Has a J-curve been present in Argentina?
An Analysis of the Real Effective Exchange Rate and the Current Account

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Abstract

This study analyses how the real effective exchange rate affected the current account in Argentina between the years 1978 and 2006 divided into three sub-periods. Theory concerning the subject, the so called J-curve that the current account should immediately be reduced after a devaluation, thereafter recovering and in the end becoming larger than it was initially.

This study has been unable find all the three stages of the J-curve, at best only the first two were found. In the first two periods – 1978 to 1990 and 1991 to 2000 – a real depreciation seemed to have an instant negative impact on the current account and then a positive trend could be seen. For the third sub-period of 2001 – 2006, there was even less evidence supporting a J-curve, although the small number of observations may be driving this results.
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Sammanfattning


1 Introduction

During the 1980's the Latin American countries were hit by a major debt crisis. The underlying reasons were their huge debts, mainly in dollars, along with an appreciation of the dollar which forced the interest rates to go up. The financial crisis that initiated in Mexico in 1982 gave signals to investors that it would spread. As they withdrew their investments and demanded faster repayments for their loans, the disaster exploded in Brazil and Argentina, resulting in what to day is called “the lost decade”. Another chronic curse is inflation, that has forced not only Argentina but also its neighboring countries to use either a fixed or a crawling currency peg against the dollar. Argentina underwent some major restructuring, like cutting trade barriers, that helped the economy for some time. But the economy slipped once again and faced another crisis in 2001 (Krugman and Obstfeld 2003).

As can be seen from Figure 1, the current account has been fluctuating extensively over the years. Between 1995 and 1998 Argentina’s current account performed quite badly, however managed to increase steadily after 1998 until 2002 when the crisis struck and the country lost significant export revenues. Even though Argentina has managed to stabilize the economy in the latest years, it has not yet reached the same high values as in 2002.

![Figure 1 Current account given in million of pesos](image.png)

Source: Delphos

According to Magee (1973) after a devaluation the current account will immediately deteriorate as buying behavior and trading patterns are hard to adjust. At this stage imports are more expensive than exports. However, after some period of time the value of imports will decrease along with an increase in the value of export – as it will be cheaper for foreigners to buy domestic goods. These movements in the current account will form the J-curve, which will further be described in the theory section. Turning once again to Figure 1, it can be suspected that after 2001 some elements of the J-curve prevail, as the current account is almost zero in 2000 but manages to recover quite strongly the following years.

Argentina was a country that from its birth flourished and had a larger GDP than many countries in Europe. After that it transformed and became haunted by hyperinflation, political scandals, economic stagnation and chaos. This sharp turn has made economists perplex and confused over and over again, as it seem to be impossible to explain Argentina’s economic vulnerability and fragility. Given this overall review it should be clear that investigating the causes of the changes in the current account, could give rise to a broad discussion.
1.1 Purpose and outline

The main purpose of this thesis is to investigate the effects of a real depreciation on the current account in Argentina over time and to see whether a J-curve exists.

In the following section a brief review of Argentina's economic history will be given, referring to the time span covered in this paper that is 1978-2006. Moving on, the theoretical framework will show how a depreciation will affect the current account, on both a bilateral and a multilateral level. This will serve as a foundation for the empirical section, where the various components of the J-curve are investigated. In section four, to stress the importance of the theoretical background for the J-curve, a few previous studies will be discussed. Section five will mainly deal with the implications and repercussions of the so called convertibility plan and the crisis in 2001 when Argentina was on the verge of a national default. Subsequently, the empirical analysis is presented along with the regression results, where the following time periods were investigated 1978 – 1990, 1991 – 2000 and 2001 – 2006, based on data from the two major data basis BCRA and INDEC. Lastly, conclusions are made when combining theory and data analysis.
2 Background

To understand the complexity of the situation Argentina is facing today, one has to recognize the very complex economic history. Between the years 1955 and 1973 Argentina had 10 different presidents, with five of them being generals, and it was a period marked by nationalism and introversion. It was not until 1983 that Argentina elected its first democratic leader. A vast array of import restrictions, import licenses, import prohibitions and multiple exchange rates restricted trade. For example, a 133 percentage tariff imposition on capital goods and 164 percent for industrial goods. This is one example among many that demonstrates how the government actively took measures against an open and functioning market. After the oil shocks during the 1970's Argentina along with many developing countries faced great difficulties, mainly because the loans that were issued became too expensive and unbearable to repay. The Argentine economy was undermined not only by its enormous foreign debt – in 1983 it was 40 billion dollars – but later by severe inflation.

This thesis will investigate the J-curve during the time span of 1978 and 2006. The starting year 1978 was chosen because Argentina went through some major structural and economic reforms, thus before that year data accessibility at BACRA and INDEC (the two largest Argentine statistical sites) gets fairly restricted.

A fist glance at Figure 2 below one can see that there is apparently a negative long-run relation between the current account and the real effective exchange rate (REER), but both components has been fluctuating highly over the time period. The real effective exchange rate and the bilateral exchange rate between the Argentine exchange rate ($) and the dollar (US$) are measured along the left axis, where a devaluation or a depreciation is indicated by a rise. The exchange rate between Argentina and the US has managed to be fairly stable, except for the jumps after 1990 and 2001, a topic that will be discussed further shortly.

The current account is measured along the right axis. Note that the breaking points are set differently at the two axes and do not quite correspond to each other as zero for the current account is equivalent to almost one for the exchange rates.

Figure 2 The real effective exchange rate and the exchange rate between the Argentine peso ($) and the US dollar (US$) in relation to the current account (calculated in million of pesos)
Source: Delphos
This thesis will deal with three different periods separately in the 1978-2006 time span. The reason for dividing the time period into three is mainly due to different exchange rate regimes existing during 1978-2006. The currency was pegged against the dollar between 1991 and 2000 forming a natural breaking point. Due to different dynamics in the economy in different exchange rate regimes, the pre-peg period (1978-1990) the peg period (1991-2000) and the post-peg period (2001-2006) are examined separately.¹

When the movements in the current account and the real effective exchange rate are compared, it is clear that they are negatively correlated at least in the first period. Between 1978 and 1990 the current account initially decreases and then it starts increasing steadily, except for 1987. The real effective exchange rate tends to increase when the current account decreases and decreases when the current account goes up. It is important to stress that during 1978 and 1990 the country changed its currency two times, an outcome that clearly does not improve the current account (Rojas 2002). A reason why the current account during this period delivered a weak and initially negative trend, could be blamed upon the complicated import restrictions and the introverted economy of this time. When investigating the relationship more closely, as the real effective exchange rate changes there will be a response in the current account after a short period of time.

