Argentina and Brazil formed a monetary union. As before a demand shift from Argentinean to Brazilian products would occur. Zero capital mobility is assumed. Argentina would run a current account deficit and output would decrease. If the Brazilian authorities were unwilling to increase inflation (they would not lower their interest rate),<sup>27</sup> Argentina would suffer the full consequences of the demand shift, that is, output would decrease at the expense of employment. For restoring internal and external equilibrium alternative instruments for adjustment would be needed. The alternative instrument proposed by Mundell, was factor mobility.

#### 3.2.2.1.1 Capital Mobility

In the MF model (see above), full capital mobility was assumed. Interest rate differences between countries possessing an open capital account would be arbitrated within a relatively short period of time. Thus, the interest rate at best can be used for attracting capital inflows temporarily. As soon as the interest rate is forced back to the international level of the interest rate these inflows would stop, and they would revert again. As a relatively short period of time is considered, it is extremely unlikely that the demand shift would have been reverted or the current account, by any other means, would have been equilibrated.<sup>28</sup>

(De Grauwe, 1989, pp. 138) makes the point by using a model of Ricardian equivalence with imperfect foresight that the cumulative current account position might influence the interest rate in such a way that increasing default risk would drive up the interest rate in terms of a risk premium. This phenomenon is often found in developing countries.<sup>29</sup> The mechanism of equilibrating capital flows might prove non-existent or at least asymmetrical. Add a high degree of external indebtedness to the previously presented demand shift from Argentina. Fearing default risk, foreign investors are likely to withdraw their short-term capital from the Argentinean financial system. Subsequently pressure toward devaluation will evolve. In the presence of a weak financial system the government would have to bail out the banks. As a

---

<sup>27</sup> In the real world a comparable case was the dominant role of Germany within the European Monetary System (EMS) at the beginning of the nineties. Germany, who faced a boom that was motivated by the unification of the former Eastern Germany and the Federal Republic of Germany raised its interest rate. This interest rise had negative repercussions in terms of output on the rest of the EMS members.

<sup>28</sup> The reason for such deficit financing can be found in Eichengreen(1990, p. 143). Accordingly in a monetary union – under both types of monetary integration: fixed exchange rates and a single currency – these capital flows would work powerfully. Devaluation risk in the presence of a balance-of-payments crisis would be foregone. Consequently, investors would not incur the risk of capital loss. Even, if such a scenario would correspond to reality, the economy or region concerned would suffer higher interest rate payments; putting a further strain on economic activity.

<sup>29</sup> Developing economies are often characterized by a weaker financial system (i.e. due to private financial mismanagement and inadequate supervision). Even the liquidity of the treasury might not be guaranteed.

consequence the government itself would be forced to assume a short foreign-currency position in order to avoid a collapse of the domestic banking system. Hence, the government runs short of foreign exchange reserves putting a constraint on borrowing in the world credit markets (Obstfeld, 1998, p. 26).<sup>30</sup>

The above described capital movements do reflect changes in the fundamental variables. Adverse short-term capital movements, however, might even occur in the absence of the deterioration of the Argentina's current account. Assume that instead of Argentina, Brazil is hit by an exogenous demand disturbance, resulting from the European Union. Brazil's accumulated current account situation is assumed to be highly negative, not so Argentina's. Now Foreign investors might not only withdraw short-term capital from Brazil but also from Argentina as the result of so called '*herd behavior*'. Such behavior occurs if investors diversify widely without worrying about information, since it does not pay for them to become more thoroughly informed. Hence, they are merely following others reinforcing the volatility of capital flows (Calvo and Mendoza, 1997).

So far short-term capital movements were indicated, which were motivated within the private sector. Theoretically, a fiscal transfer between members of a monetary union could provide an alternate adjustment mechanism.<sup>31</sup> In the traditional Mundell-Fleming model under perfect capital mobility and a fixed exchange rate the monetary policy instrument becomes absolutely ineffective. Only fiscal policy remains as the sole effective policy instrument. The demand shift modeled at the beginning of 3.2.2.1 could now be helped by transferring public funds from Brazil to Argentina. Argentina would not have to reduce its public spending drastically and pressure on real wages, as without these transfers. It has been stressed before, that a temporary demand shift is considered.

Hence, if a distinction between stabilizing and redistributive flows is made, it is the former that would (partially) eliminate temporary imbalances. The latter provides long term adjustment resulting from structural differences within the regions or economies (Bayoumi and Masson, 1994).<sup>32</sup> This mechanism of fiscal federalism proves to be quite problematic for already developed economies forming a monetary union. The European Economic and Monetary Union (EMU) does not have powerful stabilizing flow mechanisms, nor are redistributive flows of significance relative to GDP per-capita. Considerations of national sovereignty represent the main barrier for the setting up of a mechanism that transfers funds from one sovereign nation to the other. Regarding developing/emerging countries the establishment of such a mechanism seems even less likely. Tax collection usually works less efficiently and effectively compared to more developed economies, thus, putting fiscal income on a relatively less solid base. In conclusion, if fiscal income already represents a relatively '*scarce good*' within an economy, it is illusory to think of fiscal transfers between national economies.<sup>33</sup>

---

<sup>30</sup> Government stands here for either the central bank or for the treasury; e.g., it is the French Treasury who fulfills the function as a lender of last resort for the African central banks of the CFA-Franc zone (Berrigan and Carré, 1997).

<sup>31</sup> Various works try to shed light on the implications of fiscal flows for monetary unions, inter alia, Eichengreen and von Hagen(1995), and Dornbusch(1997).

<sup>32</sup> Taking the European Union as a reference, redistributive flows would correspond, inter alia, with the so called '*Cohesion Funds*'. Bayoumi and Masson(1994) report that in the EU a decline of approximately 1 US \$ in national income is compensated for by an increase of US \$0.03 of the structural funds for the period of 1989 to 1993. Stabilizing transfers are almost negligible in the EU. In Canada and in the US redistributive flows compensate US \$ 0.39 and US \$ 0.22 respectively for a 1\$ decrease in per capita income.

<sup>33</sup> When considering long-term capital movements in a small open economy the equation for the trade balance or net foreign investment respectively for Argentina and Brazil can be written:

$$S_A - I_A = NX$$

$$S_B - I_B = -NX$$

### 3.2.2.1.2 Labor Mobility

Besides capital, labor represents the other factor facilitating adjustment according to Mundell (1961, p. 664).<sup>34</sup> The demand shift from Argentina to Brazil results into an increased demand for labor in the latter country. Assume an internationally mobile labor force in Argentina. In the presence of higher unemployment, Argentinean workers are prepared to move to Brazil, satisfying augmented Brazilian labor demand. The Argentinean current account would again tend toward equilibrium, since less Brazilian exports to Argentina would be demanded, by a then shrunken Argentinean labor force. By analogy, emigrated Argentineans (to Brazil) would transform a part of the former Argentinean export demand into the Brazilian domestic demand.

Assume the demand shift in question would put a temporary strain on the Argentinean current account only. Thereafter, the Argentinean current account would turn positive, as the demand shift would have reverted. Then if labor mobility were the only adjustment mechanism, the previously emigrated Argentinean workers would need to return to their home country in order to restore equilibrium between the two countries again. Thus, for balancing temporary shocks at least one of the two countries requires a mobile labor force, who move according to the state of the current account balance. That is, migration in theory would need to be 'reversible'.<sup>35</sup> Nevertheless, labor cannot move as easily, as for instance, capital since labor migration imposes social and cultural costs (e.g. language and different way of thinking). Moreover, labor demand in one country would have to coincide with the expelled labor force of the other country and vice versa, a requisite unlikely to be found in reality..<sup>36</sup>

### 3.2.2.1.3 Wage Flexibility

As just seen the case was made against labor mobility as a means of adjustment. In contrast, wage flexibility seems to be a working adjustment mechanism found more often in reality. As before rigid wages are assumed. An extension to the MF model allowing for flexible wages will be presented. The real demand equation takes the following form (Argy, 1994, pp. 85):<sup>37</sup>

$$y_d = d(y, r, i) + x(r) \quad (3-1)$$

Real domestic demand and demand for exports is now a function of the real exchange rate ( $r = e - p_d$ ).<sup>38</sup>

$$X(r) - rm(y, i, r) + K(i) = 0 \quad (3-2)$$

The same applies to the balance of payments equation. Further a variable, the price level  $p$ , is added to the money demand function. Thus, the money market takes the following form:

---

If at the same time when Argentina suffers the negative demand shock, incentives to saving  $S_A$  are less relative to investment  $I_A$  and the reverse development can be observed for Brazil; the current account of Argentina would continue to deteriorate. Again, under the assumption of rigid wages and rigid prices unemployment in Argentina would increase (Fleming, 1971).

<sup>34</sup> However, Mundell(1961) does not clearly distinguish between the two factors labor and capital in his analysis.

<sup>35</sup> This reasoning can be found in Buiters(1995, p. 30) and Ricci(1997, p. 25).

<sup>36</sup> When considering asymmetrical cyclical movements, labor force is thus required to respond to migration movements at cyclical frequencies.

<sup>37</sup> As a recognized study EG Kommission(1990) is one of the first to refer to real wage flexibility in the context of the OCA Theory. Mundell(1961) assumed rigid wages. Compare assumptions in 3.2.2.1.

<sup>38</sup> The variables of this equation are denoted in logarithms.

$$M^*=L(y,i,p_d) \quad (3-3)$$

The major change to a simple MF model is that the real aggregate supply is modeled. With technology fixed and a given stock of capital, output will depend negatively on the real wage  $wr$ .

$$y_s=s(wr) \quad (3-4)$$

The consumer price index depends positively on the domestic price level  $p_d$  and positively on the nominal exchange rate  $e$  also.

$$p=p(p_d,e) \quad (3-5)$$

The wage rate is a function of the consumer prices. This equation is written in logarithms. The nominal wage rate is linked over the degree of wage indexation to the changes in the general price level  $p$ .

$$w=\mathbf{P} \quad (3-6)$$

Finally, real aggregate supply denotes:

$$y_s=y_s(p_d,\mathbf{P}e) \quad (3-7)$$

Equilibrium in the goods market is then established by:

$$y_s=y_d \quad (3-8)$$

If the degree of wage indexation were set at 0 in equation ( 3-6 ), equation ( 3-7 ) could be changed to  $y_s=y_s(p_d)$ . Further, it could be assumed that prices in this equation were fixed. Next, if the capital account were completely open, the same set of assumption, as in the MF model, would prevail. Assuming full wage indexation (completely flexible nominal wages) would render monetary policy completely ineffective, regardless of the degree of capital mobility.<sup>39</sup> Moreover, the real exchange rate would remain unchanged.

More interesting, is the case of flexible real wages under a fixed exchange rate regime. Assume the same demand shift as in Diagram 3-2. Resulting from lower income and output the *RR* schedule will shift to the left. If prices were fixed, the *LL* schedule would also move to the left as to establish new equilibrium in *E''*. The flexible price assumption would allow producers to reduce real wages - nominal wages would have to grow slower than the domestic price – this way a real depreciation could take place without having to alter the nominal exchange rate.

### 3.2.2.2 Openness of the Economy and Stability of the Domestic Price Level

It was only a question of time until Mundell's approach was challenged by others. McKinnon(1963) introduced additional to the criterion of factor mobility the one of openness. Suppose Argentina was a small extremely open economy.<sup>40</sup> Openness is defined in terms of the

---

<sup>39</sup> Zero capital mobility, as assumed by Mundell(1969) for his OCA approach, yields the same result. Regarding fiscal policy with zero capital mobility in the extended MF model, fiscal policy becomes completely ineffective, too. Fiscal policy will become more effective, the more the capital account opens.

<sup>40</sup> This criterion is now almost common sense and part of many textbooks, for example, "In general the smaller the region the higher the marginal propensity to import will be - an unsurprising proposition. But from this

share of tradables (as the sum of importables and exportables) of the total product of an economy. As before assume that Argentina is hit by an external demand shock. If Argentina now devalued, the effects on output would be limited, if present at all. Recall equation ( 3-5 ). In an extremely open economy the general price level is dominated by the import prices represented in this equation by the nominal exchange rate  $e$ . The probability of wage illusion in such an open economy is negligibly small. Thus, adjustment could not be facilitated via the wage channel nor via the nominal exchange rate. The exchange rate instrument in such an economy becomes obsolete. The structuralist school made a somewhat differing but still relatively similar point, in the context of developing countries.<sup>41</sup> How could this economy restore equilibrium then? Only by the means of fiscal policy. The government could, for example, reduce its real expenditure, which should result in an improvement of the balance of payments.

However, a prerequisite for abolishing a flexible exchange rate regime would be that “*Price stability prevails in the rest of the world*” (Ishiyama, 1975, p. 352). If the main trade partners exhibited volatile price levels or frequently used the exchange rate instrument, they would also export volatility to the domestic economy. Therefore, in a highly volatile environment flexible exchange rates could be of some utility for small open economies in order to insulate them from exogenous shocks.

### 3.2.2.3 *More Than Two Goods – A Diversified Economy*

Up to now just two-good economies were considered, goods that were exported, goods that were imported and when dealing with the quantitative model a distinction between a traded and a non-traded goods sector was also made. Nonetheless, in reality an economy will produce more than one product at a time, which it exports. As before a demand shift from Argentina to Brazil is assumed. In addition, the Argentinean economy now produces ten products. The assumed demand shift affects but a single export product that represents a tenth of total exports. Simply by “*the law of large numbers*” the effect on the balance of payments will be much reduced compared to the single product economy (Kenen, 1967, p. 49). As a result, the exchange rate instrument for restoring external and internal balance is comparatively less needed.

In addition, if Argentina were even more diversified - if it produced additional 10 import competing products - and even its major export products were affected by an exogenous demand disturbance, the downward pressure on economic activity would not be as pronounced as without a diversified import-competing goods sector. Suppose the import-competing sector's elasticity of labor demand with respect to real wages were high. This sector would now possess the ability to absorb the unemployed workers of the export sector; all the more so, if the link between investment and exports is considered. Greater diversity might help to stabilize capital formation. As with exports, variations in investment might average out by the law of large numbers.<sup>42</sup>

What might be puzzling, is that more diversified economies tend to be large and

---

*it follows that the smaller the region the easier it will be for that region to adjust to external shocks by relatively acceptable changes in real incomes and wealth, without having to rely on relative price changes: whereas large, self-sufficient regions would have to undertake massive shifts in incomes (wealth) to maintain external equilibrium, in the absence of relative price changes.”(Goodhart, 1989, pp. 393).*

<sup>41</sup> They argue that, under the assumption of imperfectly substitutable domestic and foreign assets, devaluation triggers wage increases through the imported input channel that in turn augments credit demand, therefore increasing domestic interest rates and depressing domestic output.

<sup>42</sup> The validity of this link was questioned by Kenen(1967, pp. 52) himself. Investment depends, inter alia, on the perception of the investors. If they perceive a decrease of external demand only as temporary, they might not reduce domestic investment. However, it could also be the other way round.

typically are thus assumed to be rather closed economies. This would allow for a flexible exchange rate regime, as was stated in 3.2.2.2. This puzzle can be resolved by analyzing the nature of the trade, inter- or intra-industry trade. A high degree of intra-industry trade will conflict less with a high degree of openness of a large economy.<sup>43</sup>

#### 3.2.2.4 Similarity of Inflation Rates

Another relevant criterion for determining the optimality of a currency area is the similarity of inflation rates. Although this criterion was less renowned in the traditional optimum currency area theory it is subject to academic debate.<sup>44</sup> Take the two countries Argentina and Brazil. Assume, labor productivity in Brazil is significantly higher than in Argentina, and Brazilian unions are relatively weak. Thus, increased labor productivity is neither fully translated into wage increases nor to the price level. Changes in the real exchange rate would result; therefore increasing the pressure toward a nominal appreciation of Brazilian currency versus the Argentinean one. Bilateral imbalances favoring Brazil would result. Under these conditions the respective two countries would not represent ideal candidates for forming a monetary union. The criterion of the similarity of inflation rates was introduced by Haberler(1970) and by Fleming(1971, pp. 476). The latter identified three factors determining the level of inflation: (1) similar objectives in national unemployment; (2) similar productivity growth rates; (3) similarity of union behavior regarding wages. Not all of the three points have to be fulfilled simultaneously. If one of these points is not fulfilled it might be compensated by the other two points. For example, Brazil displays a significantly higher productivity growth rate than Argentina. If the Argentinean unions proved to be less aggressive regarding their wage claims, or the Argentinean government were inclined to accept increased rates of unemployment, the relatively lower Argentinean productivity growth could be compensated for.

Traditional OCA theory offers additional criteria for analyzing currency areas that will not be covered in depth here.<sup>45</sup> These are '*Degree of Financial Integration*', which in part has been covered by 3.2.2.1.1., and the '*Degree of Policy Integration*'. Tower and Willett(1976, pp. 15) defined policy integration as the extent of agreement over the position on the Philips Curve.

**THESIS 5: If optimum currency area criteria derived from the traditional approaches to optimum currency area are not satisfied, it cannot be concluded that the respective currency area is not optimal. The MERCOSUR countries do not, or only to a limited extent, fulfill these criteria. Within the context of MERCOSUR these criteria suffer serious caveats, theoretically as well as empirically.**

#### 3.2.3 The New OCA Theory

Traditional approaches to OCA theory presented in the previous section lost much of their appeal, inter alia, due to their mistaken assumptions regarding the effectiveness of the

---

<sup>43</sup> The findings of the '*new*' trade theory, that not only goods are traded when a country possesses a comparative advantage, but also that differentiated goods are traded (intra-industry trade) added a further aspect to OCA theory. Countries possessing a high share of intra-industry trade are more likely to face a symmetrical shock, since it is more probable that similar products will be affected by the same disturbance. Compare also 3.2.3.1.

<sup>44</sup> While the previously listed criteria focus on adjustment to predominantly temporary disturbances the latter criterion envisages rather permanent disturbances, for example lasting productivity shocks.

<sup>45</sup> For an overview see Ishiyama(1975, pp. 354).

exchange rate as an adjustment instrument and due to the fact that they took into account just a limited range of shocks affecting an economy. Some of the traditional approaches did not distinguish between a fixed exchange rate and a common currency. It was assumed that economies could choose freely a point on the Philips curve. Different economic models were employed. Two-country models rather than three-country models were applied. If two countries were to join a monetary union, adjustment costs in terms of a fixed bilateral exchange rate between these two countries were analyzed. It was not usually analyzed how adjustment of these two countries vis-à-vis the rest of the world worked.<sup>46</sup>

Besides these caveats other findings in economic theory have further questioned the validity of the traditional approaches to OCA theory. The endogeneity of some of the OCA criteria suggests that a non-optimal currency area can become one. In the developing/emerging country context the endogeneity approach can be twofold. In the past, many of the developing/emerging countries have been characterized, inter alia, by a series of asymmetrical endogenous policy shocks. It may prove difficult in a group of developing/emerging countries intending to create a monetary union to remove the source(s) these shocks. Only in a second step the conventional discussion on the endogeneity of OCA criteria, as discussed in 3.2.3.2, will be of importance. Time inconsistency literature demonstrated that a formerly high inflation economy can join a monetary union with the objective of price stability without too much adjustment cost. However, the question remains what to do, if none of the prospective monetary union members can look back to a '*conservative*' central bank policy. Does it make sense to import credibility from somewhere else?

### 3.2.3.1 *Endogeneity of the OCA Criteria*

Dynamic considerations regarding the creation of a monetary union have been left out until now. Suppose MERCOSUR, with Argentina and Brazil, achieved the stage of a common market. All the car production would now – after a concentration process – be located in and around Sao Paulo and Rio de Janeiro. If the car sector faced an external demand shock, only the two respective states would be affected. This industry-specific shock would be of an asymmetrical nature, which had not been the case before this assumed concentration process. This point was made by Krugman (1991).<sup>47</sup> However, considering developing countries, regional concentration has to be considered in an additional context. In developing countries with strong regional differences in terms of concentration the question has to be asked whether concentration on the national scale is more important than concentration, and possible changes of concentration, on the regional scale.

Empirically Krugman's assumptions have not been confirmed. On the contrary, a small number of empirical studies suggests that in the most recent undertaking of an economic and monetary union project (EMU) the criterion of shock correlation exhibits endogeneity. Increased trade integration resulted in an increase of intra-industry trade, augmenting the correlation of the respective business cycles setting off (at least to a certain extent) emphasized asymmetrical shocks, resulting from increased specialization in trade. Two examples are Frankel and

---

<sup>46</sup> For the last point also compare Mèlitz(1995, p. 493). In addition, this article provides a critical view on the traditional approaches to optimum currency area, as well as on the '*new*' OCA theory.

<sup>47</sup> Picking up the core-periphery issue Krugman(1991) models two regions, each disposing of a manufacturing and an agricultural sector. Only the working force of the manufacturing sector can move. And only manufactured goods face transportation costs. He confirms, analytically, that the region with the larger manufacture sector will attract even more workers due to its, by tendency, higher nominal wages. Moreover, an additional effect on real wages exists, since the larger market will offer relatively cheaper products. Opposing these trends is that workers in the region with the smaller manufacture market will face less competition. Under the assumption of either low transportation costs and/or economies of scale and/or a relatively large manufacturing sector the former trend will dominate and attract even more workers to its manufacturing sector.

Rose(1996) and Artis et al. (1999).

(1) Frankel and Rose(1996) regress the correlation of the business cycles on the degree of openness finding a clearly positive correlation between the two variables. It is important, however, to consider the time interval of the analyzed series. Economic data from 21 'old industrial economies', with emphasis on members of the European Union, from the year 1959 to 1993 was divided into four subsets of equal size. Thus, a relatively lengthy time span was analyzed suggesting that the effects of increased trade integration and consequently the degree of openness will take its time until it brings business cycles into a more equal pace. Moreover, the study does not refer exclusively to the endogeneity of the exchange rate regime, but also to the effects of a deepening trade integration. The link between the effects of the exchange rate regime, trade integration and business cycles is somewhat blurred. First, the exchange rate regimes changed over the time period analyzed. Fixed exchange rates date back to the Bretton Woods arrangement. Its abandonment was followed by an era of flexible exchange rates until the European Monetary System was introduced in 1979. Thereafter exchange rate bands were in operation until the members of Economic and Monetary Union fixed their exchange rates in 1998. Trade integration in the then European Economic Community started in 1959.<sup>48</sup> Trade structure (assumedly) and the degree of openness started to change from the beginning of the time series analyzed. Thus, the results of this study have to be seen in the context of changes in the exchange rate regime and changes in the degree of trade integration.

(2) Artis et al. (1999) find, by the means of a time domain analysis, using three different filter methods (centered seven-term-moving average, Hodrick-Prescott filter and an unobserved-component model) that the cross correlation of 8 European Union members with Germany vis-à-vis the US has increased after the implementation of the ERM. Frequency domain statistics deliver similar results. This study, however, does not imply endogeneity of the business cycles as does the foregoing one. It simply shows changes of the correlation of some business cycles and their contribution to a single European business cycle.

Both studies analyze a very limited set of variables like the degree of openness and variables indicating economic activity (GDP, industrial production and unemployment). Disaggregated data delivering some information about the trade structure and how it changed was not applied, although such a setting would have been even more interesting from the point of view of OCA theory.

**THESIS 6: Integration of trade will probably increase the degree of trade openness and therefore lead to a higher degree of symmetry of shocks. In MERCOSUR the customs union is not yet perfectly implemented, and it was created just several years ago. With further trade integration, a further increase in intra-trade and less asymmetrical shocks to the trading bloc are likely.**

Nonetheless, evidence exists that a region, that before the start of an economic integration project, was less of an optimum currency area can over time become one. This view fundamentally changes the way optimum currency area is looked at. But even the latter approach faces some limitations. It is unknown how fast trade structure and openness within a

---

<sup>48</sup> The preliminary stage of tariff reductions following the Treaty of Rome went into operation in January 1959. Tariffs were reduced 10% and import quotas augmented 20% (Urwin, 1991, p. 85).

monetary union will change. Further, it is uncertain which degree of trade integration (unilateral reduction of tariffs, customs union, common market, etc.) will influence the degree of openness and the change in trade structure most.

### 3.2.3.2 *Endogeneity of the Optimum Currency Area Criteria, Monetary Union and the Degree of Political Integration*

Political affinity, if not to say unity, of potential members of any economic integration scheme represents a prerequisite for successful integration projects. In most of the OCA literature economics is strictly separated from political considerations. However, the findings that OCA criteria can change endogenously, that is, they can be influenced by political agreements deserves a brief analysis. The relevance of political integration for monetary union can be illustrated by the following two scenarios.

(1) Supposing Argentina and Brazil, are not in the sense of the traditional OCA theory, an optimal currency area due to either a limited degree of trade openness or due to more or less frequent asymmetrical external shocks. A high degree of political cohesion between the two economies prevails and economic integration deepens gradually from a customs union to a common market over time without too many tensions, and a common political intention of establishing a monetary union will exist. The potential members are formally disposed to relinquish national sovereignty over monetary policy and will create supranational institutions assuming the conduct of a common monetary policy.

(2) Assume that both countries now form a close to optimal currency area in the sense of traditional OCA theory. However, economic integration has not deepened very much - it is stuck in a customs union and no power has been deferred to supranational institutions - and a low degree of political cohesion predominates the political arena. Although common agreement regarding fixing the nominal exchange exists, political commitment seems to be at best temporary and rather vague.