Moving on to the middle period, of 1991 – 2000 the current account faced severe difficulties with a short recovery in 1995 along with a marginal appreciation of the real effective exchange rate. The relationship between the two components is not as clear as in the previous period and in fact it is difficult to detect any sort of relationship. Lastly, in the last period of 2001 – 2006 the current account improves quite strongly and overshoots in 2003 after which it subsides slowly. Along with this both of the exchange rate measures increase slowly.

Turning to the exchange rate between Argentina and the US, Argentina introduced a crawling peg in 1978, an exchange system that would help the country to overcome its chronic inflation problems. Through the *tablita* ("little table"), the central bank dictated the exchange rate of the peso against the dollar. Unfortunately, the attempts were in vain as inflation later came to explode. As the persistent price-rises were far too high in comparison to the US inflation along with the forced depreciation, the peso actually appreciated in real terms along with a decrease in the current account (Krugman and Obstfeld 2003).

The *tablita* was abandoned in the early 1980s, as it created an untenable situation and created a new wave of inflation. In 1992 the peso was devalued and replaced by the new currency *australes* that immediately depreciated. The current account started to fall sharply and inflation started to increase. To control the frequent problem of inflation the government confiscated the Argentine peoples’ savings and turned them into government bonds, which only paid dividend every seventh month. This hampered the velocity of money significantly (Rojas 2002).

After Menem became president in 1989 some stability was brought to the country. Export increased, but this was not enough to overcome the large excess import values. In 1991 the exchange rate was pegged once again this time fixed at 1 peso per dollar. A number of ad-

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¹ The third devaluation and replacement of a new currency, the peso, was introduced in 1992. Thus, the first year the peg guaranteed that one dollar corresponded to 10 000 *australes* the currency between 1985 and 1991.

² Please refer to table A1.4 where a currency convertibility table is displayed. Moreover, the currency changes occurred in 1983 and 1985.
ditional measures were taken, for example the abolishment of large number of import restrictions and a large sell off of state-owned companies, which caused the current account to explode after 1999.

The peg was released in 2001 as the government was not able to support its value any longer. Foreign investors were now withdrawing their investments from the country and both the outside world and the Argentine people had lost all the confidence of the currency. People withdrew their savings, converted them into dollars and sent the money abroad. The only option left for the government to do to avoid hyperinflation was to once again to freeze all the bank accounts (Rojas 2002).
3 Theoretical framework

In this section the J-curve’s effect on the current account will be described. In short, “due to lag structure, currency [devaluation] is said to worsen the trade balance first and improve it later resulting in … the J-curve phenomenon”. (Bahmani-Oskooee and Ratha 2004, p1377).

Starting off, the current account (CA) is the difference between exports and imports.

\[ CA = EX - IM \]

(Equation 1)

In turn, this depends on national income (Y) and the real exchange rate (q). Thus we will have:

\[ CA = f(Y, q) \]

(Equation 2)

The equations above shows that the current account is a function of the real exchange rate (q) and national income (Y). The real exchange rate is defined as 

\[ q = \frac{EP}{P*} \]

where \( E \) is the nominal exchange rate (the price of foreign currency), \( P \) indicates the domestic price level, and \( P* \) is the foreign price level. Obviously, the current account is influenced by a number of things beyond the above variables, but those are not taken explicitly into account here (Krugman and Obstfeld 2003).

As a consequence of a devaluation, q will increase and export will tend to get more attractive to foreign buyers as domestic prices will go down, thus it will improve the current account. Imports demanded from abroad will get more expensive and go down in quantity but the total outcome on import value is ambiguous, as it can actually increase (Krugman and Obstfeld 2003). Together export and import can produce either a rise or a fall in the current account as it depends on whether the volume effect (the changes in export and import volumes) or the value effect (the change in the value of each unit imported) is the strongest. However, it is assumed that imports will only decrease in value in the long run, and the total effect on the current account will then be positive. If an appreciation will occur, this relationship will be reversed (Magee 1973).

If income will go up the country will consume more imports as the demand will go up for all goods. This will have a negative effect on the current account, all other things being equal.
Figure 3 shows how the current account will respond to a real depreciation, the so called J-curve phenomenon. At (1) is the initial stage is the so called pre-devaluation stage (Appleyard et. al., 1986). When devaluing the national currency an immediate negative change in the current account will prevail (the movement between point 1 and 2). The reason for this is that consumers may be reluctant to change their consumption behavior and that investments are often done in the long run. Thus the total value of import will rise which will lead to a negative impact on the current account. Producers may face an increasing demand for their products, but it will take time to invest in new plants and machinery delaying larger volumes of export (Krugman 1989). As time goes by consumption and production behavior will adjust making the current account recover and slowly increase. The concrete results can be seen only after some time, empirical results suggest after at least 4 quarters, that is one year (3). After that the current account is expected to become higher than it was prior to the devaluation as exports are now cheaper for foreigners thus total export volumes are expected to rise. In addition imports will most likely decrease as they are now too expensive in relation to domestic products (Magee, 1973).

The process for the current account to improve and to reach its new equilibrium is not something that happens over night, as the components will respond to changes in the exchange rate only after some period of time (Krugman and Obstfeld, 2003).

Magee (1973) only looked at the repercussions of the devaluation of the American dollar in 1971, on the US current account on an aggregate level. In the next subsection we can see how his ideas can be extended to include bilateral trade data.

### 3.1 The J-curve with bilateral data

Among others, Rose and Yellen came to the conclusion that when empirically examining the issue of the J-curve with respect to different trading partners and not only investigating one country against “the rest of the world”, the accuracy of the estimates would improve and made results more reliable. One of the reasons is that trade could improve with one country, while diminishing with another. This rationale could also be applied for the ex-
change rate. According to the results found by Bahmani-Oskooee and Ratha (2004), it can be said that the short run impact of a depreciation on the current account is ambiguous, however country specific. On the other hand in the long run, a depreciation does have a positive impact on the current account.

### 3.2 Pass-through and quantity adjustment

After years of empirical investigation Stephen Magee (in 1973) published his famous paper of his findings on aggregate data for the US. He found that three states of the J-curve prevailed. In the first stage, currency contracts were signed by various economic agents, knowing that there is a possibility that a depreciation or an appreciation may occur. If you are an exporter you would like the currency to become weaker in order to make your goods cheaper for foreign costumers while at the same time you get the same price in domestic currency. If you are an importer the most preferable is that the domestic currency gets stronger, in order to make as large capital gain as possible. As countries generally have a comparative advantage in their exports, it is presumed that exporters will have the strongest say in this bargaining process. Therefore the trade balance will decrease in this currency contract period, and will last for some time depending on whether the country has imported more than exported.

After a devaluation export and import quantities will most likely adjust only after some period of time. This period was named “the pass-through period” by Magee. According to him this “analysis refers to the behaviour of international prices on contracts agreed upon after the devaluation has taken place but before it has effected significant changes in quantities.” (Magee, 1973).