Even on intuitive grounds one would not bet, despite the optimality of the currency area, on the second option being a good basis for the creation of a monetary union. Thus, it is essential to include political considerations into the analysis, whilst thinking about the creation of a monetary union. De Grauwe(1984) puts it even more stringently: *„Therefore, it is utopian to separate the problem of monetary union from political unification... Monetary union is an essential part of political union.“*<sup>49</sup>

The proposition of accompanying monetary union by political union, since political union serves as *‘adhesive’* for monetary union, is an appealing proposition. In practice this would mean formerly sovereign nations would have to bundle up their political institutions to one single entity foregoing national political sovereignty. The participants in EMU opted for an intermediate concept: full monetary union and the centralizing of monetary authority to the European Central Bank. Fiscal policy remained in national hands, although the Stability Pact

---

<sup>49</sup> An in-depth analysis regarding political factors influencing the creation and continuity of monetary unions can be found in Theurl(1992, pp. 291). Important theses are: (1) Political visions and their marketing are essential in providing momentum to deepening integration. (2) Left sovereignty to the member states of an integration scheme bears potential for intra-union conflicts, thus, jeopardizing a smooth continuance of an integration project. (3) Money has never ceased to be political. (4) Missing coordination rules in the monetary unions of the 19<sup>th</sup> century, lead to the existence of temporary disequilibria, the infringement of agreements and also to the dissolution of monetary unions. (5) Adjustment processes in past monetary unions often lead to the dissolution of monetary unions based on inter-government institutions and international law.

prescribes some fiscal rules for the EU members. If central banks of emerging countries were judged on the basis of their institutional convergence many of them would have accelerated their pace of increasing the degree of independence, constituting an important ingredient for augmenting credibility for monetary policy and eventually providing the basis for further convergence of monetary policy.

**THESIS 9: The establishment of a common central bank with the principle objective of price level stability requires a bundle of rules and measures, inter alia, the guarantee of the independence of the national central banks that represent the predecessors of the common central bank. The central banks of the MERCOSUR countries have already shown accelerating convergence in their degree of independence in recent years.**

### 3.2.3.3 *Time Inconsistency, Stabilization and Monetary Union*

The deliberate use of the exchange rate instrument in the absence of wage illusion is likely to increase inflation. In addition, even negative effects on output are possible. In fact such preconditions already limit the use of this policy tool. Furthermore, the time-inconsistency literature demonstrates that economic agents apply optimal strategies as a response to the strategic behavior of the authorities. Consequently, the private sector possesses the ability to limit the effectiveness of discretionary policies by the authorities even more. The basic insight of this approach is that a high inflation country can by pegging its exchange rate credibly to one of a low inflation country reduce its inflation rate without too much cost in terms of unemployment or contraction of output.

Usually three scenarios are modeled: (1) The authorities undertake policy actions in a discretionary manner. Assume the Brazilian government decides to increase the inflation rate in order to augment real economic activity. Since the private agents expect the Brazilian government to do this, they will offset the resulting monetary expansion by increasing their wage claims. The effect on the economic activity will be limited or null.<sup>50</sup> A possible reduction of the real stock of the nominal debt will be frustrated, too. Seignorage gains, however, can be obtained by the government. (2) The Brazilian authorities announce a rule for a fixed inflation rate that is below the current one and they stick to it. Private agents believe the government. There will be no loss in terms of a decreased economic activity or increased unemployment (mid and long term) (3) The Brazilian authorities announce a rule, as they did in (2). Now, they renege on the commitment and cheat the private agents by a unexpected inflation. Economic activity will be increased in the short term and welfare will be the highest within this option. Nonetheless, the loss in credibility is not taken into account. If the scenario of a repeated game is introduced, a punishment function comes into play. Cheating the private agents is associated with costs. The government has to take into account that by reneging its commitment it will not be able to make the rule under (2) or (3) credible in the following period. The authorities know that "*cheating cannot occur systematically*" (Barro and Gordon, 1983, p. 113). Consequently the government will weigh the costs of adopting a discretionary policy (enforcement) in the future against the gains of cheating (temptation) with unexpected inflation. What the equilibrium

---

<sup>50</sup> Some economists in the 60ies and 70ies (for instance, Tower and Willett, 1976, p. 26) supposed that the unemployment-inflation trade-off was valid in the long run. Today every economic textbook shows that this trade-off is valid only short term. Furthermore, a natural rate of unemployment is assumed which persists independently of monetary disturbances. Changes in the natural rate over time are possible due to supply shocks, demographic changes, changes in fiscal policy, etc.

will be like depends on various factors: The higher the inflation rate is, that the rule describes, the less costly the loss of reputation is. If inflation is not very costly the rate prescribed by the rule has to be high.<sup>51</sup>

The Barro-Gordon framework can be extended to the open economy by adding the real exchange rate to the model (compare Giavazzi and Pagano, 1988). By credibly committing to an exchange rate rule an economy can reduce its rate of inflation without incurring too much cost. If an economy admits a relative increase in its rate of inflation, it will be punished anyway by an appreciating real exchange rate. However the type of commitment to the exchange rate rule will in the end influence on its credibility. “..., *merely fixing the exchange rate does not solve the problem, because the fixed exchange rate rule is no more credible than a fixed inflation rate rule*” (De Grauwe, 1992, p. 53). Examples, where this exchange rate rule lacked credibility are numerous in the context of Latin American economies. Fixed exchange rate regimes often suffered speculative attacks. Klein and Marion (1996) analyzed the duration of currency pegs in a group of 17 mainly Latin American countries. The mean duration of a currency peg did not exceed 32 months.<sup>52</sup> Thus, as the past shows (and empirical literature), simply pegging to another exchange rate or to a basket will not deliver sufficient credibility. The possibility of a Krugman-like or self-fulfilling prophecy-type attack will persist as long there is a fixed or a close to fixed exchange rate one can speculate against. Thus, the instrument of a fixed exchange rate would represent an instrument for temporary stabilization<sup>53</sup> of an economy rather than considering such a solution for a durable exchange-rate union.

Thus, perfect credibility can only be achieved by the creation of a monetary union.<sup>54</sup> A monetary authority, that formerly had the reputation of assigning much weight to competitiveness/low unemployment, will be able to improve its reputation when entering a monetary union that has inherited its reputation from a ‘*conservative central banker*’. Imagine an economy with a floating exchange rate regime, a tight monetary policy in order to suppress significant inflation expectations due to a not too distant hyperinflationary past. If such an economy joined a monetary union as just described, it could not only reduce inflation credibly but also relieve the interest burden on its external debt.<sup>55</sup> Such a decrease in the interest rate

---

<sup>51</sup> Barro and Gordon (1983, p. 114) identify the following cases in which inflation is less costly: (1) in the presence of high natural unemployment rate (2) during a recession (3) facing a huge real stock of nominally denominated public debt.

<sup>52</sup> As one key determinant for the giving up of the fixed exchange rate, they could identify real appreciation. Another study by Martinez Peria(1997) demonstrates by means of a logit analysis that most forced devaluations in Latin America are of a Krugman-type. Bad fundamentals, as, for instance, foreign reserves, current account balance, domestic credit, overvalued exchange rates, etc. force the exchange rates out of fixity. The author, however, failed in operationalizing the credibility variables. The number of exits during the last 12 months and the durability in months of an exchange rate peg obviously do reflect the credibility effect only insufficiently. An alternative measure would be the indication of a simple loss of competitiveness in terms of an overvalued exchange rate. This condition obviously augments the likelihood of a future devaluation. Compare Agènor and Mélitz(1996, pp. 196).

<sup>53</sup> Exchange-rate based stabilization has often been implemented in Latin American economies, sometimes successfully and occasionally this type of stabilization attempt was deemed to failure. The probability of success augmented with the perceived commitment of the authorities to the rules and accompanying measures in the fiscal area. For various analysis on stabilization attempts see, inter alia, Bruno et al.(1988).

<sup>54</sup> A flexible exchange rate regime which is accompanied by consistent macroeconomic management can be perfectly credible, too. Nonetheless, in this work the viability of monetary union for a set of developing/emerging countries is analyzed.

<sup>55</sup> Of course this does not apply to any debt level. If the debt level is too high, the interest rate also reflects default risk, etc. This component, however, cannot be eliminated by a monetary union. Rather, if the high interest rate results from inflation expectations, augmented credibility through the joining of a monetary union will likely result into a reduced interest rate.

would be advantageous for the case that interest payments relative to debt payments are high, that is, a relatively low debt level.

In conclusion, an *'irrevocably fixed exchange rate'* ,as such, simply does not exist. Nonetheless, a fixed exchange rate proves a valuable stabilization instrument by which, at least over the short run, credibility can be *'imported'*. Only a monetary union-cum-unification of the currency will deliver perfect credibility and consequently be close to costless disinflation. If before joining a monetary union interest rates had been high, due to inflation expectations and, interest payments of foreign debt relative to debt repayment had been high, positive effects on the fiscal accounts may even occur.

#### 3.2.3.4 *The New OCA Theory in the Context of Developing/Emerging Countries*

Endogeneity of the OCA criteria may be judged differently in the context of developing/emerging countries. Continuous trade opening which tends to occur over several cycles and the simultaneous application of a single currency presuppose political coherence and economic cooperation, a constituent often lacking in developing/emerging countries. Endogeneity should thus be considered from the point of view of the establishment and sustainability of a common economic and monetary policy.

Time inconsistency in developing/emerging countries may acquire a different meaning compared with developed industrialized countries, too. If a group of developing/emerging countries wants to import credibility for its common central bank the question has to be permitted where they should import it from, if none of the national central banks have sufficient credibility.

##### 3.2.3.4.1 Preconditions for Endogeneity

Take a group of developing/emerging countries, which in the past have been fairly closed in terms of trade openness. Moreover, their economies are characterized by frequent endogenous policy shocks (besides symmetrical and asymmetrical exogenous shocks that for the current problem are of secondary order). If the argument of the endogeneity of the OCA criteria should be applied to them at least two central aspects have to be taken into account. (1) Although barriers to trade can be removed relatively fast, the adjustment of trade flows and trade structure will take some time. (2) Endogeneity presumes stable and coherent policies of the member states.

(1) Economies that formerly were relatively closed and that employed import-substitution programs will, despite having rapidly removed their barriers to trade, require some time to change their trade structure. Industries will have to adapt in order to compete on a regional scale and possibly on a global scale. Not only the structure of trade but also the level of trade flows will most likely increase. As a result fundamental equilibria are also likely to change. The direction of change cannot be predicted from the beginning. Therefore, some adjustment valves have to be provided until the new equilibria are established. It cannot be ruled out that at a transitional stage of an economic and monetary union the exchange rate mechanism provides an apt adjustment mechanism until the new equilibria are reached.

(2) The finding, that OCA criteria are endogenous, could be of a mixed blessing for developing/emerging countries. Many developing/emerging countries look back to a long period of negative endogenous policy shocks that resulted either from economic mismanagement or from subsequent stabilization attempts. This has several consequences for judging whether a group of developing/emerging countries forms an OCA or can become one. (a) If the respective countries are capable of successfully stabilizing their economies and capable of maintaining relatively consistent macroeconomic policies at a national level, an important source of

asymmetrical endogenous shocks can be removed, thus, rendering these countries more optimal for a common currency area.<sup>56</sup> (b) From an empirical point of view, the analysis of past shocks will be of little value, if the present and the future are characterized by more stable and consistent macroeconomic policies. In the past the cycles of these countries were superimposed by rather unpredictable endogenous policy shocks. If it is technically difficult or impossible to separate the endogenous policy shocks from the resting shocks the indicated analysis will be of little use.<sup>57</sup> Further, the judgement, whether cycles have converged or not due to economic and monetary integration efforts; the economy needs to have run through a series of cycles under, at best, a similar policy setting. (c) Assume formerly closed economies, that applied import-substitution programs and adhered to the '*hypothesis of conflict*' in order to be independent from the rest of the world, may find it relatively difficult to turn to more cooperative policy schemes. Firstly, they might have to concentrate on consolidating their formerly unstable economic and monetary policies. Secondly, they will have to establish a framework for new rules of cooperation. It will take time to negotiate and subsequently implement this framework. (d) In a similar way the reasoning goes that there is a long way from economic cooperation to setting up common political entities with common policy objectives. It will require less of an effort to agree on common central bank standards with regards to credibility of monetary policy than, for instance, cede sovereign rights to a supranational common central bank.

To conclude: there has to be a strong political will and strong political consensus for providing the necessary political-economical framework for successfully affecting OCA criteria, that is, providing stable, consistent and lasting common trade policies or even monetary policies in order to make cycles converge and render the respective region a more optimal currency area than it was before the application of the regional liberalization measures.

#### 3.2.3.4.2 Import of Credibility for a Common Central Bank of a Group of Developing/Emerging Countries

If a group of developing/merging countries decides to form a monetary union, usually none of their members can look back to a history of credibly pursued monetary policies. Thus, the benefit for one developing country to import the credibility of one another is likely to be low. The probability is low that one of the members has a long record as a '*conservative*' central banker that deserves tying one's hands to.<sup>58</sup>

A relatively intuitive answer to this problem would be tying the member countries hands that presumably face a credibility problem, to a '*conservative*' central banker outside the prospective monetary union. The probability is high that such a set-up would result in an

---

<sup>56</sup> In fact, the Brazilian maxi-devaluation seems worthy of discussion in the context of endogeneity. Under the assumption that large fiscal deficits resulted from economic mismanagement and the current account deficit from an overvalued currency that gave impetus to the maxi-devaluation, at least the large fiscal deficit could have been avoided by proper economic management without altering the exchange rate regime. Maybe the devaluation would not have occurred under a more convergent and consistent economic policy, e.g. more convergent fiscal policies. It seems to be – at least to some extent – as if the provision of a stable macroeconomic environment itself would render a currency area more optimal. One could speak, so to say, of a twofold endogeneity: one resulting, from trade opening and converging monetary policy, or one resulting from a stabilized economic environment.

<sup>57</sup> Further, it has to be taken into account that liberalization will change the behavior of the respective economies as well rendering again the analysis of past shocks less valuable.

<sup>58</sup> In the context of EMU the example of Germany and Italy is often given (compare, inter alia, De Grauwe, 1992, pp. 52). The German central bank has a reputation as a '*conservative*' central bank and the Italian central bank has a reputation as willing to inflate its currency bases for easing unemployment contrary to the German central bank. By the establishment of a European common central bank, Italy will benefit by importing the credibility of the German central bank without suffering too large adjustment costs.

asymmetrical monetary or exchange-rate union.<sup>59</sup> An asymmetrical monetary union may bring about higher credibility but at the same time exit may be more difficult, in case the monetary union proves to be non-optimal for the member countries. An exchange-rate union makes exit easier but may at the same time be less credible. It can, for instance, become subject to exchange rate speculations.

Closer to reality is - that if a group of developing/emerging countries is considered - that one of these countries (country A) has already tied its hands to a conservative central banker (country U) outside the prospective monetary union (for instance, for reasons of stabilizing the economy) and other developing/emerging countries of that prospective union have not (country B). At least two options become viable (1) A and U maintain the exchange-rate union and B joins the exchange-rate union and subsequently A and B enter a monetary union with U. Since U is assumedly a large economic entity, which is not interested ceding national sovereignty to a group of developing/emerging countries, the monetary union remains asymmetrical. (2a) A and U step back from the exchange-rate union. A credibility loss for A and thus a currency crisis may result.<sup>60</sup> A and B may gradually try to build up the credibility of their national central banks and then form a monetary union. (2b) Country A exits from the exchange-rate union with U. Subsequently A and B establish a band with a currency basket representing the weights of their most important trading partners, thus, importing credibility by this means, and as a third step form a monetary union with a common central bank. In this case the credibility loss of A when exiting the exchange-rate union with U, may be less severe since A and also B immediately enter into a new exchange-rate arrangement, possibly rendering increased credibility. However, the peg to a currency basket may be subject to exchange rate speculations at least in the medium

---

<sup>59</sup> Examples for an asymmetrical exchange rate union would be the CFA-Franc zone (Boughton, 1991). In the dollar region, for a more institutionalized exchange rate union, the Argentinean currency board and for an asymmetrical monetary union, inter alia, Panama can be mentioned.

<sup>60</sup> From the point of view of herd behavior it has to be asked whether the exit of country A from monetary union really bears such a high cost (in terms of a resulting currency crisis). A less than perfectly credible peg does not protect against speculative pressure resulting from herd behavior resulting from a currency crisis, for example, from the currency crisis of a neighbor country. This may provide the argument for a symmetrical and at least a cooperative if not common monetary and exchange-policy for the affected region.

term.<sup>61</sup>

---

<sup>61</sup> For a similar discussion see also Eichengreen(1998).

## 4 Empirical Analysis of MERCOSUR

In the three previous theoretical chapters a total of 7 theses were derived. The objective of this chapter is the empirical consideration of these theses. The order of the theses corresponds to the theses presented in the previous chapters.

### 4.1 *Avoiding a Beggar-Thy-Neighbor Policy*

**THESIS 1: A common currency avoids beggar-thy-neighbor policies in terms of competitive devaluations vis-à-vis other monetary union members. The maxi-devaluation of Brazil in January 1999 caused considerable economic cost for the rest of MERCOSUR, that by the theoretical existence of a common currency, could have been avoided.**

In the past exchange rate devaluations proved to be traumatic in particular in developing countries in Latin America (Edwards, 1989, p. 2). Devaluations were often accompanied by, or were the consequence of, political upheaval. Finance ministers had to resign or even governments as a whole had to resign. Due to its high political cost, even in the presence of large macroeconomic disequilibria, governments resisted devaluation. This argument also holds true for Brazil during the period of the Real Plan. Nevertheless, in the past devaluations were evaluated on their internal cost rather than on their possible effects on neighbor countries, specifically with respect to developing countries. The membership of Brazil in MERCOSUR, however, demands a different perspective than the internal cost side on the Brazilian maxi-devaluation in January 1999. The political cost of the devaluation will briefly be discussed, as well as, the question of its economic cost will be treated, in terms of the behavior of aggregate trade variables.<sup>62</sup>

#### 4.1.1 Political Cost

In 2.1 the point was made that pronounced exchange rate swings would alert political pressure groups representing the exporting industries of the affected countries. Political reactions in Argentina were alike. Soon after the devaluation had occurred representatives, from the Argentinean Industrial Union and various political parties pushed, for compensatory measures in order to provide some protection for the most likely affected sectors; like rice, chicken, processed pork, automobiles (car, car bodies and tractors), dairy products, shoe manufacture, textiles and chemicals (Clarín, 1999a; Clarín, 1999b).

Interestingly the representatives of the export industry did not press for the abandonment of the Argentinean currency board in favor of a flexible exchange rate regime. In Argentina regardless of the political party and the economic sector, the consensus on the maintenance of the fixed parity of the peso vis-à-vis the US dollar was very broad. The pressure groups asked for the use of other instruments rather than a change in the exchange rate. The demanded instruments ranged from the application of tariffs, a stop of Brazilian subsidies to Brazilian

---

<sup>62</sup> For a more detailed analysis of the economic cost of the Brazilian devaluation, including the presentation of stylized facts of the devaluation, the behavior of various trade sector variables and the induces uncertainty by the devaluation see Kronberger(2001a).

exporters, the voluntary application of taxes on Brazilian imports, to temporary restrictions on imports by the means of quotas (Burgueño, 1999).<sup>63</sup>

The Argentinean government decided to introduce the instrument of the '*previous permission*' on 1,200 Brazilian products - all of them pertaining to sensitive sectors (Clarín, 1999c). Brazilian imports had to be registered at the Argentinean border and were monitored carefully. Other measures that would provide compensation on a more general basis could not be agreed on. Arising sector imbalances had to be negotiated on a case by case basis. Often the outcome was unsatisfactory for both parties leading to severe political tensions between the two governments (Peña, 1999). These tensions built up to a full blown trade war between the two large economies. The severity of these tensions can be judged on the grounds of selected announcements of the respective government officials.

The Brazilian government officially announced that it was revising three possible attitudes toward the prevailing trade war; (1) abandon the customs union; (2) leave the things as they are, that is, continuation of the trade war; (3) deepening of the integration scheme (Ambito Financiero, 2000).

Nonetheless, the discussion was not only geared toward indirect measures concerning the relative price competitiveness of Argentinean and Brazilian products. Tensions between the large countries also arose in the monetary policy field. The Treaty of Asuncion does not provide any regulation regarding macroeconomic coordination.<sup>64</sup> This loose cooperation turned out to be a boomerang for the MERCOSUR countries in the presence of the Brazilian maxi-devaluation. As any other country outside the customs union, the MERCOSUR countries learned about the decision of the Brazilian government to devalue from news papers.<sup>65</sup> The extremely reserved information policy of the Brazilian authorities, and the intent of Argentinean officials to suggest monetary and fiscal policy measures for the Brazilian government led to distress. Inter alia, the implementation of a debt conversion scheme similar to the Argentinean BONEX plan<sup>66</sup> or the implementation of a currency board for Brazil were proposed by Argentinean representatives. These suggestions were immediately dismissed by Brazilian officials. The Brazilians themselves, criticized the Argentinean idea of a complete dollarization of the Argentinean economy. The official Brazilian view was that a complete dollarization of the Argentinean economy would be the end of MERCOSUR.

To conclude, the maxi-devaluation of Brazil culminated in a trade war, specifically between the two large MERCOSUR economies Argentina and Brazil. For Argentina the policy instruments at its disposal were strongly limited. Neither the exchange rate instrument could be used, inter alia, due to the common (Argentinean) consensus of no devaluation at any cost and the stipulation of the currency board in the Argentinean constitution nor could tariffs be imposed on Brazilian imports without violating the agreement on the weakly institutionalized customs union.

---

<sup>63</sup> Clearly the Argentinean government discarded the application of tariffs, since it obviously contradicted the spirit of the customs union.

<sup>64</sup> A loose exchange of statistical data and meetings within SWG 10 exists.

<sup>65</sup> On 13 January 1999 the Argentinean press was still talking about rumors concerning a possible devaluation of the real vis-à-vis other currencies (Ambito Financiero, 1999a). The following day, the public as well as the officials of the MERCOSUR countries, were confronted by the facts without prior information (Gerschenson, 1999).

<sup>66</sup> The Bonex Plan represents a debt rescheduling program adopted in one of the previous stabilization attempts in Argentina (Almansi and Rodriguez, 1997). It converted domestic debt to convertible debt that was denominated in US dollar.

### 4.1.2 Economic Cost

Productivity and bilateral trade will be looked at as one, since the effect of the foregoing recession and the devaluation on trade cannot be clearly separated. Diagram 4-1 shows the evolution of the bilateral real/USD exchange rate deflated by the consumer price index (CPI). The drop in the exchange rate was largest in the period from December to February, where the decrease in the exchange rate equaled 62.9%. In July the real had again appreciated (since December the real had overall appreciated by a total of 40,88%). In December 1999, the real appreciated reducing the competitiveness gain to 35,8%. Diagram 4-1 also shows overshooting effect becoming evident.

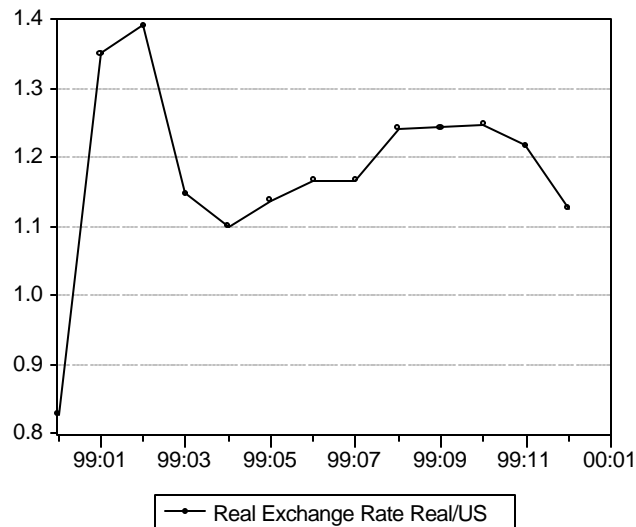


Diagram 4-1: Brazil: Evolution of the real/US dollar exchange rate adjusted for the CPI  
Source: Central bank of Brazil, Brasilia; Instituto Brasileiro de Geografia e Estatística/IBGE, Rio de Janeiro

Diagram 4-2 and Diagram 4-3 show the evolution of the Argentinean and Brazilian gross domestic product (GDP) and industrial production. According to these indicators both countries entered recession in the third quarter of 1998, but the Argentinean GDP started to decrease in the fourth quarter). Negative growth rates of these indicators can be observed up to the end of the third quarter of 1999.

**Argentina**  
Change of GDP and Ind. Production

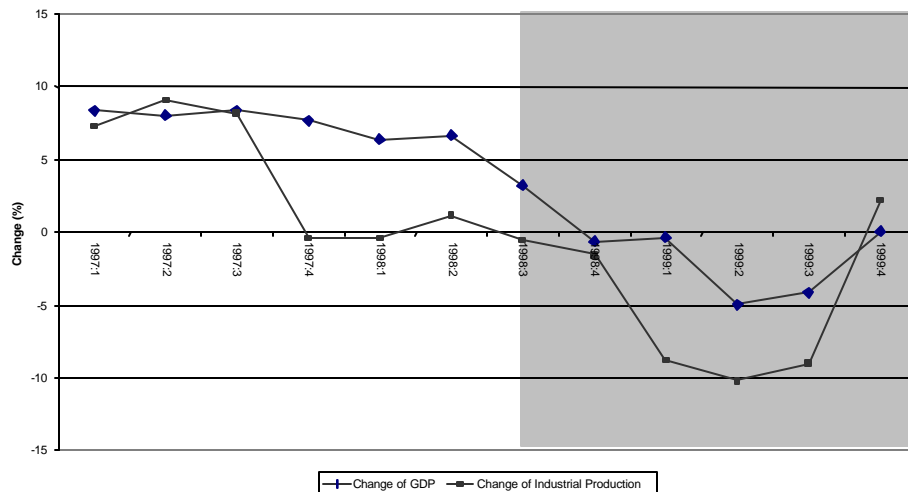


Diagram 4-2: Argentina: Change of GDP and industrial production 1997-1999  
Source: Centro de Economía Internacional, Ministerio de Relaciones Exteriores, Comercio Internacional y Culto, Buenos Aires

**Brazil**  
Change of GDP and Ind. Production

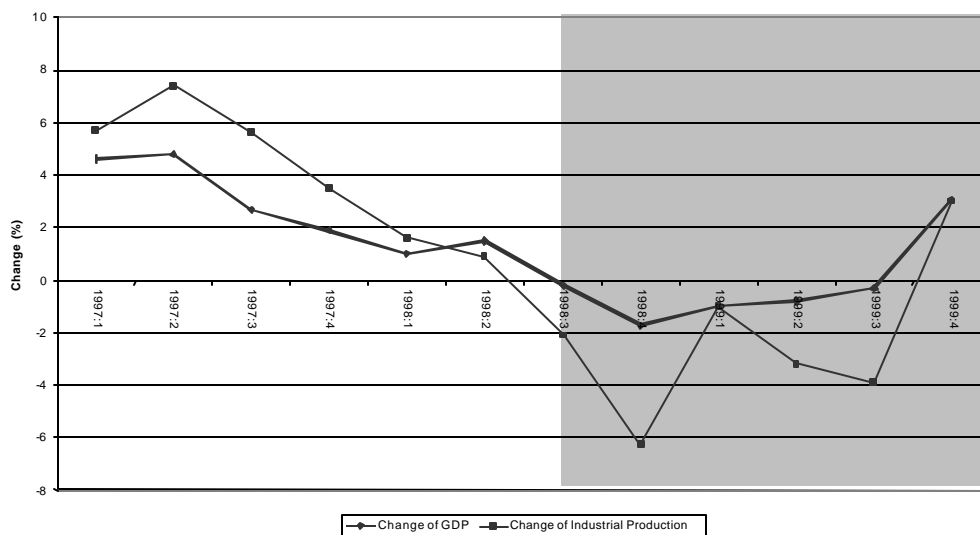


Diagram 4-3: Brazil: Change of GDP and industrial production 1997-1999  
Source: Centro de Economía Internacional, Ministerio de Relaciones Exteriores, Comercio Internacional y Culto, Buenos Aires

The analysis of the Argentinean trade balance, once vis-à-vis the rest of the world (ROW) and once vis-à-vis Brazil confirms that both effects – recession and devaluation – supposedly had a significant influence on the trade balance.

Argentinean imports (ROW) dropped 22.6% within one year, whereas exports decreased less than imports by 15.6% (see Diagram 4-4).

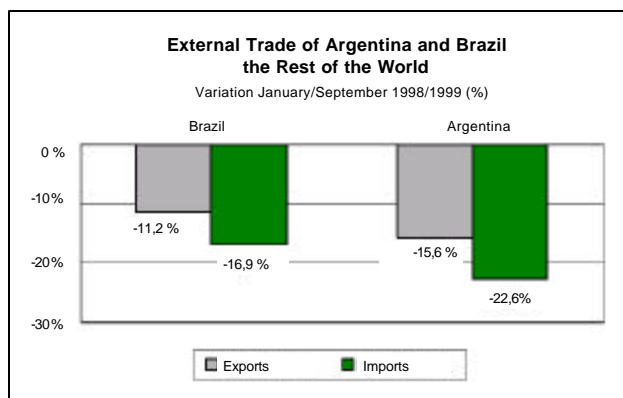


Diagram 4-4: External trade of Argentina and Brazil with the rest of the world

Source: Centro de Economía Internacional, Ministerio de Relaciones Exteriores, Comercio Internacional y Culto, Buenos Aires

The bilateral trade balance between Argentina and Brazil shows a somewhat different picture. Argentinean imports dropped 24.4%, and Argentinean exports dropped 34.2%. The bilateral trade balance had worsened, contrary to the trade balance vis-à-vis the ROW. In July 1998 Brazilian exports to Argentina accounted for 703 million US dollars and almost halved by January 1999 (386 million US dollars). From January to September 1999 Brazilian exports increased by less than 100 million US dollars to 469 million US dollars (see Diagram 4-5). Thus, the first nine months of the new exchange rate regime in Brazil did not bring about the feared flooding of the Argentinean market by exports originating from Brazil.

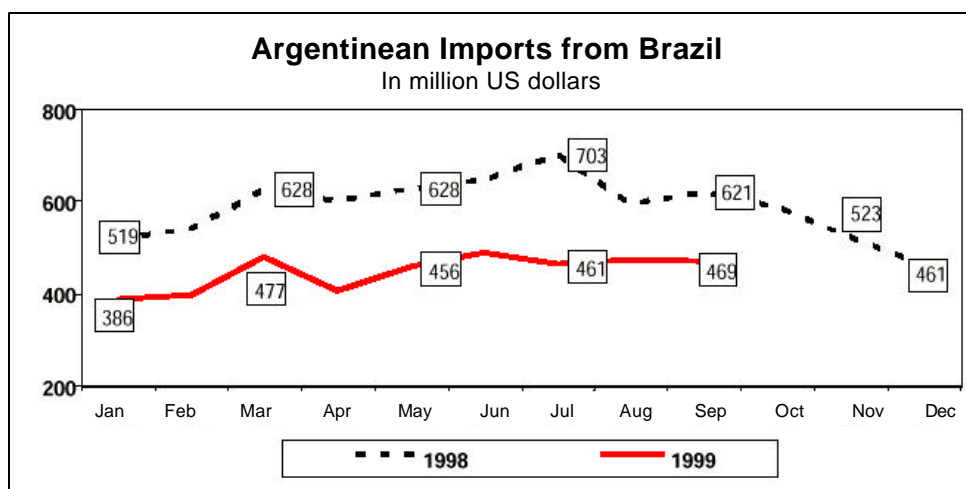


Diagram 4-5: Argentinean imports from Brazil 1998/99

Source: Centro de Economía Internacional, Ministerio de Relaciones Exteriores, Comercio Internacional y Culto, Buenos Aires

Moreover, Brazilian exports, as a share of total Argentinean imports, oscillated between 20.3% and 23.6% between January 1998 and September 1999. A somewhat more marked low is recognizable in the first quarter of 1999, that might be due to the recession (see Diagram 4-6).

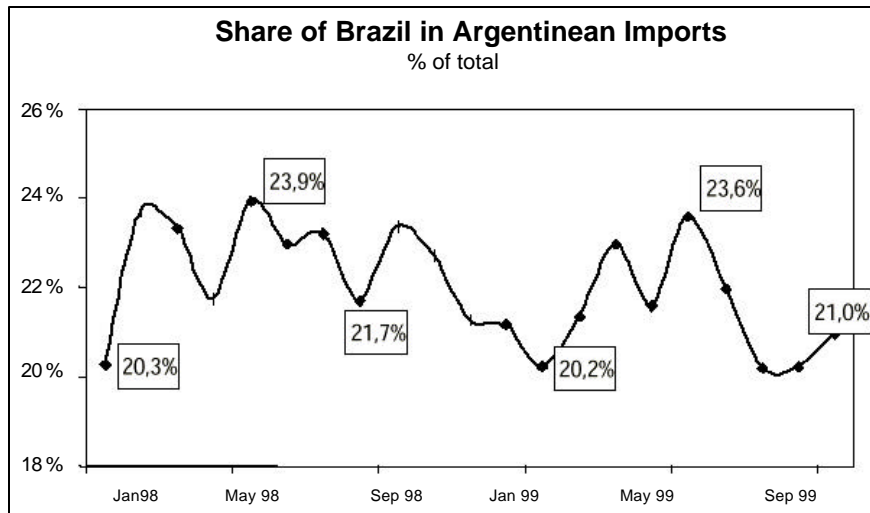


Diagram 4-6: Brazilian share in Argentinean imports  
 Source: Centro de Economía Internacional, Ministerio de Relaciones Exteriores, Comercio Internacional y Culto, Buenos Aires

From October 1998 to December 1998 Argentinean exports to Brazil decreased from 768 million US dollar to 589 million US dollars (-23.3%). From December 1998 to January 1999 exports declined a further 31.91%. From January 1999 to September 1999 exports increased by 25.93% to a monthly volume of 505 million US dollars. Again, almost half of the decline in Argentinean exports to Brazil occurred in the last quarter of 1999 (see Diagram 4-7). Thus, the drop in exports is explained, inter alia, by the foregoing recession. The changes of competitiveness by the change of relative prices might come into play; but only later.

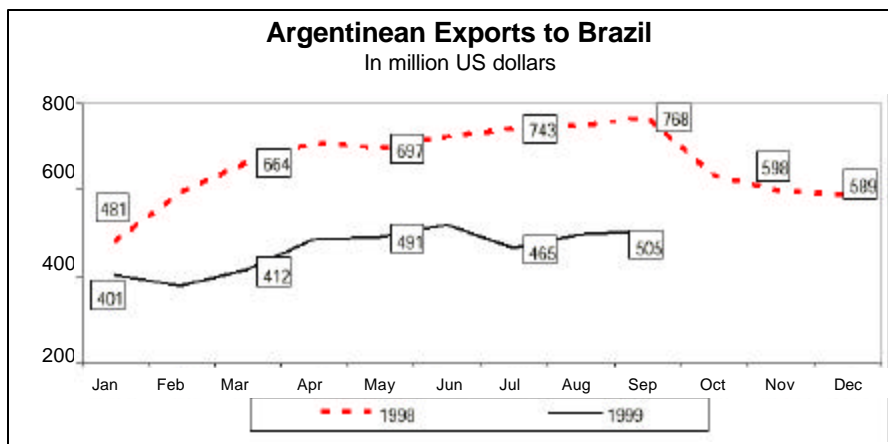


Diagram 4-7: Argentinean exports to Brazil  
 Source: Centro de Economía Internacional, Ministerio de Relaciones Exteriores, Comercio Internacional y Culto, Buenos Aires

The share of Argentinean exports to Brazil relative to total exports showed a sharp decline from 33.4% in September 1998 to approximately 21% in April 1999. Until September 1999 it recovered to 27%. Again, the decrease in exports had already started in the fourth quarter of 1998 and as a consequence cannot be attributed exclusively to the change of relative prices between Argentina and Brazil. Assumedly the decrease on the export side was prolonged by the change in competitiveness.



Diagram 4-8: Brazilian share in Argentinean exports  
 Source: Centro de Economía Internacional, Ministerio de Relaciones Exteriores, Comercio Internacional y Culto, Buenos Aires

The evolution of the monthly bilateral trade balance might allow for the conclusion that the low in March 1999 was also helped by the change of relative competitiveness. However, it cannot be deduced from the timing alone, that the change of relative prices was the only explaining factor for the negative monthly trade balance in the first quarter of 1999. It had already been negative 12 months before, when the monetary regime of the Real Plan was still in place.

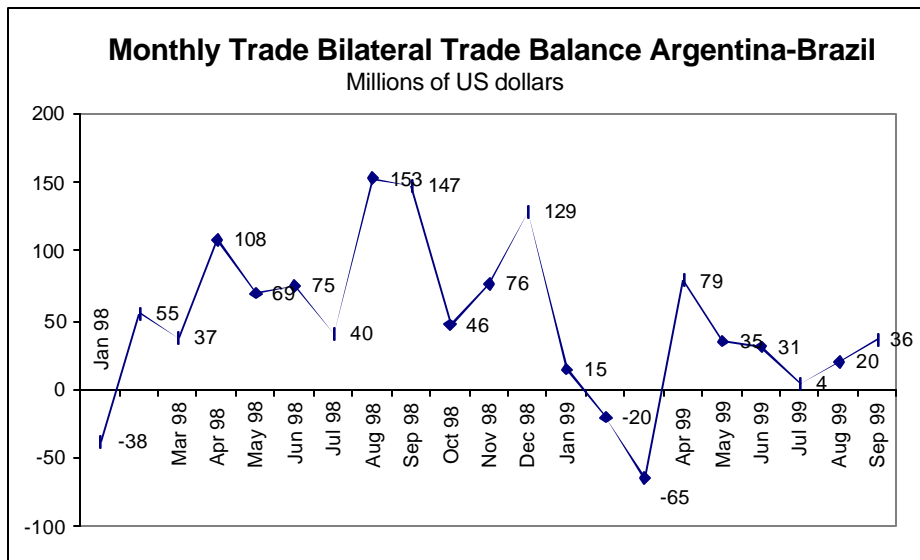


Diagram 4-9: Monthly bilateral trade balance Argentina-Brazil  
 source: Centro de Economía Internacional, Ministerio de Relaciones Exteriores, Comercio Internacional y Culto, Buenos Aires

## 4.2 The Effectiveness of Exchange Rate Devaluations

**THESIS 2: In the past devaluations of Latin American currencies often proved to be highly ineffective. Under the assumption that devaluations continue to be ineffective a single currency would not impose costs on the single member countries in terms of the loss of an adjustment instrument. Nonetheless, the Brazilian maxi-devaluation of January 1999 showed a relatively high degree of effectiveness until 12:1999.**

In the past Latin American economies frequently adhered to the use of the exchange rate instrument for adjustment. It was discussed earlier that devaluations undertaken in Latin American economies were frequently of little effectiveness.<sup>67</sup> Gains in competitiveness were eroded relatively quickly due to high levels of inflation and/or due to the increased importance of imported inputs for the price level. However, the Brazilian maxi-devaluation of January 1999, that was accompanied by a change of the exchange rate regime from an asymmetrical exchange rate band to managed floating, does not show such clear signs of erosion.

Applying the effectiveness index to the recent Brazilian devaluation renders the devaluation of January 1999 relatively effective, as far as this can be judged after just a year since the devaluation (Edwards, 1989, p. 255).

$$\text{effectiveness index}_x = \frac{R\hat{E}R_t}{\hat{E}_t} \quad (4-1)$$

Two time series were applied, *effectiveness index*<sub>1</sub> (08:1994 – 12:1999), from the introduction of the Real Plan, until 1 year after the devaluation, and *effectiveness index*<sub>2</sub> (01:1999 – 12:1999), from the devaluation until eleven months after.

$$\text{effectiveness index}_1 = 0.379 \quad (4-2)$$

$$\text{effectiveness index}_2 = 0.84 \quad (4-3)$$

In the latter case only 16% of the devaluation was eroded. If the real appreciation during the real Plan period were taken into account, the maxi-devaluation discounted for the mini-devaluations, the effectiveness would still have been equal to 40%. Based on these numbers the Brazilian maxi-devaluation cannot be judged as ineffective as this was the case for many Latin American economies in the seventies and in the eighties (Edwards, 1989). Nonetheless, it has to be taken into account that only a period of 12 months following the devaluation was considered for the computation of the effectiveness index.<sup>68,69</sup>

Besides imported inputs, rigid real wages tend to have a negative impact on the

---

<sup>67</sup> Many of the traditional approaches to OCA theory claim exchange-rate devaluations to be effective.

<sup>68</sup> Edwards(1989) analyzed periods of 3 years.

<sup>69</sup> As predicted by the Dornbusch model the devaluation was accompanied by a clearly noticeable overshooting effect.

effectiveness of devaluations. Minimum wage data<sup>70</sup> from the first 10 months after the devaluation shows some real wage flexibility downwards. Nominal minimum wage increased by 4.6%. Nominal minimum wages, deflated by the general price index, decreased by 8.4%, and nominal minimum wages, deflated by the cost of living index, decreased by 1.8%. Therefore, real minimum wages decreased far less than the nominal exchange rate, and exhibit rigidity.<sup>71</sup>

### **4.3 Differences in Productivity and the Real Exchange Rate**

**THESIS 3: Differences in productivity combined with inflexible real wages might require the exchange rate instrument for adjustment over the long run. These preconditions apply to MERCOSUR.**

In 3.1 the point was made that in the long run productivity changes have to be balanced by the means of wage adjustment. It is shown in 4.5.2.2 that wages are relatively rigid in the MERCOSUR countries. Marginal productivity rates as suggested in the model were not available for the MERCOSUR countries over a longer period. Instead the only available productivity variable was real GDP per capita (1960-1998) and GDP adjusted by PPP in USD<sup>72</sup> (1975-1998). Per-capita GDP is highest in Argentina and Uruguay (6,716 USD and 6,058 USD respectively in 1998). Brazil is intermediate with 4,413 USD and Paraguay exhibits the lowest product of 2,194 USD in 1998. The average annual growth rate for real GDP per capita from 1975 to 1998 has been highest for Uruguay (1.43%), followed by Paraguay (1.20%), Brazil (0.96%) and Argentina (0.43%) (see Table 4-1). In the subperiod from 1991 to 1998 - coincident with the existence of MERCOSUR - growth figures were subject to considerable changes. Annual average growth accounted for 3.41% in Argentina, 3.04% in Uruguay, 1.21% in Brazil and 0.28% in Paraguay.

GDP adjusted to purchase power parity in USD does not change the observed patterns with respect to real GDP per capita. Over the whole period from 1975 to 1998 nominal growth was 8.0% in Paraguay, 6.72% in Brazil, 6.15% in Uruguay and 5.92% in Argentina. In the MERCOSUR period the Argentinean economy grew on average 6.01%, Uruguay 5.32% and relative decelerations can be observed in Brazil with an annual growth rate of 4.41% and in Paraguay of 3.68%.

A limited insight can be gained from the analysis of the data provided in Table 4-1. The growth differences measured in real GDP per capita have widened significantly in the MERCOSUR period relative to the large 1975-1998 period. Not only the data provided in Table 4-1 reveals that marked structural breaks in the growth paths are at play. It is also shown in literature<sup>73</sup> that in the nineties, growth in Latin American countries increased relative to the

---

<sup>70</sup> Average wage data would be more adequate as an indicator but this data was not available.

<sup>71</sup> Although the Brazilian devaluation was relatively successful in terms of the effectiveness indicator by Edwards(1989), effects on the fiscal balances were not taken into account. Large parts of the Brazilian public debt is indexed in US dollars, thus, increasing the relative cost of servicing its debt.

<sup>72</sup> The below cited numbers are all drawn from the Global Development Network Growth Database (Worldbank). Although real GDP would have been more desirable it was not provided by the World Bank. Instead the adjustment of GDP to PPP in USD had to be taken. It allows for the comparison between the respective countries. Nonetheless, since Argentina, Brazil and Paraguay were highly inflationary economies it cannot be taken for sure that all distortions were eliminated by this relatively aggregate adjustment operator.

<sup>73</sup> For a small survey on economic growth and liberalization see Edwards(1997, pp. 119).

eighties (the lost decade) due to the implementation of a set of reforms; among them trade liberalization. Brazil has the most developed and largest industry but still lags behind Argentina and Uruguay. Under the assumption of further convergence between industrialized and less industrialized regions in Brazil, its overall productivity should increase further relative to Argentina and Uruguay in the future. When analyzing GDP at current market prices, over the longer observation period, it becomes evident that Brazil is on average growing faster than Argentina and Uruguay. In the MERCOSUR period, however, this pattern has reversed. The slower Brazilian growth performance in this period is also explained by the later implementation of its stabilization program, the Real Plan, relative to the earlier implementations of the Argentinian Convertibility Plan and the Uruguayan stabilization programs. The difference, between the fastest and the slowest growth rate has also widened for GDP adjusted to PPP in USD in the MERCOSUR period relative to the whole observation period. For both real GDP per capita and GDP adjusted to PPP in USD the growth differences increased by approximately 50% in the MERCOSUR period.

To conclude, growth performance and thus productivity is far from convergent in the MERCOSUR economies. Over the long run increased wage flexibility compared to now will be needed to compensate for productivity differences.

Annual growth		Real GDP per capita – geom. average 1975-1998	Real GDP per capita – geom. average 1991-1998	GDP adjusted to PPP in USD – geom. average 1975-1998	GDP adjusted to PPP in USD – geom. average 1991-1998
Argentina	(1)	0.43%	3.41%	5.92%	6.01%
Brazil	(2)	0.96%	1.21%	6.72%	4.41%
Paraguay	(3)	1.20%	0.28%	8.08%	3.68%
Uruguay	(4)	1.43%	3.04%	6.15%	5.32%
Arithmetic average	(5) = [(1)+(2)+(3)+(4)]/4	1.05%	1.98%	6.71%	4.85%
Growth difference (highest-lowest)	(6)	1.00%	3.13%	2.16%	2.33%
Growth difference relative to average	(7) = (6)-(5)	0.05%	1.58%	0.32%	0.48%

Table 4-1: Annual growth rates of the MERCOSUR countries

Source: own calculations based on the Global Development Network Growth Database, World Bank, Washington D.C.

#### 4.4 Symmetry of Recent External Shocks to Latin American Economies

**THESIS 4: The cost of a single currency will be lower, the more symmetrical the shocks to the member countries occur. Since the creation of MERCOSUR external shocks to the economies occurred rather symmetrically, except the effects of the Brazilian maxi-devaluation in January 1999, which can be viewed as endogenous shock.**

Hoffmaister and Roldos(1996) estimate a structural vector autoregression model (SVAR) on a group of 15 Asian and 17 Latin American economies with annual observations from 1970 to 1993.<sup>74</sup> They use a more complex set of restrictions than Blanchard and

<sup>74</sup> Besides the 4 MERCOSUR countries Argentina, Brazil, Paraguay and Uruguay, the countries Bolivia, 39

Quah(1989) do. Besides that aggregate demand shocks do not have a permanent effect on output (as in Blanchard and Quah, 1989), fiscal shocks do not affect the level of aggregate GDP. Further, exogenous and endogenous variables are distinguished. They are restricted in such a way that external variables like world interest rates and the terms of trade are not affected by endogenous variables like domestic output, the real exchange rate and the price level. Finally, innovations are assumed to be orthogonal. They find that compared to the Asian countries interest rate shocks in Latin American countries are much more important. Shocks to the interest rates explain 20% of GDP fluctuations compared to 5% in the Asian countries.

Carrera et al.(1999) follow the methodology of Hoffmaister and Roldos(1996). They use quarterly time series from 1980 to 1996 for Argentina and Brazil that are X-11 filtered. They use a set of four variables: A shock to the interest rate is interpreted as external supply shock, to the terms of trade as international demand shock, to GDP as a domestic supply shock and to the inflation rate as a domestic demand shock. Contrary to Blanchard and Quah(1989) demand shocks are allowed to have a permanent effect on GDP. Their results were as follows:

The variance decomposition for Argentina indicates that fluctuations of the GDP are explained by interest rate shocks (38%) and by terms of trade shocks (5.14%) in the long run. The total external shocks (43.14%) to the system are more important than domestic supply shocks (40.64%). Fluctuations in the Argentinean inflation rate are explained by inflation itself (80%). Fluctuations in the Brazilian GDP are explained to a lesser extent by interest rate (external supply) shocks (6.23%) and terms of trade (external demand) shocks (11.96%). Compared to Argentina, international demand shocks have an impact twice as large as supply shocks. Brazil is much less receptive to interest rate shocks than Argentina. Domestic supply shocks – they explain 75.51% of the fluctuations in Brazilian GDP - are most important. Fluctuations in the inflation rate are explained by changes of the inflation rate itself (86.74%). As described in 0 the application of a vector-error-correction model does not only estimate short-term equations but also delivers a long-term relationship of the system variables. This is true, not only for the Engle-Granger methodology, but also for the Johansen methodology. Carrera et al.(1999, p. 50) computed the following long term relationships for Argentina and Brazil.

$$GDP_{ARG} = 23.9 - 0.07 CPI - 1.87 i_{INT} + 0.36 TOT \quad (4-4)$$

$$GDP_{BRA} = 15.03 - 0.005 CPI - 1.19 i_{INT} + 0.58 TOT \quad (4-5)$$

Equations ( 4-4 ) and ( 4-5 ) show that a rise in inflation (*CPI*) had an almost negligible negative effect on the *GDP* of the respective countries. The elasticity between the Argentinean *GDP* and the international interest rate *i<sub>INT</sub>* was approximately 50% higher than the one between the Brazilian *GDP* and the international interest rate. In both countries the sign was negative, that is, a rise in the interest rate caused a decline in the *GDP*. A rise in the terms of trade (*TOT*) was 60% more beneficial to Brazil than to Argentina. The findings of Carrera et al.(1999) confirm that the two large MERCOSUR countries are receptive to external shocks over the terms of trade channel and over the international interest rate channel. The impact of shocks to these variables on the respective products differed in the two countries.

Caveats of the time-series-model approaches applied in the before mentioned studies are discussed in 4.5.1. The time series applied to the Beveridge-Nelson decomposition in 4.5.1 and in Carrera et al.(1999) do not include the period after 1996. From the point of view of external

---

Chile, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru and Venezuela figure in their set of Latin American countries.

shocks this time period is important. Although it covers the Mexican crisis, which occurred in 1994/95, it omits the Asian and the Russian crisis which had significant impacts on the MERCOSUR economies.<sup>75</sup> In brief, stylized facts of the effects of these three external shocks on the MERCOSUR countries will be presented. The brief analysis was limited by the consideration of international reserves, real domestic credit and industrial production due to the availability of quarterly data. The real domestic credit variable was chosen due to the assumption that the Mexican crisis induced a liquidity crisis, at least in Argentina. Consequently high domestic interest rates and a decrease in real domestic credit should proceed decreases in production. The international reserves variable was analyzed due to the assumption that a high degree of external short-term capital is placed in the MERCOSUR countries. If foreign investors perceive higher risk for their short-term investment, for example, due to herd behavior they would either expect higher interest rates and/or withdraw their capital from the country. International reserve losses would be the consequence.

#### 4.4.1 The Mexican Crisis

The Mexican crisis was preceded by an increase of the US-American short-term interest rate by the Fed in the beginning of 1994. Capital inflows diminished, the Mexican economy showed first signs of contraction, and the current account worsened. Finally, on 20 December 1994 the Mexican central bank gave up its exchange rate anchor and devalued.<sup>76</sup>

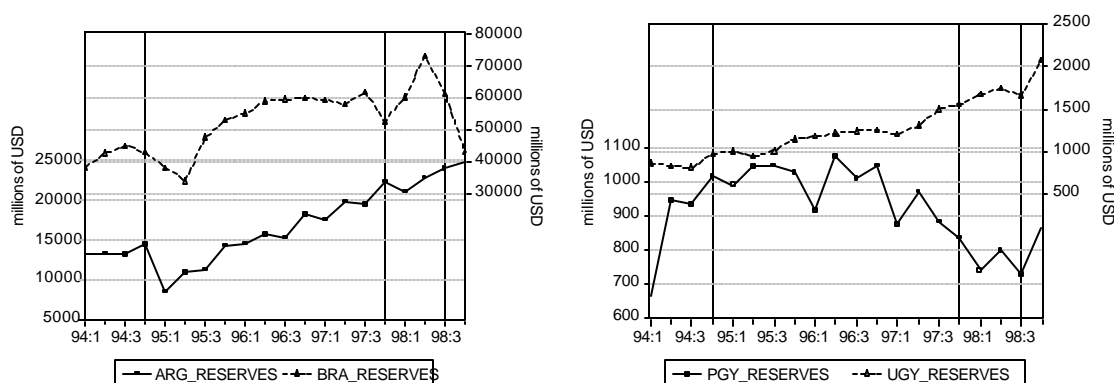


Diagram 4-10: MERCOSUR: Development of international reserves minus gold (11.d)

Source: International Financial Statistics (IFS), International Monetary Fund, Washington D.C., various editions

In Argentina<sup>77</sup> the fourth quarter of 1994 was characterized by a contraction of domestic credits (see Diagram 4-11).<sup>78</sup> Significant outflows of international reserves followed in the first quarter of 1995 (Diagram 4-10). The impact on the real side was greatest in the subsequent quarter. Within three months the Argentinean industrial production declined 6.78% (see Diagram 4-12). In Brazil the contagion occurred first via the financial channel. Domestic credit

<sup>75</sup> It was also mentioned earlier that the time series provided in the International Financial Statistics (IFS) exhibit several breaks, inter alia the GDP. Consequently the less methodical approach of the description of some stylized facts had to be chosen.