The contributions of the quest of finding the optimal way of measuring the fluctuations in the current account given changes in the exchange rate has been many and varied. The next section will therefore deal with previous studies that have been investigating the topic.
4 Previous studies

This section will provide a review of relevant studies that have dealt with the J-curve and its overall structure.

The contributions have been many and relevant since its introduction in 1973 by Stephen Magee. He investigated whether there existed movements in the current account that coincided with the J-curve theory after the US devaluation in 1970. The model he constructed consisted of exports divided by imports as a dependant variable, and with the exchange rate, domestic real income and foreign real income as explanatory variables. His empirical analysis showed that there exists a long run positive effect of a devaluation on the current account.

Over the years, more contemporary investigations have emerged, proving that Magee was correct. For example, Hacker and Hatemi-J (2004), who conducted a study on the trade relations of the Czech Republic, Hungary, and Poland with Germany, to determine whether the J-curve was observable.

An interesting contribution, in the form of an empirical analysis of the J-curve’s effect in Argentina was delivered recently by Matesanz Gómez, and Fugarolas Álvarez-Ude in 2006. Through a cointegration analysis and a Granger Causality test, they estimated the relationship of the logarithmic change in the export-import ratio to output and the real exchange rate, at various lags (where one lag was equal to one year) all in logarithmic and the first difference form. They discovered that a J-curve was present in Argentina only before 1991 when the exchange rate was floating, and not under the fixed exchange rate regime. Moreover, the devaluation in 2002 and the abandonment of the fixed exchange rate was necessary to give a long run stable and positive effects on the trade balance which in turn will yield economic development (Matesanz Gómez and Fugarolas Álvarez-Ude, 2006).

The J-curve has come to play an important role in economic theory because of its simplicity. In addition, the researcher is quite free when manipulating the various components. For example instead of taking exports minus imports, one can find results more accurate when dividing the two, or when simply using the natural log of that ratio. Another alternative is to divide the current account with the gross domestic product or with the consumer price index. Taking one example, Chinn and Lee, (2002), considered the relation of the current account divided by output against the exchange rate. The researchers came to the conclusion that there exists a long run relationship in Argentina between the trade balance on one hand and the real exchange rate and the foreign and domestic incomes on the other.

The tradition has been to use some kind of exchange rate – for example in real or nominal terms – as an explanatory variable, together with some stabilizing factor like gross domestic product. The exchange rate used should be bilateral if the trade examined is bilateral.
5 The Convertibility Plan

In 1989 Carlos Saúl Menem was elected president by the Argentine people. During his first term of office Menem came to restore its diplomatic relations with the USA and Great Brittan as a way to rebuild its financial system (Cavallo, 2004). The so-called convertibility plan was together with a vast array of reforms introduced in 1991. The plan was developed to stop hyperinflation, not only through pegging the currency to the dollar, but also by undertaking a number of trade measures for example joining various trading blocks. From the very start the IMF refused Menem’s proposal of a currency peg but the president asserted that this was the ultimate decision. Below, the content of the convertibility plan will be exposed in short.

5.1 Convertibility

At the end of March 1991 it was decided that the peso was going to be pegged to the dollar in order to cut inflation.

![Figure 4: Inflation changes in percent, on a monthly basis, between 1986 and 1992](source: Delphos)

As one can see from Figure 4 the inflation in the country reached its peak in March 1990 when it was more than 200 percent (!). To overcome this problem both the current and the capital transactions were set to use a fixed exchange rate (IMF 1998), such that 1 peso (the country’s currency), could be bought for 1 American dollar. Banco Central de la República Argentina (BCRA) – the Argentine Central Bank – maintained this parity by holding the stock of currency fixed. In addition, BCRA was prohibited by law in 1992 to grant any loans to the government and to publicly owned companies (Rojas, 2002).

5.2 Trade Reforms

Another component in the Convertibility Plan was the trade issue. During Menem’s first term of office (1989-95), a first step to loosen the traditionally high barriers of trade was to join MERCOSUR (Mercado Común del Sur), a regional trade agreement. Under this re-
gime and later under the WTO (a collaboration that initiated in 1995) various trade integration measures were undertaken (MERCOSUR, 2007). Between the years 1989 and 1991 on average tariffs were cut to only 9 percent from 40 percent. Moreover, bureaucratic procedures were simplified to enable more imports, except for certain sectors, like automobiles and textiles. Anti-dumping became more restricted and trade liberalization more free. Due to a more stable economy the country was able to handle external shocks in a more favorably way, for example the depreciation of the Brazilian Real (WTO, 1998).

Additionally, public companies were sold out and the public employment were cut by more than 200,000 workers (Rojas, 2002). By the end of 1994 more than 90 percent of the publicly owned companies were privatized, resulting in that the government gained US$20 billion with which it could pay off a large amount of its foreign debt (IMF, 1998). One of the reasons why exports grew at a steady rate was because the industrial sector was rationalized, and between the years 1990 – 1998 it expanded by 47.5 percent (Rojas, 2002). Another sector that helped to increase exports was the agricultural sector, which was Argentina’s ace.

![Exports and imports, calculated in constant 1986 prices](source: INDEC)

All in all we can draw the conclusion that even though exports increased, it was not enough to overcome the effects of the increased imports. As we can see from Figure 5 the current account deteriorated until 1999.

As a consequence of the currency peg in 1991, importers took advantage of the low exchange rate and lower barriers to trade, which affected the trade balance negatively. This trend continued until the crisis in 2001 when the Argentine economy collapsed, and after the depreciation in 2002 imports fell sharply producing a trade surplus. In 2002 the exchange rate was totally released and the resulting depreciation caused the imports to recover along with an increase in exports (INDEC, 2007).

### 5.2.1 MERCOSUR

In 1991 Argentina along with Brazil, Paraguay and Uruguay founded the regional trade agreement Mercado Común del Sur (MERCOSUR). Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela are at present solely associate members. The main aim of this agree-
ment is to protect its members from the external market, as experience has shown that these countries tend to be fairly unstable when an external shock hits them. Moreover through economic integration the quest has been to extend each other’s respective markets along with social justice. One of the goals has been to eliminate the inter-trade tariffs and today 90 percent of trade between them is duty-free. The countries prefer to be treated as one economic unit and as an intermediary to the international market and have thus developed common external tariffs (that applies to around 85 percent of the imported goods). The reason for this is to generate greater growth rates for each individual country and through this, supply the market with more diversified goods with a higher degree of specialization and to produce at economies of scale. Along with these goals, MERCOSUR provides the region with economical and political stability. (MERCOSUR, 2007)

Even sixteen years after the foundation, trade policies are not fully developed and some issues on trade policy are not yet completely agreed upon. However, MERCOSUR is the fifth largest trade region in the world – the region comprises of 263 million inhabitants and the total GDP (in PPP) was 2.42 trillion in 2006. Brazil contributes with about 70 percent of the total GDP and Argentina with about 27 per cent (INDEC, 2007).