<sup>76</sup> For a more detailed analysis of the Mexican crisis see, inter alia, Damill et al.(1996) and Calvo and Mendoza(1996).

<sup>77</sup> Numerous works analyze the effects of the Mexican crisis on the Argentinean economy. See, for instance, Arnaudo(1995), Catão(1997), Eduardo et al.(1997), Damil and Frenkel(1997), and Rozenwurzel and Bleger(1996).

<sup>78</sup> The three vertical lines in the respective diagrams represent the beginnings of the Mexican, Asian and Russian Crisis.

slowed its growth in the third quarter of 1994.<sup>79</sup> International reserves started to decline in the fourth quarter. As in Argentina the effects of the Mexican crisis could be felt on the real economy in the second quarter of 1995. The Brazilian industrial production index ceded -7.83% in the second quarter and -5.03% in the third quarter. In Paraguay losses of international reserves were minor and it is questionable whether these losses are attributable to the Mexican crisis. Real domestic credit slowed its growth in the first quarter of 1995 and declined in the two subsequent quarters. Industrial production data for Paraguay was not available. Uruguay's international reserves showed a weak decline in the second quarter of 1995. Real domestic credit slowed its growth in the first quarter of 1995 and decreased in the following three quarters. Industrial production measured by the IVF (Indice de Valor Físico/Physical Value Index) declines according to the seasonally adjusted index in the fourth quarter of 1994 and also in the first quarter of 1995.

Country	<i>DRES (11.d)</i>					<i>DRCREDIT (32)</i>					<i>DPROD</i>				
	94:3	94:4	95:1	95:2	95:3	94:3	94:4	95:1	95:2	95:3	94:3	94:4	95:1	95:2	95:3
<b>Argentina</b>	-	+	-	+	+	+	-	-	+	-	+	+	-	-	-
<b>Brazil</b>	+	-	-	-	+	+	+	+	+	+	+	+	+	-	-
<b>Paraguay</b>	-	+	-	+	+	+	+	+	-	-	n/a	n/a	n/a	n/a	n/a
<b>Uruguay</b>	-	+	+	-	+	+	+	-	-	-	+	-	-	+	-

Table 4-2: Behavior of selected variables in MERCOSUR during the Mexican crisis

Source: International Financial Statistics /IFS, International Monetary Fund, Washington D.C.; Economic Commission for Latin America and the Caribbean/ECLAC, Santiago de Chile; Instituto Nacional de Estadística/INE, Montevideo; Secretaria Administrativa del MERCOSUR, Montevideo

Table 4-2 provides an overview of the changes of the before described variables one quarter before and three quarters after the Mexican crisis occurred. All four countries suffer reserve losses (see gray fields in Table 4-2) indicating short-term capital outflows that supposedly resulted in contractions of real domestic credit (except in Brazil). The effect on industrial production was strongest in Argentina and Brazil. In Argentina the contraction of industrial production lagged behind the financial variables. In Brazil the slowdown in industrial production lagged behind the decrease in reserves. In Diagram 4-18 and Diagram 4-19 large shocks to the domestic interest rates become evident for the two large countries. Lags are not as clearly visible in the two smaller countries, Paraguay and Uruguay, as they are in the two larger MERCOSUR economies. Nonetheless, the evidence is strong that signs in the financial and real variables reflect the impact of the Mexican crisis on all four MERCOSUR countries.

#### 4.4.2 The South East Asian Crisis

Less than three years passed before the MERCOSUR economies were subject to the next exogenous shock. On 22 October 1997 the collapse of the Hong-Kong-stock exchange initiated the South East Asian crisis. Several South-East Asian countries had to devalue.

<sup>79</sup> With respect to Brazil it has to be born in mind that the Brazilian economy was affected by the implementation of the Real Plan and the Mexican crisis at the same time.

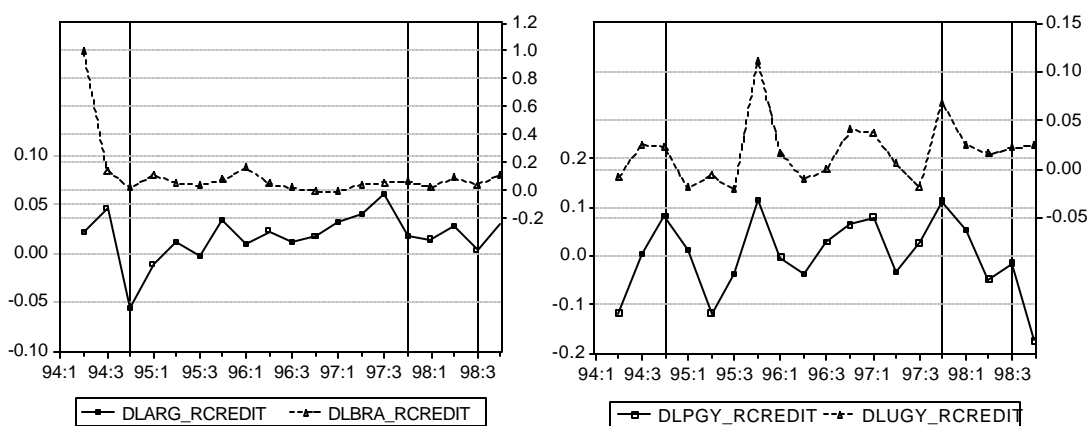


Diagram 4-11: MERCOSUR: Development of log difference of real domestic credit (32)  
 Source: International Financial Statistics/IFS, International Monetary Fund, Washington D.C.;  
 Secretaría Administrativa del MERCOSUR, Montevideo

The signs of the change in the variables international reserves and industrial production tend to confirm the negative effect of the Asian crisis on Argentina, Brazil and Paraguay (see Table 4-3). Real domestic credit did not decrease in either country except in Paraguay from the second quarter of 1998 on. In Uruguay the effect on international reserves, as well as on real domestic credit, seems to be unimportant (see Diagram 4-10). There does not seem to be a clear cut lag between the loss of reserves and a decrease in production regarding Argentina and Brazil. A considerable interest rate hike in Brazil, and less so Argentina, resulted (see Diagram 4-18 and Diagram 4-19 in 0). Thus, the South East Asian crisis can also be perceived as a relative symmetrical exogenous shock, which affected all MERCOSUR countries - less notably Uruguay.

Country	<i>DRES (11.d)</i>						<i>DRCREDIT (32)</i>						<i>DPROD</i>					
	97:3	97:4	98:1	98:2	98:3	98:4	97:3	97:4	98:1	98:2	98:3	98:4	97:3	97:4	98:1	98:2	98:3	98:4
Argentina	-	+	-	+	+	+	+	+	+	+	+	+	+	+	-	+	-	-
Brazil	+	-	+	+	-	-	+	+	+	+	+	+	+	-	-	+	-	-
Paraguay	-	-	-	+	-	+	+	+	+	-	-	-	n/a	n/a	n/a	n/a	n/a	n/a
Uruguay	+	+	+	+	-	+	-	+	+	+	+	+	-	+	+	-	+	-

Table 4-3: Behavior of selected variables during the South East Asian and Russian crisis  
 Source: International Financial Statistics, International Monetary Fund/IMF, Washington D.C.; Economic Commission of Latin America and the Caribbean/ECLAC, Santiago de Chile; Instituto Nacional de Estadística/INE, Montevideo; Secretaria Administrativa del MERCOSUR, Montevideo

#### 4.4.3 The Russian Crisis

Less than a year later, the South East Asian crisis was to be followed by the Russian crisis. On 17 August 1998 the Russian government widened the exchange rate band of the Russian ruble and announced the moratorium of some of its outstanding debt. The repercussion of the Russian crisis on the MERCOSUR economies was clearly reflected by the behavior of the analyzed variables. Except Argentina, all MERCOSUR countries faced a loss of reserves in the third quarter. Real domestic credit showed decelerating growth in the third quarter of 1998 in Argentina and Brazil and continued to decrease in Paraguay. Industrial production decreased significantly in Argentina and Brazil. During two consecutive periods, in the third and the fourth quarter of 1998, industrial production declined. In Uruguay, the seasonally adjusted IVF became negative in the second and in the fourth quarter of 1998. Shocks to the domestic interest rates

occurred in Argentina, Brazil and Uruguay. To conclude, the repercussions of the Russian crisis on the MERCOSUR economies were symmetric in nature and seem to be more pronounced than the effects of South East Asian crisis on the MERCOSUR countries.

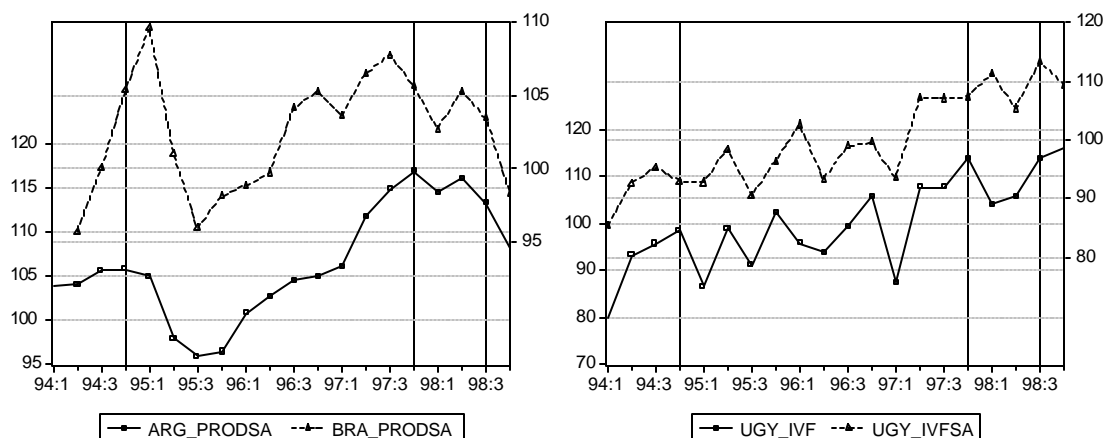


Diagram 4-12: MERCOSUR: Development of seasonally adjusted industrial production

Source: Macroeconomic indicators of Argentina and Brazil, Economic Commission for Latin America and the Caribbean/ECLAC, Buenos Aires and Brasilia; Instituto Nacional de Estadística, Montevideo

#### 4.5 Traditional OCA Criteria and the Optimality of MERCOSUR

**THESIS 5: If optimum currency area criteria derived from the traditional approaches to optimum currency area are not satisfied, it cannot be concluded that the respective currency area is not optimal. The MERCOSUR countries do not, or only to a limited extent, fulfill these criteria. Within the context of MERCOSUR these criteria suffer serious caveats, theoretically as well as empirically.**

##### 4.5.1 Symmetry of Shocks

Prior to the creation of MERCOSUR all the member countries of today's MERCOSUR had been subject to frequent shocks whose origins were highly heterogeneous. Endogenous shocks that followed political instability, credit restrictions originating from the external sector, changes of the economic model (Convertibility Plan, Plan Real), etc. The analysis of these shocks proved to be highly challenging, inter alia, due (1) to the properties of the empirical data available - the available series are integrated by different orders, display structural breaks, etc. (2) The application of multivariate time series techniques is highly data consuming. With respect to MERCOSUR large samples do not exist due to the simple fact that MERCOSUR was founded 10 years ago. Consequently larger samples would include Pre-MERCOSUR data. (3) Large representative continuous samples are hardly available for MERCOSUR countries at all.<sup>80</sup> The application of the univariate time series method Beveridge-Nelson decomposition on the respective GDP series will show that cycles differed considerably in the past (until 1995:4

<sup>80</sup> Standard data sources like IFS, national statistical institutes, World Bank and many more were consulted for large samples of continuous time series data. Moreover, it was already indicated earlier in this work that in the case of Paraguay, if statistical data is available at all, this data does not reflect the black market economy that represents up to 50% of the Paraguayan economic activity.

#### 4.5.1.1 Decomposition of the GDP of the MERCOSUR Countries into a Permanent Stochastic Trend and Temporary Shocks

##### *The Method*

Originally it was intended to apply the Blanchard and Quah decomposition of a vector autoregression (VAR) method (Blanchard and Quah, 1989). By the means of a structural decomposition of a VAR demand shocks (defined as temporary shocks) and supply shocks (having a permanent effect on output) are identified. This method allows for analyzing the timely coincidence of temporary and permanent shocks in a group of countries. In addition, it allows for the comparison of the dynamics of the shocks by the means of impulse-response functions. In practice, however, available time series data for the MERCOSUR countries resulted to be inappropriate for the application of the before described method.

In other studies – inter alia, Bayoumi and Eichengreen(1993) - the real GDP which tends to be  $I(1)$  and the deflator of GDP or CPI which tends to be  $I(0)$  were used.<sup>81</sup> In case CPI were  $I(1)$  it could also be differenced (Enders, 1995, p. 332). Nonetheless, both series need to be stationary. For Argentina, Brazil and Uruguay continuous time series for GDP and CPI were available, which were tested for the presence of a unit root by the Philips-Perron and the augmented Dickey-Fuller test.<sup>82</sup>

The results of these tests rendered the application of the Blanchard-and-Quah method to all three countries Argentina, Brazil and Uruguay impossible.<sup>83</sup> Although the GDP for all three countries was  $I(1)$ , the orders of integration for the CPI of the respective countries were mixed. Seasonally adjusted series (1980:1 – 1995:4) of the CPI for the three countries have been tested for the presence of a unit root.  $CPI_{BRA}$  was clearly  $I(1)$ ,  $CPI_{ARG}$  was  $I(1)$  by the Philips Perron-Test and  $I(2)$  by the augmented Dickey-Fuller test and finally  $CPI_{UGY}$  was clearly  $I(2)$ . Also the log of the same series showed a mixed picture.  $CPI_{ARG}$  was  $I(1)$  with the Philips-Perron test and  $I(2)$  with the augmented Dickey-Fuller test.  $CPI_{BRA}$  was  $I(1)$  although only at a 10% significance level.  $CPI_{UGY}$  was  $I(1)$  by the Philips-Perron Test at a 10% significance level and by the augmented Dickey-Fuller test it was  $I(2)$ .

As an alternative method the Beveridge-Nelson decomposition was chosen (Beveridge and Nelson, 1981). A univariate series is decomposed into its stochastic trend (permanent component) and into a stationary series (cycle, transitory or irregular component). It is assumed that the time series of concern is stationary in its first differences and is represented by an autoregressive moving-average process (ARMA process). Although at first sight this process seems to exhibit a trend, (it displays a persistent upward drift) it is an accumulation of autocorrelated changes that have a positive mean value. Assume a series  $z_t$  which is written in its first difference  $w_t$ .

---

<sup>81</sup> A series is said to be integrated of order one – this denotes  $I(1)$  – if after taking the first difference a stationary process results.

<sup>82</sup> For a short introduction on unit-root testing see Greene(1997, pp. 847) or Kennedy(1992, pp. 265). The augmented Dickey-Fuller test is more appropriate for small samples in the case of non-normal errors and heteroskedasticity whereas the Philips Perron test displays better properties when applied to large samples and if the errors are autocorrelated. Since the sample size was intermediate both tests were used for the time series at hand.

<sup>83</sup> The GDP and CPI time series used in this section were drawn from the sources as follows: International Financial Statistics/IFS, International Monetary Fund, Washington D.C.; Instituto Nacional de Estadística y Censos, Buenos Aires; Instituto Brasileiro de Geografia e Estatística/IBGE, Rio de Janeiro; Instituto Nacional de Estadística, Montevideo; Banco Central do Brasil, Brasília; Banco Central de la República Argentina, Buenos Aires, Banco Central del Uruguay, Montevideo. Quarterly observations for the Paraguayan GDP and CPI were not available.

$$w_t = z_t - z_{t-1} \quad (4-6)$$

Due to the decomposition theorem of Wold the following model results.

$$\mathbf{f}(L)(w_t - \mathbf{m}) = \mathbf{q}(L)\mathbf{e} \quad (4-7)$$

The optimal linear predictor  $z_{t+k}$  is represented by the sum of the contemporaneous  $z_t$  and the predicted  $w_t$  accumulated  $w_t$  to  $w_{t+k}$ :

$$\hat{z}_t(k) = z_t + \sum_{j=1}^k \hat{w}_t(j) \quad (4-8)$$

As indicated before  $w_t$  is stationary and consequently asymptotically a linear function in  $k$ . The function has the slope  $\mathbf{m}$  (the rate of drift of the series) and the intercept  $z_t$ , which is the permanent or the trend component of  $z_t$ , or in the words of Beveridge and Nelson (1981, p. 156) „The permanent component is ... the long-run forecast of the series adjusted for its mean rate of change ...“

$$\bar{z}_t = z_t + \lim_{k \rightarrow \infty} \left[ \sum_{j=1}^k \hat{w}_t(j) - k\mathbf{m} \right] \quad (4-9)$$

The cyclical or transitory component is obtained by the difference between the contemporaneous permanent component  $\bar{z}_t$  and the contemporaneous observation  $z_t$ .

$$c_t = \bar{z}_t - z_t \quad (4-10)$$

In literature the implications of equation (4-10) were subject to critique. The transitory component is perfectly negatively correlated with the stochastic trend component. Watson (1986) objects that there is no unique decomposition. Any correlation coefficient between  $-1$  and  $1$  is theoretically possible. However, in the short-run the Beveridge-Nelson decomposition produces similar results for the standard error for the one-step ahead forecast like the trend plus noise model used by Watson (Enders, 1995, p. 195).

#### *Preparation, First Analysis and Unit Root Tests*

The raw series were adjusted seasonally by a multiplicative moving average procedure as provided by EViews 2.0®. In addition, the series were transformed into natural logarithms, not least due to scalability reasons. For a first approximation to the correlation of the shocks the correlation coefficients for the GDP series, as well as their means and their standard deviation expressing its volatility, were calculated.

<b>Correlation-Matrix</b> <i>DGDP</i> (in log differences and seasonally adjusted)		<i>DGDP</i> <sub>Arg</sub>	<i>DGDP</i> <sub>Bra</sub>	<i>DGDP</i> <sub>Ugy</sub>	Mean	Volatility (standard deviation)
<b>whole series</b> 1980:1 – 1995:4	<i>DGDP</i> <sub>Arg</sub>	1.000			0.002	0.034
	<i>DGDP</i> <sub>Bra</sub>	0.242	1.000		0.004	0.029
	<i>DGDP</i> <sub>Ugy</sub>	0.153	0.187	1.000	0.004	0.050
<b>Pre-mercosur period</b> 1985:4 – 1990:1	<i>DGDP</i> <sub>Arg</sub>	1.000			-0.002	0.040
	<i>DGDP</i> <sub>Bra</sub>	0.011	1.000		0.005	0.023
	<i>DGDP</i> <sub>Ugy</sub>	0.296	0.531	1.000	0.011	0.026
<b>MERCOSUR period</b> 1991:2 – 1995:4	<i>DGDP</i> <sub>Arg</sub>	1.000			0.013	0.032
	<i>DGDP</i> <sub>Bra</sub>	0.558	1.000		0.004	0.039
	<i>DGDP</i> <sub>Ugy</sub>	0.030	0.247	1.000	0.009	0.033

Table 4-4: Correlation of quarterly *DGDP*<sub>Arg</sub>, *DGDP*<sub>Bra</sub>, *DGDP*<sub>Ugy</sub>

Source: Source: International Financial Statistics/IFS, International Monetary Fund, Washington D.C.; Instituto Nacional de Estadística y Censos, Buenos Aires; Instituto Brasileiro de Geografia e Estatística/IBGE, Rio de Janeiro; Instituto Nacional de Estadística, Montevideo; Banco Central do Brasil, Brasília; Banco Central de la República Argentina, Buenos Aires, Banco Central del Uruguay, Montevideo.

Between 1980 and 1995 the correlation of the GDP differences of the three countries is in a range between 0.153 and 0.242. This could be described as low correlation. In terms of volatility the GDP of Uruguay deviates as much as approximately 5% from its mean of 0.4%. Argentina's GDP deviates 3.4% from its mean of 0.2% and finally Brazil's GDP 2.9% from its mean of 0.4% (see Table 4-4).<sup>84</sup> The same indicators are shown for the period before and after the creation of MERCOSUR.<sup>85</sup> In the Pre-MERCOSUR period there was no correlation between the Argentinean and the Brazilian GDP. Interestingly, the GDP of Uruguay correlated positively by a factor of 0.531 and 0.296 with the Brazilian and the Argentinean GDP. Volatility of the Uruguayan and Brazilian GDP was almost half (2.6% and 2.3% respectively) that of the Argentinean GDP of 4%. In the respective period the Argentinean economy was the only economy that on average displayed a negative growth rate (0.2%).

The MERCOSUR period shows a strong correlation between the Argentinean and the Brazilian GDP (0.558). The Uruguayan GDP showed a higher correlation with the Brazilian GDP (0.247) than with the Argentinean GDP (0.03). In the initial stage of MERCOSUR the quarterly growth rate of the Argentinean GDP topped the one of Brazil by far (1.3% compared to 0.4%). In terms of growth Uruguay was intermediate. Volatility of GDP increased in Brazil and in Uruguay. In Argentina GDP volatility decreased relative to the Pre-MERCOSUR period.

A first approximate statistical analysis yields the result that Argentinean and Brazilian cycles became more synchronized after the creation of MERCOSUR. In terms of the average growth rate the two countries showed a strong divergence over the considered period. Uruguay became less synchronized with both other economies over time. Nonetheless Uruguay displays the most stable average growth within the respective period.

Before running the Beveridge-Nelson decomposition on the three GDP time series, unit root tests of all the series were performed. Contrary to the CPI series, regardless of the testing method applied (the Philips-Perron test or the augmented Dickey Fuller test), all GDP series

<sup>84</sup> GDP growth is measured as change in the logarithm of real GDP. Consequently a value of 0.01 can be interpreted roughly as a change of 1%.

<sup>85</sup> The sample for the Pre-MERCOSUR period was shortened for reasons of comparability between the simple correlation of GDP and the correlation of the irregular component calculated by the Beveridge-Nelson decomposition.

were  $I(1)$  at a 1% significance level. Thus, all of them fulfilled the precondition for the application of the Beveridge-Nelson decomposition.

*Estimation of ARMA Properties of Differenced Real GDP Time Series of Argentina, Brazil and Uruguay*

It was indicated earlier that the differences of the series of concern are represented by an autoregressive moving-average process. The next logical step for proceeding with the analysis is the identification of the ARMA process for each considered time series. As selection criteria for the ARMA processes, the Akaike information criterion (AIC), the Schwartz-Bayes criterion (SBC) and the Ljung-Box Q-statistics were used.<sup>86</sup> Lag lengths were analyzed for a maximum of 4 lags, both AR and MA operators (in order to capture rests of seasonality). Larger lag lengths were not selected, since a parsimonious model was intended and, with slightly more than 60 observations, a larger number of operators would have meant a too large loss in degrees of freedom. For the estimation of the autoregressive integrated moving-average models (ARIMA) the econometrics package for time series RATS® 4.0 DOS was used.

The following processes were identified for the GDPs of Argentina, Brazil and Uruguay (t-statistics denote in parenthesis).

**$GDP_{ARG}$**

$$\Delta y_t = 0.001 - 1.929\Delta y_{t-1} - 0.571\Delta y_{t-2} + 0.02\Delta y_{t-3} + 0.281 \Delta y_{t-4} + \varepsilon_t + 1.207\varepsilon_{t-1} + 0.695\varepsilon_{t-2} \quad (4-11)$$

(0.203) (-5.816)      (-2.479)      (0.098)      (1.912)      (8.198)      (4.735)

The GDP series of Argentina ( $GDP_{ARG}$ ) was found to be an ARIMA(4,1,2) series. Identification of the process was straight forward, since this process was one of the few that did not exhibit serial correlation of the residuals in higher orders according to the Ljung-Box Q-statistics.

**$GDP_{BRA}$**

$$\Delta y_t = 0.004 + 0.008\Delta y_{t-1} - 0.415\Delta y_{t-2} + 0.218\Delta y_{t-3} + \varepsilon_t \quad (4-12)$$

(1.485) (0.678)      (-3.392)      (1.619)

The GDP series for Brazil ( $GDP_{BRA}$ ) was identified as ARIMA(3,1,0) process. Two competing models ARIMA (4,1,3) and ARIMA(3,1,0) resulted according to the AIC and SBC criteria. Finally, the better fit of the in-sample forecast, of the latter model, was conclusive for its choice.

**$GDP_{UGY}$**

$$\Delta y_t = 0.003 - 0.363\Delta y_{t-1} - 0.238\Delta y_{t-2} + 0.022\Delta y_{t-3} + 0.479\Delta y_{t-4} + \varepsilon_t + 0.154\varepsilon_{t-1} \quad (4-13)$$

(0.602) (-1.584)      (-1.695)      (0.144)      (3.893)      (0.587)

Similar to the Brazilian GDP series, two competing models for the Uruguayan GDP series ( $GDP_{UGY}$ ) were compared. ARIMA(4,1,0) and ARIMA(4,1,1) showed an almost similar fit in the in-sample forecast, thus, the slightly lower SBC for the latter was decisive for its

---

<sup>86</sup> For a short exploration on identification-estimation diagnostic checking on ARIMA models see Mills(1994, pp. 116).

choice.

### Results of the Beveridge-Nelson Decomposition

The results of the Beveridge-Nelson decomposition are displayed graphically and will briefly be discussed diagram by diagram. The irregular component  $c$ , of all three series, was tested for stationarity that represents a precondition for the validity of the applied model (compare 0). For all  $c$  series the augmented Dickey-Fuller test rejected the hypothesis of the presence of a unit root, at least at the 5% level.

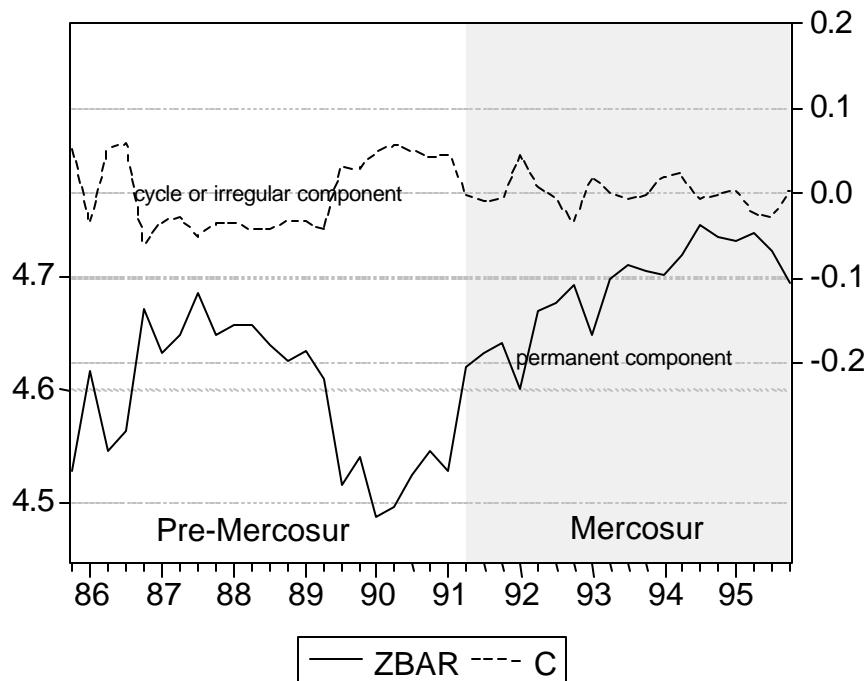


Diagram 4-13: Beveridge-Nelson decomposition of the Argentinean GDP  
1985:4 – 1995:4 (RATS 4.0 ® @BNDECOMP)

The Argentinean growth path shows a large structural break around 1990 (see Diagram 4-13). From then on, coinciding with the introduction of the Convertibility Plan in 1990, growth resumed and displayed a clearly positive slope until the advent of the Mexican crisis at the end of 1994. In the sample, Argentina is the economy that shows the largest break in the growth path that happened approximately one year before the creation of MERCOSUR. An initial visual analysis of the cycle shows a reduction in its volatility. Both economies, the one of Argentina and the one of Brazil, were marked by extremely unstable (economic) policies throughout the eighties that also translate into highly volatile economic indicators.

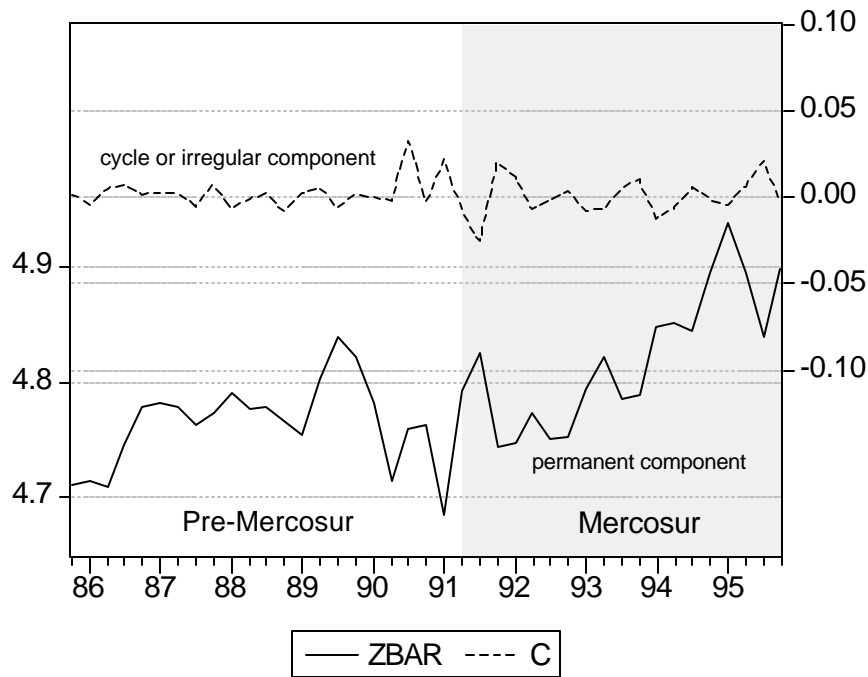


Diagram 4-14: Beveridge-Nelson decomposition of the Brazilian GDP 1985:4 – 1995:4 (RATS 4.0 © @BNDECOMP)

The Brazilian growth path exhibits a structural break around 1990/91 too, that is comparatively less pronounced than the one of Argentina (see Diagram 4-14). The break coincides with the late years of the Collor-de-Melho administration, that were marked by an important fiscal mismanagement accompanied by hyperinflation (Edwards, 1997, p. 86). This break is also reflected by the cyclical component that shows the largest peaks and lows during this period. Contrary to Argentina the cycle component displays higher volatility during the MERCOSUR period than before. Nonetheless, it has to be born in mind that the implementation of the first successful stabilization program – the Real Plan – was put into action at the end of 1994.

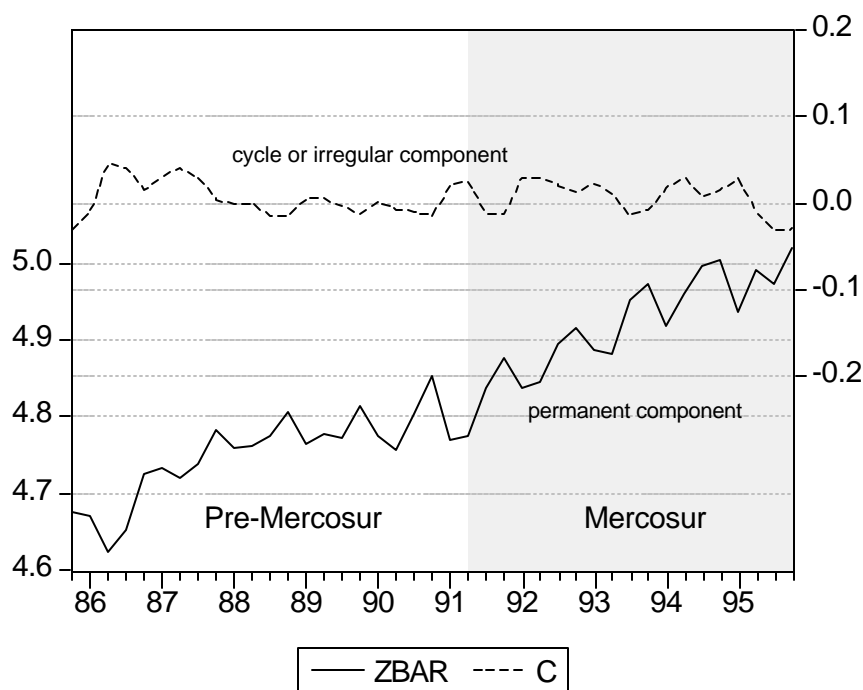


Diagram 4-15: Beveridge-Nelson decomposition of the Uruguayan GDP 1985:4 – 1995:4 (RATS 4.0 © @BNDECOMP)

The Uruguayan growth path resembles the pattern one is most used to when analyzing the growth path of the so called industrialized economies. Neither major structural breaks become visually evident regarding the permanent component nor does the cyclical component display significant volatility.

The visual analysis of the three graphs draws a disharmonic picture of the behavior from the cycles as well as from the growth path of the MERCOSUR economies. This impression was not only confirmed by the foregoing analysis of the correlation coefficients of the changes of the differenced GDP series, but also by the correlation coefficients of its permanent and irregular components. In the Pre-MERCOSUR period, changes in the permanent component show little correlation of 0.108 between the two large economies Argentina and Brazil. Uruguay shows a relatively strong correlation with the two large economies, 0.423 with Argentina and 0.591 with Brazil. Unsurprisingly, changes in the permanent component correlate slightly more than changes of the GDP do, though this difference is not really pronounced. During the MERCOSUR period, changes of the permanent component correlate slightly positively between Argentina and Brazil (0.212 and 0.207 respectively). The correlation of the changes of the permanent component between Uruguay and Brazil clearly turns negative with a factor of 0.392. The irregular component (cycle) shows a somewhat different picture. During the Pre-MERCOSUR period the Argentinean and the Brazilian cycle correlated with a coefficient of 0.352 and the Uruguayan and the Brazilian cycle with an almost negligible 0.149. The Uruguayan and Argentinean cycle show a slightly negative correlation of  $-0.069$ . During the MERCOSUR period the cyclical correlation coefficient between Argentina and Brazil and Uruguay and Brazil become negative ( $-0.25$  and  $-0.372$  respectively). The cycles between Uruguay and Argentina became strongly correlated with a correlation coefficient of 0.566.

At least two conclusions can be drawn: (1) The correlation coefficients of the differenced GDP were bad proxies for the correlation coefficients of the cycles in both periods, the Pre-MERCOSUR and the MERCOSUR period. (2) The cycles of all three countries showed

little correlation in the Pre-MERCOSUR period. One exception is the correlation between the Argentinean and Uruguayan cycle that correlate significantly positively.<sup>87</sup> Cycles seem to have widened their asymmetries in the early stage of MERCOSUR. This may be also due to the fact that Argentina and Uruguay were able to successfully implement stabilization programs at an earlier stage than Brazil could. Carrera et al.(1998) decomposed the GDP of Argentina and Brazil into its trend and cycle components by differencing the Hodrick-Prescott filtered series from the original series. For the period 1980:1 to 1991:1 they obtain a correlation coefficient of the two cycles of 0.30 and for the subsequent period 1991:2 – 1993:3 the coefficient equals -0.55. Thus, the Argentinean and Brazilian cycles show roughly comparable correlation coefficients with either decomposition method.<sup>88</sup>

Correlation matrix $\Delta\bar{z}$		$GDP_{Arg}$	$GDP_{Bra}$	$GDP_{Ugy}$
<b>Whole period</b> 1985:4 – 1995:4	$GDP_{Arg}$	1.000		
	$GDP_{Bra}$	0.163	1.000	
	$GDP_{Ugy}$	0.337	0.046	1.000
<b>Pre-mercosur period</b> 1985:4 – 1991:1	$GDP_{Arg}$	1.000		
	$GDP_{Bra}$	0.108	1.000	
	$GDP_{Ugy}$	0.423	0.591	1.000
<b>MERCOSUR period</b> 1991:2 – 1995:4	$GDP_{Arg}$	1.000		
	$GDP_{Bra}$	0.212	1.000	
	$GDP_{Ugy}$	0.207	-0.392	1.000

Table 4-5: Correlation matrix of  $\Delta\bar{z}$   
calculated by RATS 4.0 ® @ BNDECOMP procedure

Correlation-Matrix $c$		$GDP_{Arg}$	$GDP_{Bra}$	$GDP_{Ugy}$
<b>Whole period</b> 1985:4-1995:4	$GDP_{Arg}$	1.000		
	$GDP_{Bra}$	0.150	1.000	
	$GDP_{Ugy}$	0.087	-0.117	1.000
<b>Pre-Merecosur</b> 1985:4 – 1991:1	$GDP_{Arg}$	1.000		
	$GDP_{Bra}$	0.352	1.000	
	$GDP_{Ugy}$	-0.069	0.149	1.000
<b>Merecosur</b> 1991:2 – 1995:4	$GDP_{Arg}$	1.000		
	$GDP_{Bra}$	-0.250	1.000	
	$GDP_{Ugy}$	0.566	-0.372	1.000

Table 4-6: Correlation matrix of  $c$   
calculated by RATS 4.0 ® @ BNDECOMP procedure

#### 4.5.2 Factor Mobility

If shocks occur asymmetrically between countries, as was shown in the previous section other adjustment mechanisms are required. Labor mobility, although often treated in studies on OCA theory, proves to be a very unsatisfactory OCA criterion. Despite these theoretical and empirical drawbacks labor mobility, in the large MERCOSUR countries, does not seem to be of importance. Wage flexibility has improved over the last years. Nonetheless, wages in the MERCOSUR countries are still relatively rigid. The degree of financial market integration is high in Argentina and in Uruguay but less so in Brazil.

<sup>87</sup> A significantly positive correlation here is defined to be within the range of 0.5 and 1.0.

<sup>88</sup> For a detailed comparison between the Hodrick-Prescott filtered data and the Beveridge-Nelson decomposition and a critique on Carrera et al.(1998) see Kronberger (2001a, pp. 174).

#### 4.5.2.1 Labor Mobility

Data on labor migration is relatively scarce in developing countries. From the data available only very weak conclusions can be drawn. In Argentina censuses with data of immigrants of the contiguous countries from the years 1970, 1980 and 1991 are available (Table 4-7).<sup>89</sup>

Argentina: Immigrants from bordering countries	1970		1980		1991		employed (%) (1991)	% of total population (1991)	Unempl. (%) (1991)
	abs.	%	abs.	%	abs.	%			
Bolivians	92,356	17.30%	118,288	15.70%	149,822	18%	n/a	n/a	n/a
Brazilians	44,843	8.40%	42,945	5.70%	35,351	4%	0.05*	0.02	4.8
Chileans	132,928	24.90%	215,480	28.60%	255,034	30%	n/a	n/a	n/a
Paraguayans	211,938	39.70%	262,946	34.90%	261,767	31%	52.84	6.03	5.1
Uruguayans	51,249	9.60%	113,767	15.10%	139,721	17%	12.38	4.48	8.9
<b>Total</b>	<b>533,850</b>		<b>753,428</b>		<b>841,697</b>				

Table 4-7: Argentina: Immigrants from bordering countries

Source: Maguid(1997) and Inter-American Development Bank, Washington D.C.,\* 1990

The comparison of the respective figures shows that the fraction of Brazilian immigrants in Argentina was small throughout the observation period. In 1991 0.02% of the Brazilian population emigrated to Argentina. This represents a fraction that has hardly any influence on the labor markets of either country. In 1991, the development of the GDP in all two MERCOSUR countries indicated a recession in Brazil and in Uruguay and a starting recovery in Argentina, following the introduction of the Convertibility Plan.<sup>90</sup> Thus, according to the cyclical data a higher fraction of Brazilian immigrants could have been expected, if Brazilian laborers were mobile and if labor mobility were facilitated by the respective labor laws. Further, the language barrier between these two countries has to be taken into account.

The fraction of Uruguayan immigrants in Argentina has increased significantly over time. In 1970 51,249 Uruguayans emigrated to Argentina. By 1991 this number more than doubled to 139,721 immigrants. In terms of its total population 4.48% of the Uruguayan population moved its residence from Uruguay to Argentina. Besides the lower performance of the Uruguayan economy, in terms of its GDP, unemployment was also relatively higher in Uruguay than in Argentina (8.9% compared to 6.5%). Hence, the aggregate economic variables GDP and unemployment could support the thesis that economic reasons were the cause for the relatively large stock of Uruguayan immigrants in Argentina.

In absolute numbers Paraguayan immigrants represent the largest share of immigrants from the bordering countries in Argentina.<sup>91</sup> In 1980 and in 1991 approximately 260,000 Paraguayans resided in Argentina. They represented 6% of the total Paraguayan population. Heikel and Rojas Bahr(1993, p. 108) indicate wage differentials and cycles as the main reason for the large flow of Paraguayans to Argentina. However - as is true for all of the before presented figures on an aggregate level - clear conclusions cannot be drawn. Little knowledge of the socio-economic characteristics of the migrating population exists. One example would be: Do Paraguayan immigrants have a temporary working license and return to their domestic country after its expiration or do they have a permanent residence in the host country? This

<sup>89</sup> Argentina itself is an expeller of professional, technical and qualified labor that heads mainly to the US, Canada and Europe and at the same time a receiving country in the small regional subsystem (Maguid, 1997, p. 3).

<sup>90</sup> Compare Kronberger(2001a, pp. 175).

<sup>91</sup> Paraguay receives a large share of Brazilian immigrants. The reasoning, however, is different. Brazilians hold a considerable share of territory in Paraguay (Heikel and Rojas Bahr, 1993).

question comes close to the objection raised in 3.2.2.1.2, where it is doubted that migrants would act to balance internal and external macroeconomic equilibria. What role do legal and cultural barriers play? How large is the fraction of the economically active population in the cited statistics? How important are non-economic reasons for the migration flows? In the past many migrants were motivated by political instability to change their country of residence.

#### 4.5.2.2 Wage Flexibility

The model presented in 3.2.2.1.3 suggests that monetary policy becomes increasingly ineffective with an increasing degree of wage indexation. Presently, real wage rigidity in the MERCOSUR countries seems to be high (Levi Yeyati and Sturzenegger, 1999a, pp. 12). An insulated consideration of real wage-unemployment elasticities of economies, that recently have undergone high-impact stabilization programs and are currently in a strong liberalization process involved, will not provide a complete explanation. Diagram 4-16 shows graphically the path of the real average wage and unemployment in Argentina from 1991 to 1998. Until the end of 1996 unemployment had been growing almost continuously despite slowly decaying real average wages. The trend in unemployment reversed thereafter without any visually recognizable change in the path of real wages.

Diagram 4-17 shows the evolution of real average wages in Argentina, Brazil and Uruguay. For reasons of comparison the wage indices are shown on a logarithmic scale. Real wages in Argentina do not show important changes. Brazilian wages increased significantly following the introduction of the Real Plan.

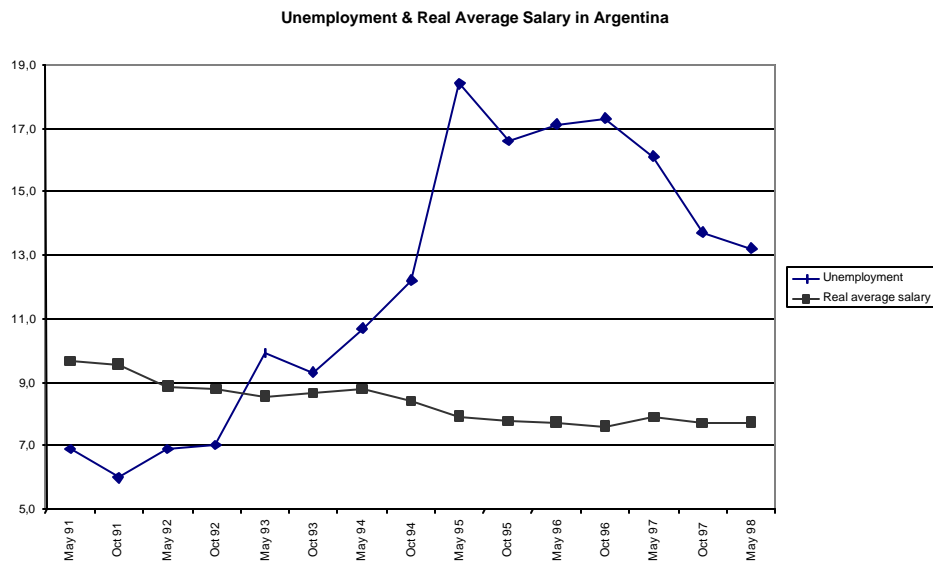


Diagram 4-16: Argentina: Log of unemployment and real average wages  
 Source: Altimir and Beccaria(1999) and Economic Commission for the Caribbean and Latin America/ECLAC, Santiago de Chile

The maxi-devaluation in January 1999 brought real wages back to the level that prevailed before the introduction of the Real Plan. Uruguayan wages increased slightly from 1993 to 1996. From then on real wages stayed relatively stable. In 1999 wages started to fall slightly. The level of 1993, however, was not achieved. Wages still remained just beyond the 1993 level. As can be seen from Diagram 4-17 wages do not seem to have reacted dramatically to the major external crisis in South East Asia in 1997 or Russia in 1998. Wages in Uruguay seem to have reacted more strongly to the Brazilian crisis in 1999 than did the wages in Argentina.

The conclusions that can be drawn from the relationship between wages and unemployment in Argentina are only such that the unemployment-wage elasticity will not tell

the whole story for the causes of unemployment in Argentina. The evolution of real wages in the different MERCOSUR countries has to be seen in the context of different and changing exchange rate regimes. Further, both, unemployment and wages, are subject to a changing environment due to the ongoing liberalization in all the MERCOSUR countries, vis-à-vis the MERCOSUR countries but also vis-à-vis the rest of the world. From 1990 to 1996 8.2 million new jobs were created, of which 7.9 millions were in the informal sector.

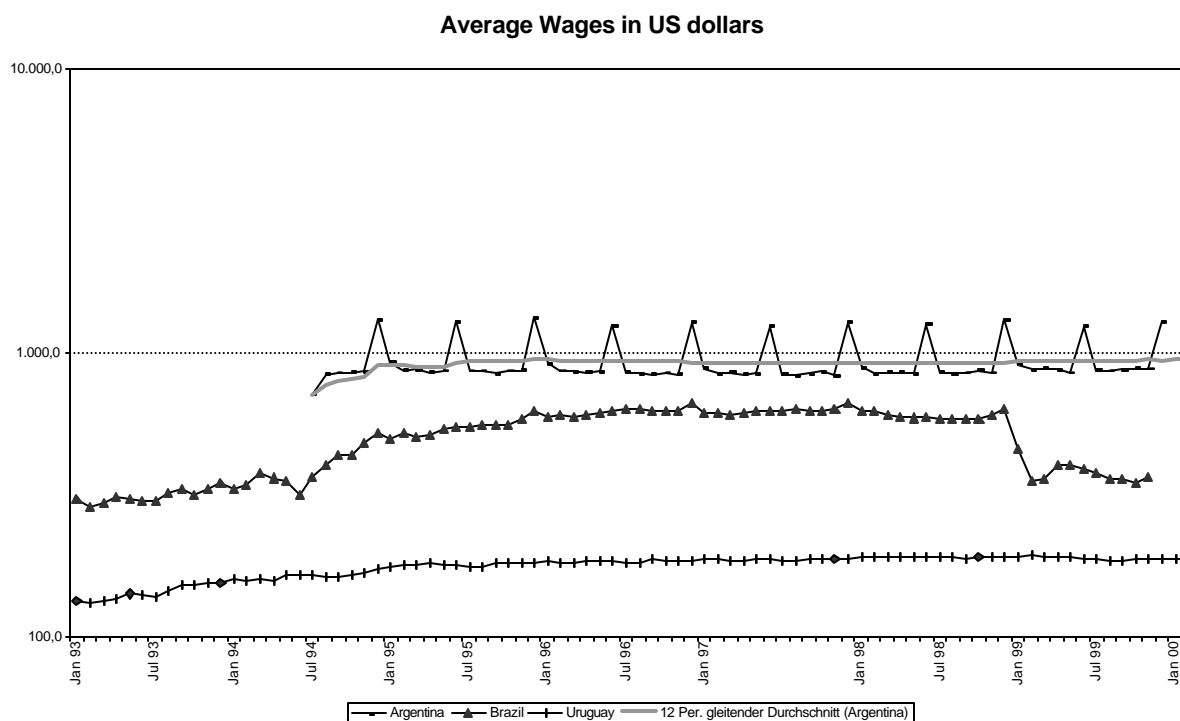


Diagram 4-17: MERCOSUR: Averages wage indices in US \$ deflated by US CPI logarithmic scale, moving average for Argentina calculated over 12 periods in Excel 97®  
Source: MERCOSUR SWG 4 Commission of Macroeconomic Indicators, Montevideo

Causal factors for unemployment are privatization of public enterprises, and a higher increase in productivity than in the labor demand as a consequence of the use of new technologies.<sup>92</sup> The analysis of differences in labor laws and the relative strengths of the unions would have to be done on a country by country basis in order to describe wage flexibility accurately. Levi Yeyati and Sturzenegger(1999a, p.12) cite correlations of 1.12 for Argentina and 1.01 for Brazil between inflation and nominal wages. This correlation provides an additional measure for the flexibility of wages in the MERCOSUR countries. These numbers would indicate overly rigid wages in the two countries.<sup>93</sup>

#### 4.5.2.3 Integration of Financial Markets

Basically the use of two different methods of measuring the degree of capital market integration is widely acknowledged. The concept of the covered interest rate differential (CID) represents the first approach to measuring the degree of capital market integration. A high interest rate differential between two countries reflects barriers between domestic capital markets, which take the form of transactions costs, capital controls, default risk, etc. The second approach is the application of the Feldstein-Horioka equation. If the saving and investment rate

<sup>92</sup> Compare Tokman and Martinez Fernandez(2000) and ILO(1998).

<sup>93</sup> Compare  $\pi$ , the measure of indexation in equation ( 3-6) in 3.2.2.1.3.

of a country correlate highly its capital market is assumed to exhibit a low degree of integration. A third approach that, however, is more limited in scope is the measuring of the co-movement of stock indices (Eichengreen, 1991, p. 6). The closer the considered stock prices move, the less important regional shocks become; or looked at from the perspective of factor mobility, the faster factors of production are reallocated from the country suffering a negative shock to countries which are not affected by this shock.

#### *The Covered Interest Rate Differential*

The definition of the covered interest-rate differential (CID) is

$$CID = i - i^* - fd \quad (4-14)$$

The difference between the nominal domestic interest rate  $i$  and the foreign interest rate  $i^*$  and the forward premium  $fd$  “...captures all barriers to integration of financial markets across national boundaries: transactions costs, information costs, capital controls, tax laws that discriminate by country of residence, default risk and risk of future capital controls.” (Frankel, 1992, p. 200).