5.3 The Crisis

Strangely enough, Argentina had managed to endure the Mexican crisis in 1994, the devaluation of the Brazilian Real and the Asian crisis. However, in 2001 when Menem was succeeded by Fernando de la Rúa, the Argentine economy moved into another recession. At this stage the government budget deficit was 2.5 percent of the gross domestic product and to overcome this problem he did was he thought was the best. He raised the taxes in three strategic areas: The first one concerned employment. It turned out to be the absolute worse thing to do with an already existing unemployment rate of 18 percent. But also taxes on exports and on financial transactions were imposed. This followed an increasing interest rate and a decrease in output. Along with this, economists and other intellectuals in and outside Argentina started to criticize the peg claiming it made the peso overvalued and the exports less competitive on the world market (Saxton, 2003).

At this stage Argentina had lost most of the confidence of external investors and experienced an enormous capital flight (Teunissen and Akkerman, 2003). At the breaking point the Argentine government did not have enough money in its reserves and people were refused to collect their savings (Vargas, 2007).

As Argentina was trapped with a huge trade deficit, a pegged currency and a debt that was all in American dollars, the country was no longer able to support its peg, as there was no money left in the financial reserves to buy up local currency (Vargas, 2007). So the currency was partly released and the government decided that a short “transition period” had to be implemented to eliminate a too rapid value loss of the peso, where the new exchange rate was 1.40 peso for every dollar. Then the so called pesificación was implemented to convert all the bank accounts from dollars to pesos. After a few months the peso was totally released, leading to a sharp rise (indicating a depreciation) in the exchange rate, where one dollar now costed 3.5 pesos. The sharp depreciation was also true for the real effective exchange rate (Teunissen and Akkerman 2003). For further details please turn to Figure 2.

From now on Argentina was in turmoil. In 2001 and 2002 the country’s output was reduced by 4.4 and 10.9 percent respectively. The unemployment rate was 23.6 percent and along with that the automobile industry – the most important income generating activity in
the country – shrank by 53.4 percent. Some of the largest companies – Metrogas, Telecom Argentina, and Aguas Argentinas among others – faced bankruptcy. In 2000 the IMF decided to grant a loan of 8 billion to the country. However, the discussions collapsed when the IMF suspected a case of moral hazard, as Argentina did not follow its recommendations and the money did not serve its purpose, and so the IMF cancelled all the payments to Argentina in 2002. Now the country was, once again, haunted by civil and political unrest (IMF 2003).
6 Empirical Analysis and Results

This section will focus on the empirical results gained from the regressions that were run, divided into three periods of time: 1978 to 1990, 1991 to 2000 and 2001 to 2006, which investigates the existence of the J-curve. For the analysis the current account with the movement in the real effective exchange rate is examined to see what relationship exists. Firstly, theoretical expectations of the repercussions of the variables on the current account will be discussed.

6.1 Current Account

As a result of the theory section the conclusion, that in response to a depreciation there will initially be a decrease in the current account can be drawn. This is because export and import – the differences sum up to the current account – in the immediate aftermath of a depreciation are characterized by buying orders that were made before the adjustment. As the change in the exchange rate will make the imports more expensive the current account will diminish, while exports stays unchanged. After some period of time – empirical research suggest around one year – the conditions will adjust to the new price levels and a positive trend in the current account is expected (Krugman and Obstfeld, 2003).

6.2 Real effective exchange rate

The real effective exchange rate is a measure of how competitive the domestic currency is in relation to some foreign currencies (Betliy, 2002). The theory presented in section 3 implies that following a depreciation there will be long run positive effects in the current account (Krugman, Obstfeld 2003). This could be true with respect to a real depreciation, but a high inflation rate could diminish the J-curve effect.

However, the outcome will be different with a fixed exchange rate. According to Krugman and Obstfeld (2003), if we assume deterioration in the current account after devaluations, expectations that the government would devaluate the currency could prevail. As the exchange rate is still the same, the domestic interest rate is forced to decrease which will give an excess demand for foreign currency. As the exchange rate is fixed under a peg the central bank is forced to sell foreign reserves in order to shrink the money supply.

6.3 Data

The regressions are based on an elaborated work by Delphos a data collection from BCRA and INDEC, the two major statistic sites developed by the Argentine government. The analysis is carried out on quarterly basis and covers the following time periods: 1978 - 1990, 1991 - 2000 and 2001 - 2006.

Between the second quarter of 1991 and the last quarter of 2001 Argentina chose to peg the peso against the dollar in order to overcome the problems of hyperinflation. Another reason for the peg was the trade deficit between 1997 and 2000. Due to the different exchange rate regime the regressions are divided into three periods, 1978 until 1990, 1991 to 2000 and lastly the years of 2001 and 2006.
The following variables were collected from the data sites mentioned above:

\[ \text{CA}_t \]

\( \text{CA}_t \) is the current account and is largely made up of the difference between export and import.

As the original data was given in US dollars, to adjust for inflation it was divided by the US consumer price index\(^3\). Each unit of \( \text{CA}_t \) is equal to one million dollars.

\[ \text{REER}_t \]

\( \text{REER}_t \) is the real effective exchange rate, which is roughly an average of the foreign prices divided by domestic prices when measured in the same currency, with the contribution of the foreign prices of each foreign country weighted by the share of that country's trade with Argentina. A more precise definition of \( \text{REER}_t \) is calculated from year to year is given in Appendix 1.

### 6.3.1 Model specification

The equation below shows that the current account is a function of its past value and the real effective exchange rate of previous periods. It is expected \textit{a priori} that the current account and the real effective exchange rate are positively correlated in the long run, but the effect of the real effective exchange rate will not fully prevail until after some period of time. This is due to for example, reluctance of changing consumer behavior and that orders usually are made months in advance. Each time period \((t)\) is equal to three months.

The equation below describes an estimable linear relationship between the current account at time \( t \) and the current account at \( t-1 \) and the real effective exchange rate at various lags.

\[
\text{CA}_t = \beta_0 + \beta_1 \text{CA}_{t} + \\
\beta_0 \text{REER}_{t-1} + \beta_2 \text{REER}_{t-2} + \ldots + \beta_k \text{REER}_{t-k} + \epsilon_t
\]  
(Equation 3)

### 6.3.2 Granger Causality

In the presented model the regressand is supposed to respond to its regressors within some time lags and is thus a dynamic model. As a lagged value of the regressand is included as an explanatory variable it is an autoregressive lagged model. It will tested if \( \text{REER} \) "causes" \( \text{CA} \) or if it is \( \text{CA} \) that "causes" \( \text{REER} \). The word "causes" in this sense means influence given information on lagged dependant variable. The equations below allow an investigation of whether the explanatory variables (in the past) give repercussions to the endogenous variables in the present, that is if the past causes the present (Gujarati 2003).