Extensive data on forward rates was not available for neither MERCOSUR country. Garcia and Valpassos (1998) computed the CID for Brazil and used altogether 3 different measures on the CID (CID computed with US dollar futures, CID computed with Brazilian bonds issued in US dollar, and the CID computed with Brazilian bonds indexed to US dollars).<sup>94</sup> The second type of computation was chosen for reasons of comparability and of data available. Ideally the difference between the domestic rate on treasury bills (this corresponds with 60c.f in the International Financial Statistics) and the US treasury bill (60c) would have served for the calculation of the CID. This measure was only available for Brazil and Uruguay (see Diagram 4-18). The CID for Uruguay throughout the observation period (from 1995 to 1998) has been constantly below 1% (during a short period even negative). The CID in Brazil ranged between 5.22% and 13.87% indicating a significantly less integrated capital market of Brazil with the rest of the world.

---

<sup>94</sup> For a discussion on the three different measures see Garcia and Valpassos (1998, pp. 14).

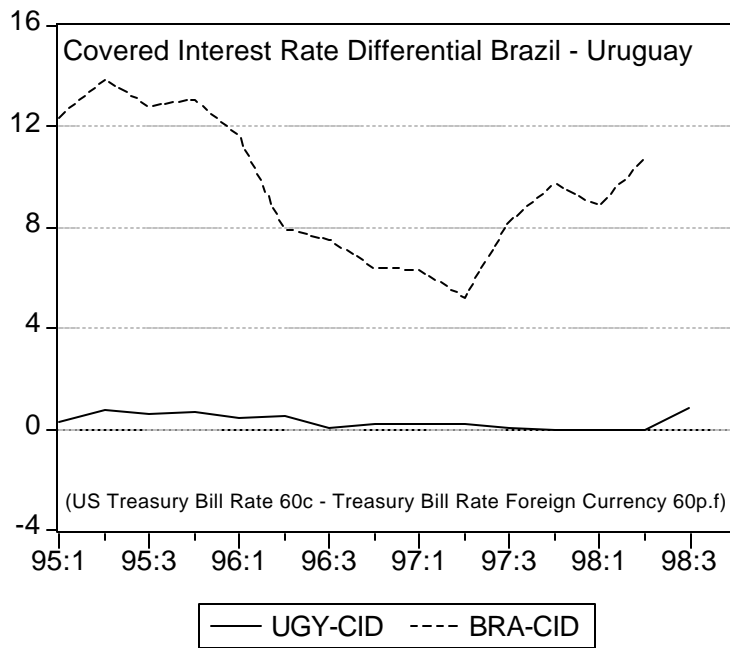


Diagram 4-18: Brazil and Uruguay: Covered interest rate differential (60c.f-60c)  
 Source: International Financial Statistics/IFS, International Monetary Fund/IMF, Washington D.C.

The same indicator was not available for Argentina. Instead of the treasury bill rate, the lending rate was used (60p.f – 60p) for computing the CID. In 1995 in Argentina, following the Mexican crisis, the CID topped 8.42%. In 1997 the CID even became negative (see Diagram 4-18). Uruguay’s credit market was less integrated, with a CID ranging between 3.17% and 5.43%. As can be seen by comparing Diagram 4-18 with Diagram 4-19 the credit market is not identical with the treasury bill market. A larger CID for the credit market than for the treasury bill market in Uruguay might reflect the fact that creditors in Uruguay faced relatively higher transaction costs or were more prone to default than treasury bills that are predominantly issued by the government and also on international markets (compare Banco Central del Uruguay, 1995).

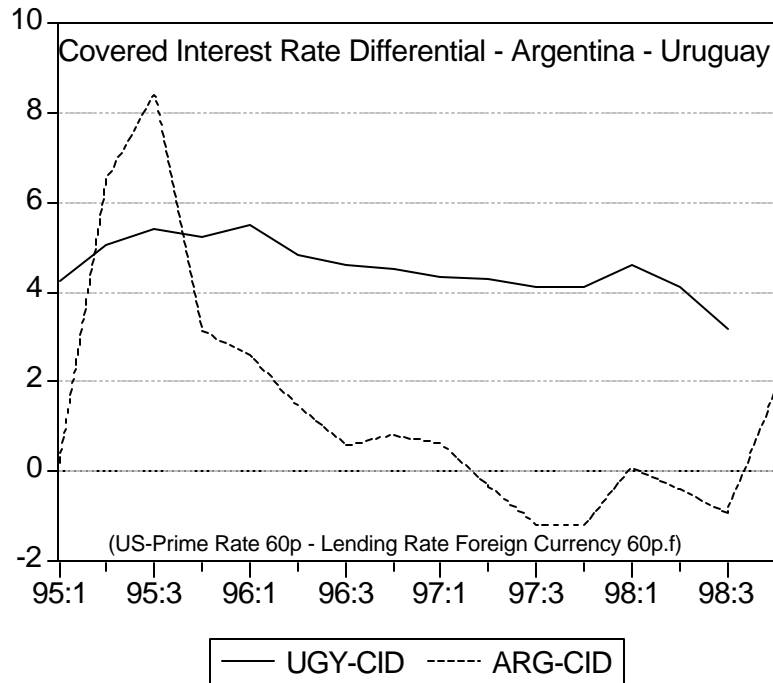


Diagram 4-19: Brazil and Uruguay: Covered interest rate differential (60p.f-60p)  
 Source: International Financial Statistics/IFS, International Monetary Fund/IMF, Washington D.C.

*The Feldstein-Horioka Equation*

Feldstein and Horioka(1980, pp. 316) developed a popular model for measuring international capital mobility thus referring to long-term capital, since long-term assets are less likely to be arbitrated internationally. Countries exhibiting a high correlation between their saving and investment rates have closed financial sectors, showing little capital mobility internationally (equation ( 4-15 )). Full capital mobility requires that the domestic real interest rate equals the world real interest rate (real interest rate parity) and that domestic savings are not correlated at all with domestic investment.

$$\left(\frac{I}{Y}\right)_t = \mathbf{a} + \mathbf{b}\left(\frac{S}{Y}\right)_t + u_t \tag{4-15}$$

Empirically, often residual correlation as well as correlation of the present residual  $u_t$  with  $(S/Y)_t$ , are likely indicating endogeneity of the latter variable. Procyclical movement of both saving and investment and/or the influence of government on saving are theoretical explanations (Frankel, 1992, p. 198). Econometrically endogeneity can be overcome by a time series approach of the following form:

$$\Delta\left(\frac{I}{Y}\right)_t = \mathbf{a} + \mathbf{b}\Delta\left(\frac{S}{Y}\right)_t + \mathbf{g}\left(\frac{S}{Y} - \frac{I}{Y}\right)_t + \mathbf{d}\left(\frac{S}{Y}\right)_t + v_t \tag{4-16}$$

Equation ( 4-16 ) represents the first equation of an error-correction model. If two variables are endogenous and converge to a long-run equilibrium, they are said to be cointegrated. Similar to equation ( 4-15 ) the coefficient  $\mathbf{b}$  explains the changes in investment by

changes in saving (short-term relation), or in other words, to what extent is a saving shock passed through to investment (Taylor, 1997, p12). The  $\mathbf{g}$  coefficient represents the adjustment speed to the long-term equilibrium.

The availability of data will constrain the application of the Feldstein-Horioka equation to the Argentinean case. The data set with quarterly time series was divided into a Pre-Convertibility Plan period (from 1980:1 to 1991:1) and a Convertibility-Plan period (from 1991:2 to 1995:4). The two estimations of equation XX yielded the following result (The t-statistics are in parenthesis).

$$i_t = 0.023 + 0.807s_t + \mathbf{e}_t \quad (4-17)$$

(0.295) (2.09)

$$i_t = 0.182 + 0.125s_t + \mathbf{e}_t \quad (4-18)$$

(2.775) (0.317)

In the Pre-Convertibility-Plan period the positive correlation for the investment and saving ratios  $\mathbf{b}$  was equal to 0.807, though the Durbin-Watson coefficient of 0.15 indicates serial correlation of the residuals. Further  $\bar{R}$  has little explanatory power with a value equal to 0.093. The period succeeding the introduction of the Law of Convertibility yields a statistically insignificant  $\mathbf{b}$  of 0.125. The savings ratio has virtually no explanatory power for investment with  $\bar{R} = 0,006$ . Even the hypothesis that none of the coefficients are significantly different from zero cannot be rejected.

Although the outcome of the equations ( 4-17 ) and ( 4-18 ) would suggest that before the introduction of the Convertibility Plan the Argentinean capital market showed a low degree of integration and thereafter the degree increased, the results of the Durbin-Watson statistic cannot be neglected. Serially correlated errors are likely to lead to misspecified estimators. The outcome of a biased estimator is probable (Kennedy, 1992, pp. 120).

The Engle-Granger methodology allows for the estimation of time series models whose variables are integrated at the same order. Although the time series are allowed to diverge temporarily, over the long run they converge to an equilibrium path, that is, they are cointegrated. Long run equilibrium is represented by equation ( 4-19 ):

$$i_t = \mathbf{b}_0 + \mathbf{b}_1 s_t + e_t \quad (4-19)$$

Short run dynamics are represented by equations ( 4-20 ) and ( 4-21 ):

$$\Delta i_t = \mathbf{a}_1 + \mathbf{a}_i(i_{t-1} - \mathbf{b}_1 s_{t-1}) + \sum_{j=1} \mathbf{a}_{i1}(j)\Delta i_{t-j} + \sum_{j=1} \mathbf{a}_{i2}(j)\Delta s_{t-j} + \mathbf{e}_{it} \quad (4-20)$$

$$\Delta s_t = \mathbf{a}_2 + \mathbf{a}_s(i_{t-1} - \mathbf{b}_1 s_{t-1}) + \sum_{j=1} \mathbf{a}_{s1}(j)\Delta i_{t-j} + \sum_{j=1} \mathbf{a}_{s2}(j)\Delta s_{t-j} + \mathbf{e}_{st} \quad (4-21)$$

$i$  denotes the investment to GDP ratio and  $s$  the saving to GDP ratio respectively.  $\mathbf{a}$  and/or  $\mathbf{a}_s$  being different from zero indicate the presence of cointegration of the saving and investment ratios. One and/or the other adjustment coefficient would ensure that the two variables converge to a long run equilibrium after a shock has occurred. Therefore,  $\mathbf{a}$  and  $\mathbf{a}_s$

measure the speed of returning to the long run equilibrium.<sup>95</sup>

The same data set as was used for the simple Feldstein-Horioka estimation, (equation ( 4-17 ) and ( 4-18 )), was tested for the presence of a unit root. The same order of integration would be the precondition for a valid cointegration system. In the Convertibility Plan period neither the investment nor the saving series contains a unit root. They are both  $I(0)$ . For the Pre-Convertibility Plan period both variables resulted to be integrated of the first order  $I(1)$ . The estimation of the long run equilibrium equation yielded a  $\mathbf{b}$  of 0.918. The constant was left out, since it proved to be insignificant (t-statistics are denoted in parentheses):

$$i_t = 0.918 s_t + e_t \quad (4-22)$$

(35.748)

Following the Engle-Granger methodology with the inclusion of seasonal dummy variables the cointegration of both variables  $CI(1,1)$  can be confirmed (see, for instance, Enders, 1995, pp. 381). The application of the Dickey-Fuller test, for the presence of a unit root, yielded a t-value of -2.28 (0 lags) and -3.53 for (4 lags). Consequently only with the augmented-Dickey-Fuller test (4 lags) the hypothesis of a unit root in the residuals of the long-run equilibrium regression can be rejected.<sup>96</sup> The estimated system for the short run dynamics takes the following form:

$$\Delta i_t = -0.003 + 0.143\Delta s_{t-1} - 0.084\hat{e}_{t-1} - 0.021\Delta i_{t-1} + \mathbf{e}_{1t} \quad (4-23)$$

(-2.04) (1.397) (-1.69) (-1.44)

$$\Delta s_t = -0.004 + 0.048\Delta s_{t-1} + 0.064\hat{e}_{t-1} - 0.877\Delta i_{t-1} + \mathbf{e}_{2t} \quad (4-24)$$

(-1.77) (0.353) (0.958) (-4.42)

The speed of adjustment coefficient  $\mathbf{a}$  is significant at the 10% level in equation ( 4-23 ).<sup>97</sup> It equals  $-0.084$ . The only other variable significant at the 5% level is the constant. The estimation of equation ( 4-24 ) did not show a significant coefficient for the error-correction term. The visually inspected residuals  $e_{1t}$  and  $e_{2t}$  did not show any anomalies. The Durbin-Watson statistics equaled 2.07 and 2.00 respectively. The use of the Engle-Granger methodology confirmed the findings of the simple Feldstein-Horioka equation. In the Pre-Convertibility Plan period the investment and the savings ratio are cointegrated. The significance level of the adjustment coefficient is at a still acceptable level but the significance is not very strong.

### *The Cointegration of the Stock Markets*

Sanchez Valle(1998) estimated an error-correction model (Johansen methodology) for the stock exchange indices of the United States, Argentina, Brazil, Chile and Mexico for the period 1976:1 to 1998:3. Like the other two stock exchanges the Merval (Argentina), the BOVESPA (Brazil) and the Dow Jones index (USA) are cointegrated. The 3 stock indices

---

<sup>95</sup> The term  $(i_{t-1} - \mathbf{b}_1 s_{t-1})$  can be replaced by  $\hat{e}_{t-1}$  which is the residual that estimates the deviation from the long run equilibrium.

<sup>96</sup> The Engle-Yoo critical value for 50 observations and 2 variables equals  $-3.29$  at the 5% and  $-2.6$  at the 10% significance level.

<sup>97</sup> When seasonally adjusted data was used  $\alpha_1$  equaled  $-0.095$  at a 5% significance level. Moreover,  $\mathbf{a}11$  was equal to  $-0.26$  at a 8.5% significance level.

converge to a long-run equilibrium. The first two estimations cover the whole period, once with a dummy variable for the 1987 stock exchange crash and once without. In both estimations the adjustment coefficient for Argentina (-0.020 and -0.018) is much larger than for the two larger countries (-0.003 and -0.003 for Brazil; 0.004 and 0.003 for the USA) (see Table 4-8). For the period from 1976 to 1987 the hypothesis of a cointegrated vector for all stock indices was rejected indicating a lower degree of integration in the second half of the seventies and the first half of the eighties.

<b>Coefficients of adjustment</b>	<b>Argentina</b>	<b>Brazil</b>	<b>USA</b>
No dummy(1976-1998)	-0.0202	-0.0033	0.0040
With dummy (1976-1998)	-0.0188	-0.0032	0.0029
Pre-October 1987 (1976-1987)	Rejection of single cointegrating vector		
Post-October 1987 (1987-1998)	-0.487	0.0712	0.0581

Table 4-8: Adjustment coefficients indicating stock market integration in MERCOSUR  
Source: Sanchez Valle(1998)

The post-stock exchange crash period from 1987 to 1998 is characterized by much faster adjustment to shocks, relative to the adjustment in the models estimated from the larger samples. In Argentina the adjustment coefficient increased to -0.487, in Brazil to 0.071 and in the United States to 0.058.<sup>98</sup>

In conclusion, the lack of harmonized data does not allow for directly comparable results on the degree of capital market integration in all MERCOSUR countries. The CID on the T-bill markets in Brazil and Uruguay suggests a highly integrated Uruguayan T-bill market and a highly disintegrated Brazilian T-bill market. By the end of 1998 the CID on foreign currency credit in Argentina and Uruguay were in a range of 2 to 3%, thus, indicating a relatively high degree of integration in this financial sector. The estimated Feldstein-Horioka equation for Argentina confirms that before the introduction of the Convertibility Plan Argentina's financial market was highly disintegrated. The change of the order of integration from  $I(1)$  to  $I(0)$  for both, the investment and saving ratio, coincides with the aperture of the Argentinean financial market. Finally, the cointegration of the stock market indices of Argentina, Brazil and the USA point at rather highly integrated stock markets in the Western Hemisphere. Levy Yeyati and Sturzenegger(1999b) provide an overview regarding tests on financial integration which correspond with the findings presented before in the case of Argentina and in the case of Brazil (see Table 4-9). For the Brazilian financial markets Garcia and Barcinski(1996) and Garcia and Valpassos(1998) provide a better benchmark for recent years.

---

<sup>98</sup> The Merval index already comprises shares, which are also quoted on the New York Stock Exchange. One example is YPF (its listing can be confirmed by typing 'YPF' at the website of the New York Stock Exchange <<http://www.nyse.com>>) The same holds true for the Brazilian stock market. Examples for listed Brazilian enterprises are TELEBRAS, EMBRAER, etc. The double quotation in two stock markets also represents a cause for a closer comovement of the respective stock indices.

Study	Type of Test	Argentina	Brazil
Obstfeld(1994)	Correlation of changes in domestic and world consumption (1951-72)/(1973-88)	low/low	n/a
Haque and Montiel(1991)	Uncovered interest rate parity (1969-1987)	n/a	intermediate
Montiel(1994)	Cross capital flows/GDP Saving-investment correlations (1970-1990) – Uncovered interest parity differentials(1985-1990)	high	low medium
World Bank(1997)	Composite index of financial integration (1985-1987)/(1992-1994)	medium (-)/high	low/high

Table 4-9: Summary of tests on financial integration in Latin American countries  
Source: Levi Yeyati and Sturzenegger(1999b)

### 4.5.3 Openness of Trade

The McKinnon criterion of trade openness (compare 3.2.2.2) is often applied in empirical works on the optimum currency area theory. According to the expectations the two larger MERCOSUR countries show a significantly lower degree of openness than do the smaller countries. Openness was defined as the ratio of either exports or imports divided by GDP in nominal terms. The empirical data that is described below is summarized in Table 4-10.

When MERCOSUR was created Argentina's exports to Brazil were worth 1.01% of its GDP. The respective figure almost tripled by 1997 to 2.97% and thereafter declined again to 2.03% in 1999. In 1990 imports from Brazil represented 0.51% of GDP. A maximum value of 2.49% was reached in 1997, which in 1999 decreased to 1.99%. In 1999 the two small MERCOSUR countries Paraguay and Uruguay bought Argentinean products worth 0.19% and 0.28% of the Argentinean GDP. In the same year the two countries sold products worth 0.11% and 0.14% respectively.

The importance of Brazilian intra-MERCOSUR exports was low in the very beginning of MERCOSUR. In 1990 Brazil sold exports worth 0.16% of its GDP to Argentina. These exports increased by approximately 400% to 0.83% in 1993. In 1998 a maximum of 0.87% was achieved and shed 0.17 percentage points to 0.7% in 1999. The share of Brazilian exports to the two small MERCOSUR countries Paraguay and Uruguay was 0.1% and 0.09% respectively. The numbers of the import side in 1999 differ only slightly from the export side. An extremely small fraction of 0.03% of Paraguayan imports is conspicuous.

Surprisingly the creation of MERCOSUR coincided with an important drop of Paraguayan sales to Brazil. Initially exports to Brazil represented 5.93% of Paraguayan GDP in 1990, subsequently dropping to 2.65% in 1992, increasing again to 5.42%, and finally dropping to 2.81% in 1999. After being close to 1% from 1990 to 1996 exports to Argentina increased sharply to 3.19% in 1997 and finally represented 3.43% in 1999. The import side is characterized by a more continuous increase. Imports from Brazil, Argentina and Uruguay rose from 4.22%, 3.27% and 0.19% in 1990 to 10.09%, 7.2% and 0.92% respectively.

Similar to Paraguay the creation of the customs union coincides with a significant decline in Uruguayan exports to Brazil. Exports to Brazil represented 6.06% of GDP in 1990 and fell to a minimum of 2.4% in 1992 since the inception of MERCOSUR. In 1999 this share was only slightly higher at 2.79% having been at 4.64% in the previous years. Exports to Argentina increased from 0.98% in 1990 to 2.55% in 1998 and consequently decreased to

1.85% in 1999. The Uruguayan import side showed less significant changes. In 1990 Argentinean imports represented 2.62% of the Uruguayan GDP and increased to 3.96% in 1999. Brazilian exports showed a less considerable decrease from 3.95% in 1990 to 3.24% in 1999. Trade with the other small MERCOSUR country Paraguay is of hardly any significance, exports amounted to 0.41% and imports to 0.07% in 1999.

In the ratio of the sum of the intra-MERCOSUR imports and exports to GDP is shown. In 1999 the respective ratios for Argentina, Brazil, Paraguay and Uruguay were 4.73%, 1.77%, 24.65% and 12.31%, Brazil being the MERCOSUR economy with the lowest degree of openness vis-à-vis the other three MERCOSUR countries. By the visual inspection of the intra-MERCOSUR trade to GDP ratios exhibit clear growth for Argentina, Brazil and Paraguay (150.83%, 103.23% and 65.55% respectively for the period from 1990 to 1999). The same ratio shows a negative growth for Uruguay (-10.89%).<sup>99</sup>

<b>Arg X</b>	<b>1990</b>	<b>1999</b>	<b>Bra X</b>	<b>1990</b>	<b>1999</b>	<b>Ugy X</b>	<b>1990</b>	<b>1999</b>	<b>Pgy X</b>	<b>1990</b>	<b>1999</b>
Brasil	1,01%	2,03%	Argentina	0,16%	0,70%	Argentina	0,98%	1,85%	Argentina	1,06%	3,43%
Paraguay	0,10%	0,19%	Paraguay	0,09%	0,10%	Brazil	6,06%	2,79%	Brazil	5,93%	2,81%
Uruguay	0,19%	0,28%	Uruguay	0,07%	0,09%	Paraguay	0,07%	0,41%	Uruguay	0,23%	0,20%
<b>Arg M</b>	<b>1990</b>	<b>1999</b>	<b>Bra M</b>	<b>1990</b>	<b>1999</b>	<b>Ugy M</b>	<b>1990</b>	<b>1999</b>	<b>PgY M</b>	<b>1990</b>	<b>1999</b>
Brasil	0,51%	1,99%	Argentina	0,34%	0,76%	Argentina	2,62%	3,96%	Argentina	3,27%	7,20%
Paraguay	0,03%	0,11%	Paraguay	0,08%	0,03%	Brazil	3,95%	3,24%	Brazil	4,22%	10,09%
Uruguay	0,06%	0,14%	Uruguay	0,14%	0,09%	Paraguay	0,13%	0,07%	Uruguay	0,19%	0,92%

Table 4-10: Intra-MERCOSUR exports and imports as share of GDP,

Source: Centro de Economía Internacional, Ministerio de Relaciones Exteriores, Comercio Internacional y Culto, Buenos Aires

Diagram 4-20 further reveals that Brazil's degree of openness comprising intra- and extra-MERCOSUR is the lowest within MERCOSUR (13.9%). Intra-MERCOSUR trade is smallest relative to total Brazilian trade with a share of 2.32 percentage points (or 16.6% of total Brazilian trade). Argentina is still a relatively closed economy with an overall degree of openness of 20.76%, of which a fraction of 6.19 percentage points (or 29.8%) represents intra-MERCOSUR trade. The respective figures for Uruguay and Paraguay are 31.69% and 14.63 percentage points (or 46.16%) and 54.13% and 28.8 percentage points (or 53.2%) The two small MERCOSUR economies do not only have a higher degree of openness in terms of total trade but are also more intertwined with MERCOSUR in terms of their high share of intra-MERCOSUR trade.

<sup>99</sup> Far reaching commercial bilateral agreements, already concluded in the eighties between Uruguay and Brazil might have reduced trade barriers between these two countries considerably before the creation of MERCOSUR. Trade between the two countries might have caught up to levels of trade usually observed between neighbor countries with low trade barriers. Thus, later in the nineties the development of trade responded less to the elimination of trade barriers than to, for example, the business cycles of the neighboring countries. The same argument would be valid for Paraguay. The effects of its large black market and smuggling might be similar to that of the trade agreements.

### Trade as share of GDP - Intra- and Extra-Mercosur

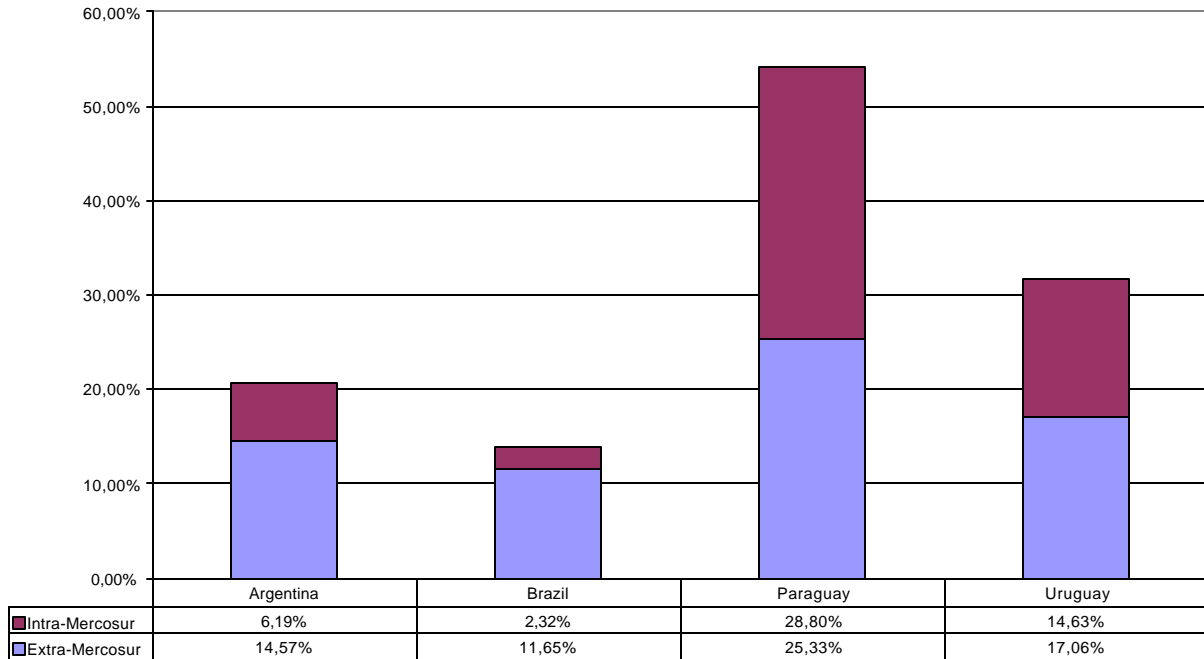


Diagram 4-20: Degree of openness: Intra- and extra-MERCOSUR trade as share of GDP  
 Source: Centro de Economía Internacional, Ministerio de Relaciones Exteriores, Comercio Internacional y Culto, Buenos Aires and IMF Direction of Trade Statistics, Washington D.C.

### MERCOSUR Intra-Industry Trade

The analysis of trade openness should be accompanied by the analysis of intra-industry trade. Lucangeli(1993) analyzes intra-industry trade between Argentina and Brazil according to the methodology of Grubel and Lloyd(1975). From 1984 to 1992 intra-industry trade increased from 22.2% to 33.7%. A more recent study on intra-industry trade was done by Baumann(1998). In 1992 he calculated the share of intra-industry trade between Argentina and Brazil of 36% (3 digits) and in 1993 47% (3 digits) and 41% (5 digits). In 1996 the respective levels were 56% and 45%. It has to be stressed that the computation of the respective shares was done with a varying number of products. Comparability between the two studies and also between the single years in the Baumann(1998) study is thus limited. For the development of intra-industry trade of Brazil with Argentina, Brazil with MERCOSUR and Brazil with MERCOSUR and the associated countries Bolivia and Chile see Diagram 4-21.

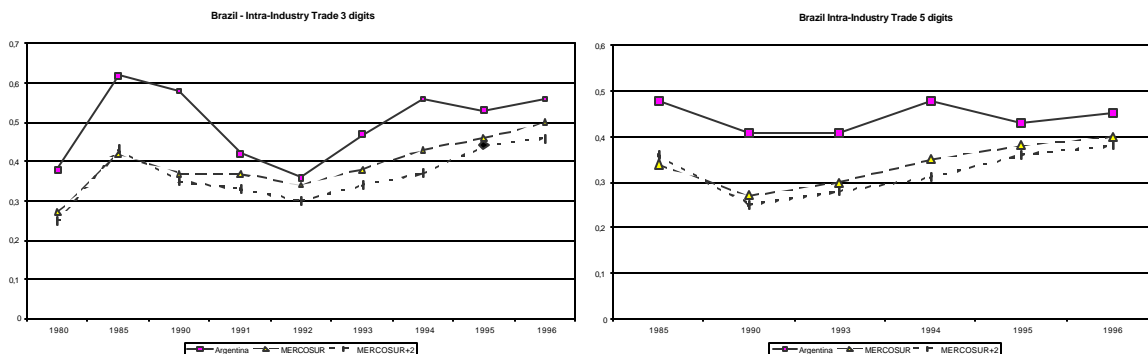


Diagram 4-21: Intra-industry trade: Brazil/Argentina /MERCOSUR (+2)  
 Source: Baumann(1998)

## 4.6 Endogeneity of OCA Criteria

**THESIS 6: Integration of trade will probably increase the degree of trade openness and therefore lead to a higher degree of symmetry of shocks. In MERCOSUR the customs union is not yet perfectly implemented, and it was created just several years ago. With further trade integration, a further increase in intra-trade and less asymmetrical shocks to the trading bloc are likely.**

Business cycles were subject to analysis in 4.4. Shocks to GDP between 1985 and 1995 tended to be asymmetrical. Shocks were decomposed into permanent and transitory components but no distinction between exogenous and endogenous shocks could be made. Carrera et al.(1998) provides a decomposition into endogenous and exogenous shocks (see 4.4). In their analysis exogenous shocks tend to be more symmetrical than endogenous shocks to GDP. Thus, it can be concluded that endogenous shocks to the MERCOSUR economies have been rather asymmetrical in the past. This does not, however, mean that this asymmetry has to persist in the future.

It was found that further integration of trade and deeper economic integration in general will likely lead to the convergence of the business cycles in an economically integrated area (compare 3.2.3.1). An empirical analysis whether business cycles have converged in MERCOSUR will not be very fruitful at the moment due to the lack of usable data. From the eighties on trade integration deepened on an international (Garriga and Sanguinetti, 1995a, pp. 6) and regional scale. The transition of the customs union ended in 1994, with the two large, and in 1995, with the two small, MERCOSUR countries.<sup>100</sup> From the point of view of trade integration it would only make sense to analyze business cycles from 1995 on.<sup>101</sup>

However, no doubt remains that the creation of MERCOSUR resulted in a significant increase of intra-regional trade flows. This impact not only becomes evident by regarding the openness of trade figures in 4.5.3 but its effects have also been confirmed econometrically in a gravity equation model by Garriga and Sanguinetti(1995b). Bilateral trade correlates positively with the product of the GDPs and negatively with the geographical distance between the two countries. Comparing two data sets (1987 and 1992) and adding two dummy variables (adjacency in terms of contiguous borders and a MERCOSUR dummy variable) as well as an explanatory openness variable (trade in terms of GDP), the two authors find that the creation of MERCOSUR had significant effects on the trade flows. For the 1992 data set, all estimated variables were significant at the 1% level and showed the expected signs. Thus, Garriga and Sanguinetti(1995b, p. 21) “conclude ... that tariff preferences within MERCOSUR have had an independent and positive effect on regional trade. Nevertheless it is also clear that once geography and unilateral trade policies are taken into account, the effect of tariff preferences on bilateral trade is greatly moderated.” In other words, the effect of MERCOSUR is comparatively small to the effects of unilateral trade liberalization and geography. Does this change the conjecture for the endogeneity of the OCA criteria for MERCOSUR? If it does, it does so only to a limited extent. Whether unilateral trade liberalization cum the increased

---

<sup>100</sup> For a more detailed analysis on tariffs and remaining trade protection in MERCOSUR see Laird(1997).

<sup>101</sup> In the study of Frankel and Rose(1996) the time interval used for the econometrical analysis was 34 years and thus could grasp a number of subsequent cycles. For MERCOSUR, at the time of writing, the respective time interval would be five years.

importance of geography or preferential trade agreements, in the form of a customs union, explain increasing bilateral trade will not change the conclusions to be drawn for the endogeneity of the OCA criteria. Cycles should be expected to converge within MERCOSUR and if the unilateral trade liberalization explains trade with the rest of the world cycles should also converge accordingly with the cycles of the rest of the world.

Endogeneity has not only to be seen in terms of a different trade policy but also in terms of stabilized economic policies in general. It is often highlighted in literature that Latin American economies were subject to frequent and severe policy shocks in the past. This was due to political mismanagement and subsequent attempts to stabilize the respective economies (see inter alia Ramos, 1985; and Bruno, 1988). Since these shocks were numerous and are difficult to identify and above all seem to be highly irrelevant for the current state of the MERCOSUR economies (all of them increased their stability significantly from 1995 on), conclusions drawn on the analysis of business cycles in the eighties and the first half of the nineties should be very cautiously dealt with. In this period the business cycles of the MERCOSUR countries were very much influenced by endogenous policy shocks. Thus, analyzing the convergence of the business cycles from the point of view of endogenous policy shocks seems to make much more sense than from the moment of the successful implementation of the respective stabilization programs, than before. Hence, if one would like to avoid the 'noise' of frequent endogenous policy shocks on the MERCOSUR economies one should start with the analysis of the cycles from 1995 on, when the last successful stabilization program in Brazil was implemented in 1995 (see e.g. Bacha, 1997).

#### **4.7 Exchange Rate Rules, Price Level Stability, and Political Convergence**

**THESIS 7: The establishment of a common central bank with the principle objective of price level stability requires a bundle of rules and measures, inter alia, the guarantee of the independence of the national central banks that represent the predecessors of the common central bank. The central banks of the MERCOSUR countries have already shown accelerating convergence in their degree of independence in recent years.**

Economies with a large record of failed stabilization attempts will have to show extraordinarily commitment in order to benefit from the credibility effect (if they tie their hands to a 'conservative' central banker). The Convertibility Plan would be one example where a successful stabilization program has benefitted from this effect. The parity of the Argentinean peso with the US dollar was decreed by law for demonstrating absolute commitment to the exchange rate rule. Even despite this commitment the Argentinean monetary regime suffered credibility losses due to spillovers from the Mexican crisis, the South East Asian and Russian crisis. The credibility of the monetary regime had to be restored by additional measures: the provision of rules and regulations in the financial sector that aimed at protection and improvements of the soundness of the financial system, as, for example, the reduction of reserve requirements of the private banks and remuneration of these reserves, the creation of an emergency fund for endangered financial institutions and the provision of a lender of last resort function by a consortium of foreign banks and international institutions. Moreover, the central bank made sure that for the improvement of the market mechanism, for example, from 1998 on private banks were obliged to disclose their credit ratings to the public, etc. (Calomiris and Powell, 2000).

Now, suppose the MERCOSUR countries agreed about the creation of a common MERCOSUR central bank (MCB) with the exclusion of the currency-board-for-all-MERCOSUR-countries variant.<sup>102</sup> Since the three MERCOSUR countries Argentina, Brazil and Uruguay showed hyperinflationary or highly inflationary behavior in their recent past, commitment of the MCB to the stable-price level objective would be crucial.

As with the creation of the European central bank (ECB), independence of the MCB would represent an important ingredient for signaling effective commitment to the price level objective. Besides the commitment to price level stability the credibility of the MCB could be increased by sensible regulations with respect to the protection of the soundness of the banking system, provision of the necessary preconditions of a functioning market mechanism, rules of regulation and direct intervention and avoidance of the use of derivatives.<sup>103</sup>

In many of these fields the central banks of the single MERCOSUR countries have already made significant advances. In particular, the central banks could significantly enhance their degree of independence in recent years. Thus, the question of credibility would rest, *inter alia*, on two important aspects.

- 1) Can the MCB be credible without an exchange rate rule linked to the US dollar?
- 2) Do the national MERCOSUR economies already have sufficiently independent central banks? Would the MERCOSUR members allow for a supranational independent MCB, thus ceding national sovereign rights to a supranational authority?

#### 4.7.1 A MERCOSUR Central Bank without an Exchange Rate Rule?

The case of the Brazilian maxi-devaluation of January 1999, with the successive change of the exchange-rate regime, had shown that after adhering to an exchange rate based stabilization program the abandonment of the exchange rate anchor did not necessarily lead to a relapse into its hyperinflationary past. Partly the successful changeover (in terms of the maintained price level stability) is attributable to the increased credibility of the Brazilian central bank (compared to Pre-Real Plan periods) and also due to its increased degree of independence at the expense of elevated interest rates (see Godfajn and Baig, 2000, p. 12).

#### 4.7.2 Convergence in Independence of the National Central Banks in MERCOSUR

Independence of the national central banks of the MERCOSUR members has increased steadily over the past years and has already augmented to high levels and therefore helped to lend the respective monetary authorities increased credibility. Hence, when thinking in terms of a credible future MCB the question will be whether the MERCOSUR members agree credibly on common objectives and rules for the MCB and whether they are prepared to cede national sovereign rights to a supranational entity. Nonetheless, it has to be taken into account that Brazil '*represents two thirds*' of MERCOSUR. In real political terms it is difficult to imagine that Brazil would cede power to a supranational entity where all four MERCOSUR countries were represented by equal shares. However, it is not intended to analyze political motives for and against the establishment of a common central bank for MERCOSUR from the perspective of

---

<sup>102</sup> Eichengreen(1998) discusses three monetary options for MERCOSUR: (1) a currency board for all, (2) a single currency for MERCOSUR, and (3) no exchange-rate coordination.

<sup>103</sup> Compare also Blejer(1998).

the respective member country.

In the following a tentative answer to the questions will be given whether the central banks of MERCOSUR have been able to increase their degree of independence and to which extent. The results of two studies of two different time periods was compared. Cukierman(1992) - he constructed a set of indicators for the measurement of the degree of central bank independence for the period 1950 to 1989 - and Zagari Rigolon(1996) - this study updates the Cukierman indicators for the Brazilian central bank up to 1996 - will be presented and compared. In addition, the Organic Charter of the Argentinean central bank and the Argentinean Law of Convertibility were analyzed according to the Cukierman criteria.

Cukierman distinguishes three different sets of indicators for the measurement of central bank independence: (1) legal independence, (2) turnover of central bank governors, (3) and a questionnaire identifying factors which most likely are responsible for the divergence between the central bank charter and the actual practice. The turnover of central bank governors should also like (3) show the deviation of the actual term in office and the legal norm in general.

(1) Cukierman constructed sixteen variables that were divided into the four groups: chief executive officer, policy formulation, final objectives and limitations on lending. A value equal to 1 corresponds with the highest degree of independence and a value equal to 0 corresponds with the lowest degree. For Argentina, Brazil and Uruguay the average without weights of these 16 variables<sup>104</sup> was calculated (see Table 4-11).

Country	1972-1979	1980-1989
Argentina	0.43	0.43
Brazil	0.20	0.20
Uruguay	0.22	0.22

Table 4-11: Degree of legal central bank independence in Argentina, Brazil and Uruguay from 1972 to 1989  
Source: calculations based on Cukierman(1992, pp. 396)

In the seventies and in the eighties the degree of legal independence of the Brazilian and Uruguayan Central Bank were found on the lower edge, 0.20 and 0.22 respectively. The degree of legal independence of the Argentinean central bank almost doubled the ones of the other two MERCOSUR countries. Of all analyzed central banks in the eighties, legal independence was highest in Switzerland (0.68), West Germany (0.66) and Austria (0.58).

(2) The turnover rates of CB governors were available for Uruguay and Argentina for the period of 1950 to 1989. For Uruguay it was 0.48 (approximately 2 years) and for Argentina it was 0.93 (13 months). The legal term for the Argentinean CB governor was four years, which deviates substantially from the actual term of 13 months. This was due to the Argentinean

---

<sup>104</sup> These 16 variables are: Term of office (*too*); Who appoints CEO (*app*); Provision for dismissal (*diss*); Another office held (*off*); Monetary policy formulation (*monpol*); Conflict resolution (*conf*); Active role in the formulation of government's budget (*adv*); CB's objectives (*obj*); Limit on advances (*lla*); Limit in securitized lendings (*lls*); Who decides on lending terms (*ldec*); Width of circle of borrowers (*lwidth*); Type of limit (*ltype*); Maturity of loans (*lmat*); Limit on interest rate (*lint*); Lending in primary market (*lprm*).

tradition that the governor offered his resignation when the government changed. Thus, the degree of legal independence in Argentina seems to be misleading. Of all analyzed countries Argentina ranks last in terms of rotation of the central bank governor.<sup>105</sup>

(3) The third set of indicators draws on 9 questions<sup>106</sup> which are put as a questionnaire to monetary specialists. Like the rotation criterion these questions aim at the divergence of legal and real independence. In Cukierman(1992) the analyzed group of countries only included Uruguay from the MERCOSUR countries. The indicator of real independence yielded a value of 0.49 for Uruguay, where it ranked 18 out of 24 (non weighted average).<sup>107</sup> Zagari Rigolon(1996) obtain a degree of real independence of 0.29 for 1980 to 1985 and 0.33 for 1986 to 1989. Like Uruguay Brazil's position would be in the last quartile. For the nineties the Brazilian central bank improved its degree of real independence. It increased to 0.45 in 1992 and to 0.64 in 1996 (see Table 4-12).

Degree of real central bank independence	Uruguay 1980-1989	Brazil 1980-85	Brazil 1986	Brazil 1987-89	Brazil 1990-92	Brazil 1994-96
Weighted average	0.49	0.29	0.33	0.33	0.45	0.64
Non weighted average	0.49	0.25	0.35	0.35	0.46	0.68

Table 4-12: Degree of real central bank independence in Brazil and Uruguay  
Source: Cukierman(1992) and Zagari Rigolon(1996)

More recent indicators on the Argentinean central bank do not exist. Nonetheless, its degree must have increased significantly after the implementation of the currency board and successfully coping with a series of external shocks or, as Calomiris and Powell(2000) put it “...the experience of the Argentine banking sector over the past decade has been unique in several aspects. Many observers view Argentina’s reforms as among the most radical attempts to overhaul a banking system.”

The policy formulation variables could not be determined, since there is little reference made to monetary policy in the Organic Charter. The exchange rate policy is stipulated by law and its amendment is subject to approval by the National Senate. As a consequence there is no or only very small room for maneuver for the Argentinean central bank. Hence, the variables *monpol*, *conf*, and *adv* would be closer to 0 than to 1.<sup>108</sup> However, without detailed knowledge of the respective stipulations no concrete codings could be assigned to the variables.

Variable	Cukierman (1992) 1989	Organic Charter 1992
----------	-----------------------	----------------------

<sup>105</sup> In the nineties the turnover of central bank governors in Brazil was still considerable. In February 1999 Arminio Fraga was appointed Brazilian central bank governor. He was the fifth governor since the introduction of the Real Plan (Ambito Financiero, 1999i).

<sup>106</sup> The specialists had to assign a value between 0 and 1 to the following questions: Tenure overlap with political authorities; Limitations on lending practice; resolution of conflict; Who determines the budget of CB?; Who determines the salaries of high CB officials and the allocation of CB profits?; Are there quantitative monetary stock targets?; Are there formal or informal interest rate targets?; What is the actual priority assigned to price stability?; Does the CB function as development bank that grants credits at subsidy rates?

<sup>107</sup> Germany was first with a value equal to 1.

<sup>108</sup> Compare also Calcagno(1997, p. 66). “Aún podía influir sobre la masa monetaria y sobre la liquidez de los bancos, através de la fijación de los encajes bancarios, y nada le impedía, en principio, realizar operaciones de contracción de la base monetaria.” (Still the central bank can have an influence on the monetary aggregate and on bank liquidity by setting the bank reserves. Furthermore, the central bank could even execute operations aimed at monetary contraction.)

<i>too</i>	0.25	0.75
<i>obj</i>	0.0	0.6
<i>diss</i>	0.83	0.83
<i>app</i>	0.25	0.5
<i>off</i>	1.0	1.0
<i>lla</i>	0.33	1.0
<i>lls</i>	0.33	0.66
<i>ldec</i>	0.33	n/a
<i>lwidth</i>	1.0	1.0
<i>ltype</i>	0.33	0.66
<i>lmat</i>	1.0	1.0
<i>lint</i>	0.5	1.0 <sup>109</sup>
<i>lprm</i>	n/a	1.0
<i>monpol</i>	0.33	n/a
<i>conv</i>	0.0	n/a
<i>adv</i>	0.0	n/a
<b>non weighted average<sup>110</sup></b>	<b>0.53</b>	<b>0.82</b>

Table 4-13: Degree of legal central bank independence of the Argentinean central bank in 1989 and 1992

Source: Cukierman(1992) and own calculations

In Table 4-13 a non weighted average on all available indicators was computed (except the policy formulation variables (*monpol*, *conv*, *adv*), which had to be left out). With the introduction of the Organic Charter of 1992 of the Argentinean Central Bank, compared to the eighties, the degree of legal independence increased from 0.53 to 0.82.<sup>111</sup>

Rotation of central bank governors in Argentina has considerably decreased, too. The governor currently in office has by far surpassed this average of 13 months, which was previously the case.

The determination for real independence according to the Cukierman questions was not possible.<sup>112</sup> Some of the questions will be tentatively answered by the author's judgement. As was indicated before, rotation has considerably decreased and adversely the term of the CB governor has increased to 6 years (*qto*). Lending practices have stuck to the rules (*qll*) (compare Calomiris and Powell, 2000). Naturally, because of the currency board, there are no quantitative monetary stock targets (*qst*). Also, as a consequence of the implemented currency board, price stability is also the principle objective in real policy (*apps*). Finally, the Argentinean central bank does not function as a development bank (*qsc*). Consequently, the tentatively obtained indicators for the real independence of the Argentinean central bank would point toward a real degree of independence similar or even better than that of the Brazilian central bank.

<sup>109</sup> The discount window can be opened by the exchange of dollar denominated government debt – the emission of the debt is at market rates – it is however unclear from the charter what maturity the debt has – with varying maturity the interest rate can also deviate from the current market rate

<sup>110</sup> Indicators with no account were left out on both sides. Consequently the sum of eleven values was used for the calculation of the average.

<sup>111</sup> The inclusion of the monetary policy variables would have reduced both variables (compare Table 4-11). Assuming unchanged policy formulation variables in 1989 and 1992 would have yielded 0.439 and 0.666 respectively. The increase in legal independence would still be considerable.

<sup>112</sup> Neither the World Bank nor the domestic branch of ECB could provide the necessary data.

Questionnaire	Variable	Argentina (tentatively)	Brazil
<b>The president stays longer than government</b>	<i>qto</i>	1.0	0.0
<b>Limitations on lending practice</b>	<i>qll</i>	1.0	0.66
<b>Resolution of conflict</b>	<i>qrc</i>	n/a	1.0
<b>Who determines the budget of CB</b>	<i>qcb</i>	n/a	0.5
<b>Who determines the salaries of high CB officials and the allocation of CB profits</b>	<i>qsp</i>	n/a	0.5
<b>Are there quantitative monetary stock targets?</b>	<i>qst</i>	0	0.66
<b>Are there formal or informal interest rate targets?</b>	<i>qirt</i>	n/a	0.0
<b>What is the actual priority assigned to price stability</b>	<i>qpps</i>	1.0	1.0
<b>Does CB function as a development bank</b>	<i>qsc</i>	1.0	1.0

Table 4-14: Real degree of central bank independence in Argentina and Brazil in 1996

Source: Rigolon Zagari(1996) and own approximation

## 5 Concluding Remarks

Evidently MERCOSUR will not start negotiating a treaty on a MERCOSUR monetary union à la Maastricht tomorrow. MERCOSUR is a relatively young integration project. MERCOSUR was able to profit from considerable momentum in its early stage, in the first half of the nineties. A difficult economic environment put the weakly institutionalized integration scheme to test in the second half of the nineties. Efforts in deepening the integration scheme have virtually come to a halt. Hence from an institutional point of view there is still a long way to go. Yet MERCOSUR represents nothing more than a customs union. A further deepening of the integration scheme toward a common market or even monetary union was only manifested by declarations of intentions. Concrete steps into this direction have not yet been taken. Changes in the institutional design, that is, a move toward supranational institutions would represent an essential ingredient for the successful creation of a monetary union. Such a step is conditioned by political rather than by economic factors. One of the crucial questions for MERCOSUR monetary union will be whether the largest MERCOSUR country will cede sovereign rights to supranational MERCOSUR entities.

The Brazilian currency crisis of 1999 clearly illustrated the economical and political turmoil caused by competitive devaluations. Interestingly, in the beginning of MERCOSUR, Brazil launched the initiative by setting up exchange rate bands for MERCOSUR, a proposal which was then rejected by the Argentinean authorities. Thereafter, the tables turned. In 1998 devaluation expectations on the Brazilian real increased drastically that finally culminated in the currency crisis of January 1999. As a consequence, the Argentinean authorities started to publicly discuss full dollarization of their economy, thus, reducing the declared desire of establishing a single MERCOSUR currency to absurdity. Obviously, political consensus on a possible future common exchange rate will require a great deal of negotiation in MERCOSUR

Economic analysis provided some interesting answers and identified issues to be investigated further:

The application of the traditional OCA criteria to the MERCOSUR countries would render MERCOSUR straight forward a non-optimal currency area – a result which was expected. In the past GDP cycles were highly asymmetrical. They differed in timing, size and duration. From this point of view one would have to argue that in the absence of acceptable wage flexibility and alternative adjustment mechanisms as, for instance, fiscal transfers or mobile labor equilibrating the abandonment of a flexible exchange rate would be very costly for the MERCOSUR countries. Such a conclusion, however, would abstract from two basic aspects. (1) The only indicator analyzed was the GDP variable. A sophisticated identification of different shocks could not be undertaken. (2) From the description of stylized facts it can be assumed that many of the shocks were of endogenous nature due to the stop-and-go policies very common during the analyzed period 1980-1995. Thereafter, all MERCOSUR economies had become relatively more stable and evidently exogenous shocks prevailed in the second half of the nineties. Further, the conjecture cannot be dismissed that the endogeneity of the OCA criteria started to play a role during the nineties, and continued to do so. Certainly a historicist approach will be even more misleading in recently stabilized economies compared to economies that are generally characterized by a less volatile environment.

If once concluded that shocks possibly occur asymmetrically, alternative adjustment

instruments to a flexible exchange rate regime should be analyzed. The empirical analysis of labor mobility within MERCOSUR suggested that labor moved from the smaller to the larger countries in the past. Consequently an asymmetrical shock between Argentina and Brazil would not have been equilibrated by moving labor, as far as timing is concerned. It can also be doubted that labor between the smaller countries moved to balance for asymmetrical shocks. Usually a bundle of heterogeneous motives are responsible for labor migration (political and economical motives) which are not covered by simple migration statistics and which are simply not taken into account in the OCA literature.

Wage flexibility in the MERCOSUR countries is low but unions seem to have lost power in the recent years. It is questionable when and in how far labor laws will allow for up- and downward adjustment of wages. Flexibilization of labor laws would be a logical step in economies that already were and still are subject to further liberalization. Hence, the assumption of increasing wage flexibility in the future should not be speculated on.

Capital seems to be the most mobile factor within MERCOSUR. The integration of capital markets had already started prior to the creation of MERCOSUR. Both the CID and the Feldstein-Horioka equation suggest highly integrated financial markets in Uruguay and Argentina, less so in Brazil. In the case of MERCOSUR, financial market integration with the rest of the world seems to be much more important than within MERCOSUR. Capital will flow between the United States/Euroland and Argentina rather than between the MERCOSUR countries. Up to now financial markets integration within MERCOSUR has not advanced too much. Further, portfolio capital movements do not necessarily balance for asymmetrical shocks. Even worse, portfolio capital movements can represent an additional source of shocks.

Finally, the McKinnon criterion was applied to MERCOSUR. As could be expected, the larger the economy was, the lower the degree of trade openness was. Nonetheless, Brazil's low level of intra-MERCOSUR share was not really expected. The high growth rate of bilateral trade with Argentina leaves room for speculation about increasing interdependence between the two large MERCOSUR countries. Paraguay and Uruguay show high interdependence with the two large MERCOSUR countries and would thus, according to the McKinnon criterion, represent far more optimal candidates for a monetary union than Argentina and Brazil. Intra-industry trade between Brazil and Argentina was at similar levels in 1985 and 1996, close to 50% in both measures (3 digits and 5 digits). It is relatively difficult to draw a clear cut conclusion from the material available due to its limited comparability. All in all, even though Brazil's trade with Argentina and MERCOSUR is relatively unimportant, intra-industry trade seems to be quite significant at levels close to 50% and 40%.