---

\(^3\) The central bank of Argentina has through the years given all their data in US dollars to avoid the negative impact of Argentine inflation. Please refer to Appendix 2, where the current account is given in pesos and dollars. The gap, especially in the most recent years, is assumed to be due to Argentine inflation and changes in the real effective exchange rate.
\[
\text{REER}_t = \sum_{i=1}^{n} \delta_i \text{CA}_{t-i} + \sum_{j=1}^{n} \delta_j \text{REER}_{t-j} + u_{1t}
\]

\[
\text{CA}_t = \sum_{i=1}^{n} \delta_i \text{CA}_{t-i} + \sum_{j=1}^{n} \delta_j \text{REER}_{t-j} + u_{2t}
\]

(Equation 4)

Here it is tested if the current real effective exchange rate (REER) in some way is linked to its past value and the past value of the current account (CA). The F-value under the null hypothesis of no Granger Causality is assumed to follow an F distribution and may be rejected if the computed F-value is greater than the critical value, given a specific significance level. This means that the null hypothesis is:

\[H_0: \delta_i = 0 \text{ for all } i \text{ when } \text{REER}_t \text{ is the dependent variable}\]

This states that the lagged term CA do not belong in the regression, that is the past value of the current account do not affect the future value of the real effective exchange rate (Gujarati, 2003).

6.3.3 Model selection criteria

The \(R^2\) will tell how well the model fits the data and ranges between 0 and 1, the higher the value the better the fit. To compare two models with each other using \(R^2\), the dependant variables have to be the same. For model selection, one can use the adjusted \(R^2\) which penalizes the inclusion of more explanatory variables (in contrast, \(R^2\) always improves when doing the same) (Gujarati, 2003).

In order to determine the optimal lag length one can either use the Akaike (AIC) or the Schwarz (SIC) information criteria

\[
\text{AIC} = e^{2k/n} \frac{\sum u_i^2}{n}
\]

\[
\text{SIC} = n^{k/n} \frac{\sum u_i^2}{n}
\]

(Equation 5)

where \(k\) is the number of explanatory variables (including the intercept) and \(n\) is the number of observations. The lag length providing the lowest value of the information criteria will be the one that is preferred. The two criteria will penalize the inclusion of more explanatory variables (Gujarati 2003).

The existence of no serial correlation (the disturbance term in any observation is not correlated with the disturbance term of some other observation) is assumed under the classical linear regression model. Thus it is desired that the following would hold:
\[ E(\mu_i) = 0 \quad i \neq j \]

As the regression model in this thesis is through a Granger Causality test the usual test for serial correlation, Durbin and Watson is invalid as it prohibits lagged values of the regres-sand. Instead the Breusch-Godfrey (the BG test, which is also known as the LM test) tests whether there is no serial correlation. The appropriate lag length was determined by the Schwarz information criteria. (EViews 5 User's Guide, 2004).

6.4 Results

The structure of regression analysis in this section uses the theory section as a reference point. According to section 3 it is anticipated that a depreciation of the real effective exchange rate would have an immediately negative impact on the current account, and after some period of time it will increase to a higher level than initially.

A first step when investigating time series data is often the testing for stationarity. The reason for conducting a stationarity test is to see whether the data contains constant mean and variance over time. Stationarity also includes the assumption that "the value of the covariance between two time periods depends only on the distance…between the two time periods and not the actual time at which the covariance is computed" (Gujarati 2003, p.797). In this paper ordinary unit root tests were carried out in EViews with the null hypothesis that the data (CA or REER) is nonstationary i.e. that they possess a unit root.

The results are displayed in more detail in appendix 4. As the t-statistics are greater in magnitude than the critical values for the current account for the second and the last time period investigated (at a 5 percent level of significance) the null hypothesis of a unit root may be rejected. However, for the first period the null hypothesis could not be rejected. Turning to the real effective exchange rate for the first two periods the hypothesis of a unit root could not be rejected, whereas it could be in the last period.

Including one lagged value of the dependant variable as an explanatory variable in subsequent regression partially removes the problem with the possession of the unit root but does not remove the problem totally. Various measures have been taken to eliminate the problem of the unit root and autocorrelation, but without succeeding completely.

The following paragraphs present the results gained from the regressions taking the three time periods, 1978-1990, 1991-2000 and 2001-2006 into consideration.

Table 1 displays the regression results for the first time period. The impact of the real effective exchange rate at various lags on the current account has been rather unstable. These results do not go in line with the priori expectations that CA, is positively related to REER in the long run, as when adding the REER coefficients an overall negative result will prevail. Moving on, as expected CA, and CA,1 are positively correlated.
Table 1 1978-1990, dependant variable CA_t

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>7.500</td>
<td>0.029</td>
</tr>
<tr>
<td>CA_{t-1}</td>
<td>0.526</td>
<td>0.000</td>
</tr>
<tr>
<td>REER_{t-1}</td>
<td>-14.765</td>
<td>0.032</td>
</tr>
<tr>
<td>REER_{t-2}</td>
<td>19.825</td>
<td>0.054</td>
</tr>
<tr>
<td>REER_{t-3}</td>
<td>-14.749</td>
<td>0.134</td>
</tr>
<tr>
<td>REER_{t-4}</td>
<td>-0.039</td>
<td>0.997</td>
</tr>
<tr>
<td>REER_{t-5}</td>
<td>1.916</td>
<td>0.855</td>
</tr>
<tr>
<td>REER_{t-6}</td>
<td>2.421</td>
<td>0.724</td>
</tr>
</tbody>
</table>

R-squared       0.629  Akaike info criterion  6.090
Adjusted R-squared 0.561  Schwarz criterion  6.408
Prob LM test (F-stat)  0.009  F-statistic  9.203
Number of observations  52  Prob F-statistic  0.000

At the five percent significance level the regression F-statistic is significant, rejecting the null hypothesis that at least one of the coefficient is not equal to zero. The R-square shows that 62.9 percent of the variance in the current account can be explained by its value in the previous quarter and the real effective exchange rate in the previous six quarters. The presence of no autocorrelation may be rejected as a consequence of the low LM test significance value, indicating that there are signs of serial correlation, so the efficiency of the coefficient estimates could be improved and the t-statistics may be suspect.

When turning to the current account, the present current account should increase by about 0.53 units if the current account in the previous period increased by 1 unit. One explanation for this relatively small number could be the two devaluations during this period thus the economy did not have a chance to really recover and adjust. However, one should be cautious when making these kinds of assumptions as there are more components that affect the current account than only the exchange rate (taking investments and government spending as an example).

Figure 6 Graphical analysis of the movements in the current account for Table 1

The regression results are presented in graphical form in Figure 6 and shows what happens over time to the current account after a one-unit increase in REER_t. The left diagram displays what happens when taking the feedback effects into account (lagged REER effects CA, which feeds back to affect REER) and the diagram to the right displays the cumulative sum of the REER coefficient estimates (which ignores the feedback effect). For the left diagram, at t-1 REER’s initial coefficient for REER_{t-1} is displayed. At t-2 the value of the coefficient estimate for the current account at t-1 is multiplied by that for REER_{t-1} and added to the sum of coefficient estimates for REER_{t-1} and REER_{t-2}. This is done as the real
effective exchange rate from the previous time periods are assumed to influence the current one. Similar calculations have been done in this manner in the following time periods too.

It is obvious that only the first and the second condition of the J-curve is fulfilled as the value of the current account decreases immediately and then starts to increase slowly. But the third condition that the current account should end up being larger than at the starting point is not satisfied.

Table 2 presents some results from Granger Causality testing for the 1978-1990 period. The current account and real effective exchange rate were lagged six times for testing whether there existed any causality between the variables.

<table>
<thead>
<tr>
<th>REER does not cause CA</th>
<th>F-statistic</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA does not cause REER</td>
<td>2.033</td>
<td>0.089</td>
</tr>
<tr>
<td>CA does not cause REER</td>
<td>1.617</td>
<td>0.173</td>
</tr>
</tbody>
</table>

It can be seen from the test results that at a 10 percent significance level we can reject the hypothesis that REER does not Granger cause CA but we may not reject the hypothesis that CA does not Granger cause REER. Therefore it appears that Granger causality runs one-way from REER to CA and not the other way (EViews 5 User's Guide 2004). However, evidence of nonstationarity in the variables could weaken the accuracy of the p-value.

In Table 3 the regression results for the middle period is displayed. The repercussions of the REER at the various lags on the CA has been more even, however not overall positive when summing all the REER coefficients, contrary to what was anticipated. The current account at its previous value is positively related to the current account at present, as expected. If the current account at t-1 increases by one unit then the value of the current account at t should go up by 0.625 units.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.727</td>
<td>0.855</td>
</tr>
<tr>
<td>CA_{t-1}</td>
<td>0.625</td>
<td>0.000</td>
</tr>
<tr>
<td>REER_{t-1}</td>
<td>-0.796</td>
<td>0.015</td>
</tr>
<tr>
<td>REER_{t-2}</td>
<td>1.154</td>
<td>0.009</td>
</tr>
<tr>
<td>REER_{t-3}</td>
<td>0.303</td>
<td>0.466</td>
</tr>
<tr>
<td>REER_{t-4}</td>
<td>-0.341</td>
<td>0.396</td>
</tr>
<tr>
<td>REER_{t-5}</td>
<td>-0.676</td>
<td>0.081</td>
</tr>
<tr>
<td>REER_{t-6}</td>
<td>0.320</td>
<td>0.227</td>
</tr>
</tbody>
</table>

At the 5 percent level of significance we can see that at least one of the coefficients of the explanatory variables is not equal to zero, that is the joint hypothesis that all explanatory variable coefficients are zero may be rejected at a 5 percent level of significance based on the F-statistic. The R-square indicates that 59.5 percent of the variance in the current account can be explained by its value in the previous quarter and in the real effective exchange rate values in the previous six quarters. The existence of no autocorrelation may be rejected, due to the low LM test significance value indicating that there are signs of serial
correlation. Therefore the efficiency of the coefficient estimates could be improved and the t-statistics may be suspect.

Figure 7 Graphical analysis of the movements in the current account for model in table 3

Turning to the graphical analysis in Figure 7 where the left diagram displays the effect on the current account, after a one-unit increase in REER and taking the feedback effects into account, and the diagram to the right displays cumulative sum of the REER coefficients estimates (as in Figure 6), it is obvious that even here only the first and the second condition of the J-curve is fulfilled as the value of the current account is affected negatively initially and then it increases only to drop after the third period. As the current account recovers after the fifth time period in the right graph, it could be a sign that is will continue to increase if the analysis was extended to more time periods.

The real effective exchange rate affects the current account rather unevenly and high inflation might be the underlying reason for this, a result that may be verified by comparing Figure 2 and 4.

Table 4 presents some results from Granger Causality testing for the 1991-2000 period. The current account and the real effective exchange rate were lagged six periods for the testing whether there existed any causality between the two variables.

Table 4 1991-2000

<table>
<thead>
<tr>
<th></th>
<th>F-statistic</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>REER does not cause CA</td>
<td>1.679</td>
<td>0.176</td>
</tr>
<tr>
<td>CA does not cause REER</td>
<td>1.554</td>
<td>0.209</td>
</tr>
</tbody>
</table>

According to the Granger causality test procedure we can reject neither the null hypothesis that REER does not cause CA nor the hypothesis that CA does not cause REER. Thus there is no empirical support for a causal long term relationship between REER and CA. Nonstationarity in the variables may affect the precision of the significance level on these tests.

Table 5 presents the same regression as in Tables 3 and 4 for the 2001 and 2006 period. Despite the fact that the models is not empirically supported, not even at a generous significance level with the standard F test, this model with six REER lags is presented for consistency.

We can see that the current account at the previous quarter and the current account at present have the anticipated a positive relationship. In addition, when adding up the REER coefficients together, they indicate a positive relation of REER with the dependent variable in the long run.
Table 5 2001-2006 Using 6 lags for REER, dependant variable CA

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-27.870</td>
<td>0.779</td>
</tr>
<tr>
<td>CA_{t-1}</td>
<td>0.052</td>
<td>0.857</td>
</tr>
<tr>
<td>REER_{t-1}</td>
<td>0.209</td>
<td>0.587</td>
</tr>
<tr>
<td>REER_{t-2}</td>
<td>0.116</td>
<td>0.676</td>
</tr>
<tr>
<td>REER_{t-3}</td>
<td>-0.109</td>
<td>0.603</td>
</tr>
<tr>
<td>REER_{t-4}</td>
<td>0.133</td>
<td>0.509</td>
</tr>
<tr>
<td>REER_{t-5}</td>
<td>-0.003</td>
<td>0.980</td>
</tr>
<tr>
<td>REER_{t-6}</td>
<td>-0.061</td>
<td>0.502</td>
</tr>
</tbody>
</table>

R-squared   
Adjusted R-squared   
Prob LM test (F-stat)   
Number of observations   

It can be concluded that at the five percent significance level the joint hypothesis that all the coefficient estimates for the explanatory variables are zero may not be rejected, not even at 15 percent significance level.