This work, however, should have contributed to the insight, that the singular application of these indicators is only of limited value, if any at all. The endogeneity argument for MERCOSUR is very important. Economic models in all MERCOSUR countries were subject to major and minor changes during the last three decades. Further liberalization on the national level and also a deepening of the MERCOSUR integration scheme is highly probable. It is hard to predict of which nature (qualitatively and quantitatively) the effects of ongoing integration will be. Neither is it the objective of this work to speculate on these effects.

Differences in productivity in MERCOSUR are likely to persist. Suspected swings in the long-run real exchange rate, under the assumption of a nominally fixed exchange rate or a common currency, makes increased wage flexibility desirable. Thus, the MERCOSUR countries should strive for more flexible labor markets. More flexible labor markets would increase the optimality of the MERCOSUR region as a currency area. Until the mid-nineties, shocks to the MERCOSUR countries were highly asymmetrical. In the second half of the nineties, symmetrical exogenous shocks gained importance. The latter development, under historicist

assumptions, represents an argument for a single MERCOSUR currency. As mentioned before, little can be said about the future behavior of the cycles of the single MERCOSUR economies. From this point of view, ongoing economic analysis of the MERCOSUR countries is necessary in order to learn more about the comovement of MERCOSUR cycles. Future economic analysis should also include the two smaller MERCOSUR countries Paraguay and Uruguay (and the associate members Chile and Bolivia, too). This is even more desirable, since current studies on MERCOSUR of Argentinean and Brazilian origin tend to concentrate merely on the two large MERCOSUR economies.

For real world considerations, however, the De Grauwe-citation: „*Therefore, it is utopian to separate the problem of monetary union from political unification... Monetary union is an essential part of political union.*“ is very true. If economic disequilibria combined with the absence of consensus on monetary and economic policy prevail impulses rather for disintegration than integration can be the consequence. Already the Brazilian currency crisis put much distress on MERCOSUR. The integration process has virtually come to a halt. Another much feared currency crisis this time in Argentina would increase the probability of a dissolution of MERCOSUR. Monetary union could stay utopia, in the words of De Grauwe. Another scenario would be, everything stays as it is. Argentina muddles individually through its problems as do the other MERCOSUR countries and MERCOSUR stays in its current stage of economic integration. Further monetary integration may be an issue in the far future or not. Mid-term, however, monetary policy coordination could gradually be increased, maybe, ending at some degree of exchange rate coordination indicated before in order to avoid further disruptions as caused by the Brazilian crisis. The final stage, that would need a large portion of consensus in a broad range of political fields, could be monetary union. Nonetheless, a big deal internal in overcoming economic difficulties in the MERCOSUR countries is needed before one could seriously think about successfully deepening monetary integration in MERCOSUR.

## Bibliography

- Agénor, P. and P. Montiel (1996), *Development macroeconomics*, Princeton University Press, Princeton
- Almansi, A. and C. Rodriguez (1997), "Alternativas de estabilización", In: Avila, J. (ed.), *Convertibilidad: Fundamentación y funcionamiento*, CEMA Instituto Universitario, Buenos Aires, pp. 43 - 48
- Altimir, O. and L. Beccaria (1999), "El mercado de trabajo bajo el nuevo régimen económico en Argentina", *Serie Reforma Económicas de CEPAL*, No. 28, Santiago de Chile
- Ambito Financiero (1999a), "Brasil perdió ayer \$ 1.080 millones y se agravó la caída en todas las Bolsas", *Ambito Financiero*, <<http://www.ambitofinanciero.com>> (13.01.99)
- Ambito Financiero (1999g), "Se triplicó la cantidad de turistas argentinos que veranean en Brasil", *Ambito Financiero*, <<http://www.ambitofinanciero.com>> (21.01.99)
- Ambito Financiero (1999i), "Se disparó más el dólar en Brasil: subió 5% en el día", *Ambito Financiero*, <<http://www.ambitofinanciero.com>> (03.02.1999)
- Ambito Financiero (2000), "Brasil pensó en abandonar el Mercosur", *Ambito Financiero*, <<http://www.ambitofinanciero.com>> (08.02.00)
- Argy, V. (1994), *International Macroeconomics: Theory and Policy*, Routledge, London
- Arnaudo, A. (1995), "La política monetaria argentina desde la convertibilidad", *Documentos de Trabajo*, No. 15/95, Insitituto y Universidad Torcuato Di Tella, Buenos Aires
- Artis, M. et al. (1999), "The European Business Cycle", *EUI Working Paper ECO*, No. 99/24, San Domenico
- Baldwin, R. (1991), „On the microeconomics of the European Monetary Union“, *European Economy*, Special edition, No. 1, pp. 21 - 35
- Bacha, L. (1997), „Plano Real: Ums segunda Avaliação“, In: IPEA/CEPAL, (eds.), *O Plano Real e outras experiencias internacionais de estabilizacáo*, IPEA/CEPAL, Brasilia, pp. 177 - 204
- Banco Central del Uruguay (1995), "Informe sobre gestión del Banco Central del Uruguay en el período 1990-1995", *Revista de Economía*, Vol. 2, No. 1, pp. 237 - 253
- Barro, R. and D. Gordon (1983), "Rules, Discretion and Reputation in a Model of Monetary Policy", *Journal of Monetary Economics*, Vol. 12, pp. 101 - 121
- Barro, R. and X. Sala-i-Martin (1995), *Economic Growth*, McGraw Hill, New York
- Baumann, R. (1998), „Nota sobre as relacoes intra-setoriais no comércio externo Brasileiro“, *LC/BRS/DT.017*, October, 1999, CEPAL, Brasilia
- Bayoumi, T. and B. Eichengreen (1993), „One Money or Many? Analyzing the Prospects for Monetary Unification in Various Parts of the World“, *CIDER Working Paper*, No. C93-030, Berkeley
- Bazzan, G. (2001), "La falta de efectivo también puede limitar el mercado negro", <<http://www.clarin.com.ar>> (04.12.01)
- Beveridge, S. and C. Nelson (1981), „A New Approach to Decomposition of Economic Time Series into Permanent and Transitory Components with Particular Attention to Measurement of the Business Cycle“, *Journal of Monetary Economics*, No. 7, pp. 151 - 74
- Blanchard, J. and D. Quah (1989), „The Dynamic Effects of Aggregate Demand and Supply Disturbances“, *American Economic Review*, Vol. 79, No. 4, pp. 655 - 673
- Blejer, M. (1998), „Central Banks and Price Stability: Is a Single Objective Enough?“, *Journal of Applied Economics*, Vol. 1, No. 1, pp. 105 - 122
- Bofinger, P. (1993), „Europa: Ein optimaler Waehrungsraum?“, In: B. Gahlen, H. Hessen and H. J. Ramser, (eds.), *Europäische Integrationsprobleme aus wirtschaftswissenschaftlicher Sicht*, Wirtschaftswissenschaftliches Seminar Ottobeuren, Bd. 23, Tübingen, pp. 123 - 151
- Boughton, J. (1991), "The CFA Franc Zone: Currency Union and Monetary Standard", *IMF Working Paper*, No. 91/133, Washington D.C.

- Burgueno, C. (1999), „Economía negará hoy bajar aportes y subir aranceles“, *Ambito Financiero*, <<http://www.ambitofinancier.com>> (18.01.1999)
- Bayoumi, T. and R. Masson (1994), "Fiscal Flows in the United States and Canada: Lessons for Monetary Union in Europe", *CEPR Discussion Paper*, No. 1057, London
- Bencivenga, V. and B. Smith (1992), „Financial Intermediation and Endogenous Growth“, *Review of Economic Studies*, Vol. 58, pp. 195 – 209
- Bergmann, M. (1995), "International Evidence of Macroeconomic Fluctuations", *European Economic Review*, Nr. 40, pp. 1237 - 1258
- Berrigan, J. and H. Carré (1997), "Exchange Arrangements Between the EU and Countries in Eastern Europe, the Mediterranean, and the CFA Zone", In: Masson, P. et al., (eds.), *EMU and the International Monetary System*, International Monetary Fund, Washington D.C., pp. 122 - 145
- Boughton, J. (1991), “The CFA Franc Zone: Currency Union and Monetary Standard”, *IMF Working Paper*, No. 91/133, Washington D.C.
- Brunner, K., and A. Meltzer (1971), „The Uses of Money: Money in the Theory of an Exchange Economy“, *American Economic Review*, No. 61, pp. 784 - 805
- Bruno, M. et al. (1988), *Inflación y estabilización, La experiencia de Israel, Argentina, Brasil, Bolivia, y México*, Trimestre Económico, México D.F.
- Buiter, W. (1995), "Macroeconomic Policy During a Transition to Monetary Union", *CEPR Discussion Paper*, No. 1222, London
- Burgueño, C. (1998), "Argentina reacciona contra Brasil en guerra comercial", *Ambito Financiero*, <<http://www.ambitofinanciero.com>> (19.11.1998)
- Calcagno, A. (1997), “ El régimen de convertibilidad y el sistema bancario en la Argentina”, *CEPAL Review*, No. 61, pp. 63 - 89
- Calomiris C. and A. Powell (2000), „Can Emerging Market Bank Regulators Establish Credible Discipline? The Case of Argentina: 1992 – 1999“, *NBER Working Paper*, No 7715, Cambridge
- Calvo, G. and E. Mendoza (1996), „Mexico's Balance-of-Payments Crisis: A Chronicle of a Death Foretold“, *Journal of International Economics*, Vol. 41, pp. 235 - 264
- Calvo, G. and E. Mendoza (1997), "Rational Herd Behavior and the Globalization of Securities Markets", *Institute for Empirical Macroeconomics Discussion Paper*, No. 120, Federal Reserve Bank of Minneapolis, Minneapolis
- Caravelis, G (1994), *European Monetary Union - An Application of the Fundamental Principles of Monetary Theory*, Aldershot, Avebury
- Carrera, F. et al. (1998), „Análisis integral de las fluctuaciones macroeconómicas en Argentina y Brasil“, *Documento Técnico*, No. 1, Centro de Asistencia a las Ciencias Económicas y Sociales, CACES - UBA, Universidad de Buenos Aires, Buenos Aires
- Carrera, F. et al. (1999), „Interdependencia macroeconómica en el Mercosur“, *Documento Técnico*, No. 9, Centro de Asistencia a las Ciencias Económicas y Sociales, CACES - UBA, Universidad de Buenos Aires, Buenos Aires
- Claassen, E. (1996), *Global Monetary Economics*, Oxford University Press, Oxford
- Clarín (1999a), „Aumenta la presión política para frenar las importaciones de Brasil“, *Clarín.com*, <<http://www.clarin.com>> (28.01.1999)
- Clarín (1999b), „Ahora Roque quiere protección“, *Clarín.com*, <<http://www.clarin.com>> (04.02.1999)
- Clarín (1999c), „Más control para las importaciones“, *Clarín.com*, <<http://www.clarin.com>> (09.02.1999)
- Conrad, E. (1997), "Expenditure Lags, Inflation, and the Real Purchasing Power of Government: Is there a Tanzi Effect on the Other Side of the Budget as Well?", In: Blejer, M. and T. Ter-Minassian, *Macroeconomic Dimensions of Public Finance: Essays in Honour of Vito Tanzi*, Routledge, London, pp. 235 - 263
- Cukierman, A. (1992), *Central Bank Strategy, Credibility, and Independence: Theory and Evidence*, The

MIT Press, Cambridge

- Damill, M., et al. (1996); „De México a México: el desempeño de América Latina en los noventa“, *Desarrollo Económico*, Vol. 36, pp. 51 - 82
- Damill, M. and R. Frenkel (1997), „América Latina: globalización y fragilidad en los año 90“, Paper presented at Economic Congress of ‚Consejo Profesional de Ciencias Economicas de la Capital Federal‘ on ‚Las tendencias económicas para el fin de siglo‘, June 23-24, 1997, Buenos Aires. *Mimeo*, Universidad de Palermo and Universidad de Buenos Aires/CEDES, Buenos Aires
- De Grauwe, P (1984), "Political Union and Monetary Union", In: Salin, P., (ed.), *Currency Competition and Monetary Union*, Kluwer, Dordrecht, pp. 260 - 262
- De Grauwe, P. (1989), *International Money: Post-War Trends and Theories*, Clarendon Press, Oxford
- De Grauwe, P. (1992), *The Economics of Monetary Integration*, Oxford University Press, New York
- De Gregorio, J. and H. Wolf (1994), "Terms of Trade, Productivity and the Real Exchange Rate", *NBER Working Paper*, No. 4807, Cambridge
- Dornbusch, R. (1997), "Fiscal Aspects of Monetary Integration", *American Economic Review*, Vol. 87, No. 2, pp. 221 - 223
- Dowd, K. and D. Greenaway (1993), „Currency Competition, Network Externalities and Switching Costs: Towards an Alternative View of Optimum Currency Areas“, *Economic Journal*, No. 103, pp. 1180 - 1189
- Eduardo et al. (1997), „The Impact of Policy Announcements and News on Capital Markets: Crisis Management in Argentina during the Tequila Effect“, *Development Research Group Working Paper*, No. 1951 World Bank, Washington D.C.
- Edwards, S. (1989), *Real Exchange Rates, Devaluation, and Adjustment: Exchange Rate Policy in Developing Countries*, MIT Press, Cambridge
- Edwards, S. (1997), *Crisis and Reform in Latin America: From Despair to Hope*, Oxford University Press, New York
- EG Kommission (1990), „Ein Markt, eine Währung“, *Europäische Wirtschaft*, No. 44, Luxemburg
- Eichengreen, B. (1990), "One Money for Europe? Lessons from the U.S. Currency Union", *Economic Policy*, No. 10, pp. 118 - 187
- Eichengreen, B. (1991), „Is Europe an Optimum Currency Area?“, *NBER Working Paper*, No. 3579, Cambridge
- Eichengreen. B. (1996), „On the Links Between Monetary and Political Integration“, *CIDER Working Paper*, No. C96-77, Berkeley
- Eichengreen, B. (1998), „Does MERCOSUR Need a Single Currency?“, *NBER Working Paper*, No. 6821, Cambridge
- Eichengreen, B. and J. von Hagen (1995), "Fiscal Policy and Monetary Union: Federalism, Fiscal Restrictions and the No-Bailout Rule", *CIDER Working Paper*, No. C95-056, Berkeley
- Enders, W. (1995), *Applied Econometric Time Series*, Wiley, New York
- Feldstein, M. and C. Horioka (1980), "Domestic Saving and International Capital", *Economic Journal*, Vol. 90, pp. 314 - 329
- Fleming, M. (1971), "On Exchange Rate Unification", *The Economic Journal*, Vol. 81, pp. 467 - 488
- Flood, R. and M. Taylor (1996), „Exchange Rate Economics: What's Wrong with the Conventional Macro Approach?“, In: Frankel, J., Galli, G. and A. Giovannini, (eds.), *The Microstructure of Foreign Exchange Markets*, University of Chicago Press, Chicago, pp. 261 - 294
- Frankel, J. (1992), "Measuring International Capital Mobility: A Review", *American Economic Review*, Vol. 82, No. 2, pp. 197 - 202.
- Frankel, J. and A. Rose (1996), „The Endogeneity of the Optimum Currency Area Criteria“, *NBER Working Paper*, No. 5700, Cambridge
- Gandolfo, G. (1995), *International Economics II: International Monetary Theory and Open*

- Macroeconomics*, 2nd ed., Springer, Berlin
- Garcia, M. and A. Barcinski (1996), „Capital Flows to Brazil in the Nineties: Macroeconomic Aspects and the Effectiveness of Capital Controls“, *Texto para Discussao*, No. 357, Departamento de Economia, PUC-RIO
- Garcia, M. and M. Valpassos (1998), „Capital Flows, Capital Controls and Currency Crisis: The Case of Brazil in the Nineties“, *Texto para Discussao*, Nr. 389, Departamento de Economia, PUC-RIO
- Garriga, M. and P. Sanguinetti (1995a), “El Arancel Externo Común del Mercosur: ¿Hacia una mayor liberalización comercial?”, Preliminary version, *Mimeo*, Centro de Economía Internacional/CEI, Ministerio de Relaciones Exteriores, Comercio Internacional y Culto, Buenos Aires
- Garriga, M. and P. Sanguinetti (1995b), „The determinants of Regional Exchange in Mercosur: Geography and Trade Liberalization”, Preliminary version, *Mimeo*, Centro de Economía Internacional/CEI, Ministerio de Relaciones Exteriores, Comercio Internacional y Culto, Buenos Aires
- Gerschenson, A. (1999), „Menem prometió a los inversores que la Argentina no devaluará“, *Clarín.com*, <<http://www.clarin.com>> (14.01.1999)
- Giambiagi, F. (1997), "Uma proposta de unificação monetária dos países do Mercosul", *Ensaio BNDES*, No. 4, Rio de Janeiro
- Giavazzi, F. and M. Pagano (1988), "The Advantage of Tying One's Hands: EMS Discipline and Central Bank Credibility", *European Economic Review*, No. 32, pp. 1055 - 1082
- Goldfajn, I. and T. Baig (2000), „The Russian Default and the Contagion to Brazil“, *Mimeo*, Departamento de Economia, PUC-RIO and International Monetary Fund, Washington D.C.
- Goodhart, C. (1989), *Money, Information and Uncertainty*, 2nd ed., Macmillan, London
- Greene, W. (1997), *Econometric Analysis*, 3rd. ed., Prentice Hall International, London
- Grubel, H. and P. Lloyd (1975), *Intra-Industry Trade. The Theory and measurement of International Trade in Differentiated Products*, Macmillan, London
- Hamada, K. (1973), „A Simple Majority Rule on the Distribution of Income“, *Journal of Economic Theory*, Vol. 6, No. 3, pp. 243 - 264
- Haberler, G. (1970), „The International Monetary System: Recent Developments and Discussions", In: Bergsten F. et al., (eds.), *Some Approaches to Greater Flexibility of Exchange Rates*, The Burgenstock Papers, Princeton University Press, Princeton, pp. 143 - 157
- Heikel, M. and C. Rojas Bahr (1993), „Otra vez migrantes. Una relectura de las condiciones socio-económicas de la migración reciente desde y hacia Paraguay“, *Revista Paraguaya de Sociología*, Vol. 30, No. 88, pp. 107 - 144
- Hoffmaister, A. and J. Roldós (1996), „Are Business Cycles Different in Asia and Latin America?“, *IMF Working Paper*, No. 97/09, Washington D.C.
- ILO (1998), „Crisis externa y deterioro de la situación laboral“, *Regional Office of the International Labor Office for the Americas*, Lima, <<http://www.oit.org.pe>> (05.08.1998)
- Ishiyama, Y. (1975), „The Theory of Optimum Currency Areas: A Survey“, *IMF Staff Papers*, No. 22, pp. 344 – 383
- Kenen, P. (1969), "The Theory of Optimum Currency Areas: An Eclectic View", In: Mundell, R. and A. Swoboda, (eds.), *Monetary Problems of the International Economy*, University of Chicago Press, Chicago, pp. 41 - 60
- Kennedy, P. (1992), *A Guide to Econometrics*, Blackwell, Oxford
- King, R., and R. Levine (1993), „Finance, Entrepreneurship, and Growth“, *Journal of Monetary Economics*, Vol. 32, pp. 513 - 542
- Klein, M. and N. Marion (1994), "Explaining the Duration of Exchange-Rate Pegs", *NBER Working Paper*, No. 4651, Cambridge
- Kronberger, R. (2001a), “Do the Mercosur Countries Form an Optimum Currency Area?”, *Ph.D. Thesis*, University of Innsbruck

- Kronberger, R. (2001b), "Dollar oder Euro für Argentinien?", *Wirtschaftspolitische Blätter*, No. 5/2001, pp. 545-554
- Krugman, P. (1991), "Increasing Returns and Economic Geography", *Journal of Political Economy*, No. 99, pp. 483 - 499
- Laird, S. (1997), „International Trade and MERCOSUR: Objectives and Achievements“, Paper presented at the Third Annual World Bank Conference on the Development of Latin America and the Caribbean, June 30/July 1, 1997, Montevideo, *Mimeo*
- Lavagna, R. and F. Giambiagi (1998), „Mercosur: Hacia la creación de una moneda común“, *Archivos del Presente*, No. 12, pp. 1 - 16
- Levi Yeyati, E. and F. Sturzenegger (1999a), „The Euro and Latin America III: Is EMU a Blueprint for Mercosur?“, *Mimeo*, Universidad Torcuato Di Tella, Buenos Aires
- Levi Yeyati, E. and F. Sturzenegger (1999b), „The Euro and Latin America II: Implications of the Euro for Latin America's Financial and Banking Systems“, *Mimeo*, Universidad Torcuato Di Tella, Buenos Aires
- Licandro Ferrando, G. (1998), "Is MERCOSUR an Optimal Currency Area? A Shock Correlation Perspective", Paper presented at the ETC Congress, June 12, 1998, Preliminary Draft, *Mimeo*, Banco Central del Uruguay, Montevideo
- Lizondo, S. and P. Montiel (1989), "Contractionary Devaluations in Developing Countries: An Analytical Overview", *IMF Staff Papers*, No. 36, pp. 182 - 227
- Longoni, M. (1999), „Guerra de la fruta: ahora la pelea es por vender aquí“, *Clarín.com*, <<http://www.clarin.com>> (31.01.1999)
- Lucángeli, J. (1993), „La presencia del comercio intra-industrial en el intercambio entre la Argentina y Brasil, *Boletín Informativo Techint*, No. 275, pp. 45 - 72
- Machinea, J. and J. Fanelli (1988), "El control de la hiperinflación: El caso del plan austral, 1985-1987", In: Bruno, M. et al. (eds.), *Inflación y estabilización: La experiencia de Israel, Argentina, Brasil, Bolivia y México*, El Trimestre Económico, México, pp. 141 - 188
- Maguid, A. (1997), „Migration and Labour Market in Argentina: The Metropolitan Buenos Aires Case Conference:", Paper presented at Conference on International Migration at Century's end: Trends and Issues, May 7-11, 1997, Barcelona, *Mimeo*, INDEC, Buenos Aires
- Martinez Peria, M. (1997), "Understanding Devaluations in Latin America: A 'Bad Fundamentals' Approach", *CIDER Working Paper*, No. C97-86, Berkeley
- McKinnon, R. (1963), "Optimum Currency Areas", *American Economic Review*, No. 53, pp. 717 - 725
- Meguire, P. (1996), "RATS Procedure and Example Files: Beveridge-Nelson decomposition procedure", *Estima*, <<http://www.estima.com/procs/bndecomp.src>> (3.10.1998)
- Méltiz, J. (1995), "The Current Impasse in Research on Optimum Currency Areas", *European Economic Review*, Vol. 39, pp. 493 - 500
- Mill, J. St. (1894), *Principles of Political Economy*, Vol. II, London
- Molle, W. (1997), *The Economics of European Integration: Theory, Practice, Policy*, 3rd. ed., Ashgate, Aldershot
- Mundell, R. (1961), "A Theory of Optimum Currency Areas", *American Economic Review*, Vol. 51, No. 4, pp. 657 - 665
- Newbold, P. (1990), „Precise and Efficient Computation of the Beveridge-Nelson Composition of Economic Time Series“, *Journal of Monetary Economics*, No. 26, pp. 453 - 457
- Niehans, J. (1980), *Theorie des Geldes: Synthese der monetären Mikro- und Makroökonomie*, Haupt, Bern
- Obstfeld, M. and K. Rogoff (1996), *Foundations of International Macroeconomics*, MIT Press, Cambridge
- Pagano, M. (1993), „Financial Markets and Growth: An Overview“, *European Economic Review*, Vol. 37, pp. 613 - 22
- Peña, F. (1999), „Ni tiempo de funerales ni de Tudo Bem“, *Archivos del Presente*, No. 17, pp. 35 - 48

- Ramos, J. (1985), „Stabilization and Adjustment Policies in the Southern Cone, 1974-1983“, *CEPAL Review*, No. 25, pp. 85 - 109
- Ricci, L. (1997), "A Model of an Optimum Currency Area", *IMF Working Paper*, No. 97/76, Washington D.C.
- Rozenwurzel, G. and L. Bleger (1996), „Argentina's Banking System in the Nineties: From Financial Deepening to Crisis“, *Mimeo*, CEDES, Buenos Aires
- Sanchez Valle, R. (1998), „A Cointegration Analysis of Latin American Stock Markets and the US“, *Mimeo*, University of Exeter, Exeter
- Sucesos (1999b), „Exportadores uruguayos se muestran alarmados“, *Sucesos*, <<http://www.mercosur.com>> (22.01.1999)
- Taylor, A. (1997), "Argentina and the World Capital Market: Saving, Investment, and International Capital Mobility in the Twentieth Century", *NBER Working Paper*, No. 6302, Cambridge
- Theurl, T. (1992), *Eine gemeinsame Wahrung fur Europa*, osterreichischer Studienverlag, Innsbruck
- Tokman, V. and D. Martinez Fernandez (2000), „Los temas laborales en el Mercosur“, *Mimeo*, Regional Office of the International Labor Office for the Americas, Lima, <<http://www.redsegsoc.org.uy>> (10.05.2000)
- Tower, E. and T. Willett (1976), "The Theory of Optimum Currency Areas and Exchange-Rate Flexibility", *Special Papers in International Economics*, No. 11, Princeton University
- Urwin, D. (1991), *The Community of Europe: A History of European Integration since 1945*, Longman, London
- Watson, M. (1986), „Univariate Detrending Methods with Stochastic Trends“, *Journal of Monetary Economics*, No. 18, pp. 49 - 75
- Yeyati, E. and F. Sturzenegger (1999a), "The Euro and Latin America III: Is EMU a Blueprint for Mercosur?“, *Mimeo*, Universidad Torcuato Di Tella, Buenos Aires
- Zagari Rigolon, F. (1997), „Independencia do Banco Central: teoria e aplicaoes para o Brasil“, *Ensaio BNDES*, No. 3, Rio de Janeiro