Figure 8 Graphical analysis of the movements in the current account for model 3

As we can see in Figure 8 above (formed similarly as Figures 6 and 7, but using Table 5 estimates) the last stage of the J-curve, the point where the current account overshoots its initial value, prevails. However, an initially dip in the current account is missing.

Regression results for seven lags are also presented (see table 6), since a significant coefficient estimate arises with the extra lag. Contrary to what was expected, the current account at its previous value has a negative correlation with its present value. Also when adding the REER coefficients together, the result is negative.
Table 6 2001-2006 Using 7 lags for REER, dependant variable CA

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>135.789</td>
<td>0.2669</td>
</tr>
<tr>
<td>CA&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>-0.075</td>
<td>0.795</td>
</tr>
<tr>
<td>REER&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>0.046</td>
<td>0.899</td>
</tr>
<tr>
<td>REER&lt;sub&gt;t-2&lt;/sub&gt;</td>
<td>-0.160</td>
<td>0.644</td>
</tr>
<tr>
<td>REER&lt;sub&gt;t-3&lt;/sub&gt;</td>
<td>-0.514</td>
<td>0.092</td>
</tr>
<tr>
<td>REER&lt;sub&gt;t-4&lt;/sub&gt;</td>
<td>0.365</td>
<td>0.113</td>
</tr>
<tr>
<td>REER&lt;sub&gt;t-5&lt;/sub&gt;</td>
<td>-0.343</td>
<td>0.112</td>
</tr>
<tr>
<td>REER&lt;sub&gt;t-6&lt;/sub&gt;</td>
<td>0.101</td>
<td>0.399</td>
</tr>
<tr>
<td>REER&lt;sub&gt;t-7&lt;/sub&gt;</td>
<td>-0.174</td>
<td>0.053</td>
</tr>
</tbody>
</table>

R-squared 0.595  Akaike info criterion 5.909
Adjusted R-squared 0.486  Schwarz criterion 6.351
Prob LM test (F-stat) 0.790  F-statistic 2.104
Number of observations 24  Prob(F-statistic) 0.157

It can be concluded that at a fifteen percent significance level we may reject the null-hypothesis, that all the coefficients are equal to zero. The R-square shows that at almost 60 percent of the variance in the current account can be explained by the prior values in the real effective exchange rate and current account. The presence of no autocorrelation may not be rejected at standard significance levels.

![Graphical analysis of the movements in the current account for model in Table 6](image)

Looking at Figure 9 (formed similarly as Figures 6, 7 and 8 but using table 6 estimates) the J-curve is hard to observe. There is a decline in the current account after a real depreciation and after three quarter and the decline tends to continue.
7 Conclusion

The aim of this thesis has been to see if there exist any short and long run effects of a real depreciation on the current account in Argentina, that is if a so called J-curve has been present. This was done by investigating the intimate relationship between the current account and the real effective exchange rate.

Previously, Matesanz Gómez, and Fugarolas Álvarez-Ude (2006) found that there existed a J-curve in Argentina only during the currency peg (1991-2000) and I expected similar results. However, I could only observe the first two stages of the J-curve, thus not that a real depreciation had a long run positive impact on the current account.

From the graphical analysis from Figure 2 I suspected that during the first time period a J-curve would prevail due to that the current account in the beginning of the period deteriorates but then in the end is greater than it was initially. The results provide some evidence of a J-curve during that period. Turning to the last period my presumptions of an absent J-curve turned out to be correct, given my graphical analysis in Figures 8 and 9.

Why has there not been a more concrete evidence of a J-curve especially since three devaluations took place during the first time period tested here (1978-1990)? One explanation for this was that the purpose of the devaluations was not to improve export patterns, but rather to control inflation and to decrease the reliance on imports, as it was not until Menem’s presidency most of the import restrictions were abolished. However we have seen that the real GDP rose at least in the middle period, showing that using the real effective exchange rate as a tool even to control inflation can come in handy. Moreover, there appears to be an overall positive relationship between the current account and the real effective exchange rate (except for the first time period, according to figure 2). In other words, if the exchange rate goes up (indicating a devaluation or a depreciation) the current account will improve.

A drawback of this thesis was that I did not perform elaborated regressions on various bilateral links, i.e. investigating if there existed a J-curve between specific regions or countries and Argentina, as Argentina’s trading patterns tend to differ widely according to region as can be seen from Figure A2 10 in the appendix 1.

Another topic that has not been given enough space is the feedback effects. A devaluation could create inflation, as the value of imports will generally increase and the country will buy more commodities, thus increasing prices. Now imports will get more expensive, and then we have created more inflation. This in short describes the concept and is a fairly interesting topic to investigate in the future (Vargas 2007).

Argentina’s debt pattern and relationship with the International Monetary Fund is yet another intriguing subject to study. During the 1970’s it was fairly cheap for Argentina and other developing countries to borrow money but during the 1980’s as the oil shocks’ repercussions struck the world, the loans got more expensive along with increasing interest rates.
Actually, according to Vargas (2007) this was one cause of the crisis, as Argentina had to pay back its loans during a fixed exchange rate, but they borrowed under a floating.

Argentina is an excellent example of how fragile and sensitive to changes an economy can be. The country’s economic history has shown that the maintenance of stability is not a simple task but a process that has to be elaborated and developed carefully. In Argentina those in power experienced that the “ordinary” economic measures such as introducing a currency peg or reducing various trade barriers does not always turn out to have the desired effect, but they can as we have seen be a crucial reason for economic disaster. In my opinion economic development has been hampered not only by inflation but also corruption (even though this topic is not covered here it is however not an insignificant topic to study).
References


- 25 -


Appendices

Appendix 1 Calculations of the real effective exchange rate

The real effective exchange rate (REER) is a measurement of how competitive Argentina’s currency peso is against foreign exchange rate and is a useful tool when describing the structure of internal demand, production, international trade and the competitiveness of the Argentine economy. If the REER increases the currency gets cheaper, thus the Argentine goods gets more competitive on the market. If it goes down an appreciation of the currency prevails making domestic goods more expensive on the world market. The impact of each trading partner’s currency is determined by how much trade it has with Argentina.

\[
\text{REER}_t = \text{REER}_{t-1} \prod_j \left[ \frac{q_{j,t}}{q_{j,t-1}} \right]^\omega_j
\]

\[
q_{j,t} = \frac{E_{j,t}}{P_{j,t}}
\]

(Equation 6)

as this competitiveness includes not only the nominal exchange rate but also takes into account price levels

$q_{j,t}$ is calculated by adding imports and exports of each respective country and then dividing this with total trade. An increase (decrease) in the weights implies a real depreciation (appreciation). This weight is updated annually where and 18 currencies are given appropriate weights according to the intensity of commerce with Argentina (at least 0.5 percent of the total exports plus imports). The Brazilian real, the American dollar and the Euro are the currencies that are given the highest weights. Note that the homogenous goods like petroleum, soybean and maize, for example, are excluded from the calculations as their prices are determined by supply and the world-wide demand at auction markets.

$q_{j,t}$ is the real bilateral exchange rate at country j at month t adjusted for prices

$E_{j,t}$ is the average price (nominal exchange rate) of the national currency in country j at month t

$P_t$ consumer price index for Argentina at month t, that include an ample basket of goods

$P_{j,t}$ is consumer price index in country j at time t, that include an ample basket of goods in the other country

$\prod_j$ is the number of countries included in the calculations

The real effective exchange rate is modified every year by the Argentine Central Bank.

According to equation 3 REER is a function of the real exchange rate (q) with country j at time t, divided by the real exchange rate one time period before, times the REER one time period before. Together this is set against how much trade that is carried out between the two countries ($\prod_j$).
Table A1 7 Countries included in the calculations of REER and their respective weights (□)

<table>
<thead>
<tr>
<th>Country</th>
<th>1991</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolivia</td>
<td>1.0</td>
<td>0.7</td>
</tr>
<tr>
<td>Brazil</td>
<td>19.2</td>
<td>32.7</td>
</tr>
<tr>
<td>Canada</td>
<td>0.9</td>
<td>0.8</td>
</tr>
<tr>
<td>Chile</td>
<td>3.8</td>
<td>4.9</td>
</tr>
<tr>
<td>United Stated</td>
<td>20.0</td>
<td>15.5</td>
</tr>
<tr>
<td>Mexico</td>
<td>2.5</td>
<td>5.4</td>
</tr>
<tr>
<td>Paraguay</td>
<td>1.2</td>
<td>1.0</td>
</tr>
<tr>
<td>Uruguay</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>The Euro Zone</td>
<td>29.8</td>
<td>20.9</td>
</tr>
<tr>
<td>Denmark</td>
<td>0.3</td>
<td>1.2</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>2.1</td>
<td>1.9</td>
</tr>
<tr>
<td>Sweden</td>
<td>0.7</td>
<td>0.9</td>
</tr>
<tr>
<td>Switzerland</td>
<td>1.3</td>
<td>0.8</td>
</tr>
<tr>
<td>Korea</td>
<td>2.7</td>
<td>1.5</td>
</tr>
<tr>
<td>China</td>
<td>2.7</td>
<td>5.5</td>
</tr>
<tr>
<td>Japan</td>
<td>6.8</td>
<td>2.6</td>
</tr>
<tr>
<td>Malaysia</td>
<td>0.4</td>
<td>0.8</td>
</tr>
<tr>
<td>Taiwan</td>
<td>1.4</td>
<td>0.7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
Appendix 2

Figure A2.10 The four major trading partners and their exports patterns with Argentina

Table A2.1 Currency changes in Argentina since 1933

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Convertibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>peso</td>
<td>1 peso = 10 000 australes</td>
</tr>
<tr>
<td>1985</td>
<td>austral</td>
<td>1 austral = 1 000 peso</td>
</tr>
<tr>
<td>1983</td>
<td>peso argentino</td>
<td>1 peso = 1000 nuevo peso</td>
</tr>
<tr>
<td>1970</td>
<td>nuevo peso (peso ley)</td>
<td>1 nuevo peso = 100 peso m/n</td>
</tr>
<tr>
<td>1933</td>
<td>peso m/n (muneda national)</td>
<td></td>
</tr>
</tbody>
</table>

Since 1933 the Argentine government has devalued and changed its country’s currency five times. After the release of the peg in 2000 the currency was still controlled by the government through a “crawling peg” regime, which implied that they adjusted to some extent the exchange rate between the peso and the dollar. This was done in order to hinder a too sharp depreciation that would most likely occur if releasing it totally at once. Therefore, when talking about the Argentine economy the term “depreciation” can only be used after 2002 as now the currency was only controlled by market powers and not by the government.
Appendix 3

Figure A3 11 The changes in real GDP on yearly basis between 1978 and 2004 with 100=1993

Figure A3 12 The differences between the current account in pesos and in dollars between 1978 and 2006 on quarterly basis

The differences between the two, especially after 2002 is mainly due to the high inflation Argentina experienced.
Appendix 4 Unit root process
The unit root test is shown in two different tables for the current account (CA) and the real effective exchange rate (REER) for the three different time periods.

Note that the numbers in the second column are the lag lengths selected with the aid of the Schwarz information criteria and the numbers in the last column are the p-values.

Table A4.8 Unit root: CA
Null Hypothesis: CA has a unit root

<table>
<thead>
<tr>
<th>Year</th>
<th>Lag Length</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978-1990</td>
<td>4</td>
<td>-1.878396</td>
<td>0.3394</td>
</tr>
<tr>
<td>Test critical values:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% level</td>
<td>-3.577723</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-2.925169</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-2.600658</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Lag Length</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991-2000</td>
<td>9</td>
<td>-4.802818</td>
<td>0.0006</td>
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<tr>
<td>1% level</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-2.963972</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-2.621007</td>
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</table>

<table>
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<tr>
<th>Year</th>
<th>Lag Length</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-2006</td>
<td>1</td>
<td>-3.118945</td>
<td>0.0398</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5% level</td>
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</tr>
<tr>
<td>10% level</td>
<td>-2.642242</td>
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</table>
Null Hypothesis: REER has a unit root

Year: 1978-1990
Lag Length: 0

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<td>-1.240653</td>
<td>0.6498</td>
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<td>Test critical values:</td>
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<tr>
<td>1% level</td>
<td>-3.565430</td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-2.919952</td>
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<td>-2.597905</td>
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Year: 1979-2000
Lag Length: 2

<table>
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<th>Prob.*</th>
</tr>
</thead>
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<td>Augmented Dickey-Fuller test statistic</td>
<td>-1.665484</td>
<td>0.4400</td>
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<td>Test critical values:</td>
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<tr>
<td>1% level</td>
<td>-3.621023</td>
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<tr>
<td>5% level</td>
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<td></td>
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<td>10% level</td>
<td>-2.610263</td>
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Year: 2001-2006
Lag Length: 2

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<th>Prob.*</th>
</tr>
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<td>0.0093</td>
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<tr>
<td>Test critical values:</td>
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<tr>
<td>1% level</td>
<td>-3.788030</td>
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<tr>
<td>5% level</td>
<td>-3.012363</td>
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<tr>
<td>10% level</td>
<td>-2.646119</td>
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