

**THE ADJUSTMENT PROCESS OF THE BALANCE OF GOODS AND SERVICES  
AGAINST FLUCTUATIONS OF THE REAL EXCHANGE RATE:  
AN APPLICATION OF THE J-CURVE FOR THE CASE OF MEXICO, 1988-1999**

## SUMMARY

During the last three decades, the Mexican economy has undergone recurring periods of crisis that have an intimate relationship with the evolution of the real bilateral exchange rate. Additionally, the behavior of the real exchange parity had effects over economic activity in general, and over the trade and non-factor services balances, in particular.

Ever since 1986, there has been an intense process to open up the Mexican economy. Therefore, Mexico is currently in the middle of a globalized economic context that allows the country to take advantage of a bigger market, but at the same time, leaves the economy more vulnerable to periods of world economic volatility.

In this globalized context it is highly relevant to know the magnitude and effect of eventual episodes of currency devaluations on the external sector's national accounts that have direct incidence over the evolution of the Gross Domestic Product (GDP). With respect to this, economic theory assumes that when faced with a devaluation of the real bilateral exchange rate, net exports (the balances of the trade and non-factor services balances) will be benefited.

Nonetheless, there are arguments between the different researchers on the subject regarding the adjustment path or trajectory and the time that such beneficial effects on net exports will be observed. In particular, some authors say that this improvement on net exports does not happen immediately after the observed devaluation of the real bilateral exchange rate. Moreover, there could be a transitory situation where the balance worsens instead of improving.

The objective of this research is to build a dynamic econometric model that incorporates an error correction mechanism (ECM) to describe the adjustment process of the balances of goods and services when faced with fluctuations of the real bilateral exchange rate. Therefore, the hypothesis of this research is that the behavior of the Mexican net exports

(balance of goods and services) can be modeled with dynamic equations that include an ECM.

With this purpose in mind, the phenomenon of study was located within the appropriate theoretical context underpinning it. To accomplish this, we refer to one of the most popular models in international economics. From this starting point, we were able to determine what would be the possible observed result in the balance of goods and services when faced with fluctuations of the real bilateral exchange rate. Specifically, the effort was focused towards a particular case of the adjustment process of the balance of goods and services when faced with fluctuations of the real bilateral exchange rate: the J-Curve. Therefore, it was necessary to explain this phenomenon known as the J-Curve and the reasons that might cause it to appear. Finally, the Marshall-Lerner Condition was introduced and explained, given that it is the key relationship that allows us to determine in which cases a J-Curve phenomenon is possible and likely to appear.

After this, it was fundamental to present a brief historical overview about the behavior of the principal macroeconomic variables that are related to the evolution of the Mexican net exports, specifically, the nominal and real exchange rates from 1975 up to date. The reason for doing this is that the biggest structural changes and the three most recent crisis periods have occurred in this time frame. It is important to look at the recent past because we must not forget the characteristics of the Mexican economy and the importance and magnitude of the structural changes that it has undergone.

The observed outcomes allow us to conclude that the crisis periods occurred under very different environments with respect to the growth strategy. However, they have the common characteristic of a highly appreciated currency, the deficit in the balance of payments was high and growing, and the macroeconomic policies made the problems worse or were the source. The policy measures taken to correct such unbalances of the external sector were usually currency devaluations.

Next, we surveyed the existing literature about the adjustment process of the goods and services accounts linked to the external sector when faced with fluctuations of the real exchange rate. This effort was focused, primarily, towards a known adjustment process called the J-Curve. The purpose of this bibliographic review was to verify and compare the different arguments related to the J-Curve. We included a wide body of literature starting from the early attempts to estimate trade elasticities until an article published in 1996 about the Chinese economy that employed a similar methodology to the one used in this paper. The chapter includes applied studies to countries such as the United States, United Kingdom, Egypt, Ghana, China, and Japan. Additionally, we survey other studies that have samples of different countries, less developed and combinations of developed and less developed countries.

The conclusion we reach from this literature survey is that some of the results of these studies depend on the econometric technique employed. In other cases, the evidence of the presence of the phenomenon is not compelling due to lack of rigor in the methodology. From the results shown in previous papers it is possible to conclude that the exchange rate has a considerable influence in the flow of goods between countries. However, the impact of this variable has lagged effects, that is, they are not immediate. Additionally, the short run trade elasticities are smaller in magnitude in comparison to their long run values.

After this literature survey, we introduce the methodology employed to estimate the coefficients from the different behavioral equations for the principal variables that conform the balance of goods and services. There is a step by step explanation of the statistical tests that must be applied, in addition to the necessary procedures to obtain statistically significant coefficient estimates. The methodology used happens to be a novel theoretical treatment and, therefore, is necessary to explain it.

The observed results allow us to conclude that when working with non-stationary time series, there is a high probability of breaking the assumptions of the classical linear regression model, specifically with respect to autocorrelation. However, from the second half of the decade of the eighties there have been several theoretical innovations that have

allowed researchers to overcome these impediments, in particular cointegration analysis and error correction models. We decided to employ the methodology put forth by Johnston and DiNardo because it offers several advantages. It incorporates the theoretical framework proposed by Engle and Granger, as well as by Johansen. That is, this methodology is flexible enough to capture multiple cointegration vectors, as well as practical, because it is estimated through Ordinary Least Squares.

Armed with this methodology, we proceeded to estimate a model for the balance of goods and services, which has multiple applications, such as the calculation and forecasting of trade elasticities, among others. In this research paper the efforts were focused towards the calculation of import and export elasticities of goods and services, with respect to the real exchange rate.

From the estimated behavioral equations for each of the components of imports and exports of the balance of goods and services it can be established that, for the Mexican economy, the Marshall-Lerner condition is satisfied in the short and the long run. Therefore, the international exchange market is stable and the J-Curve phenomenon is not present. In particular, the sum of the absolute values of the import and export elasticities of goods and services for the short run is 1.31 and for the long run is 1.36.

However, the results, as well as the whole analysis presented here stem from a partial equilibrium setting. If we were to consider the cross effects that exist between manufacturing exports without maquila, the intermediate imports with maquila, and the imports of capital goods, and simultaneously, the cross effects between between imports of goods excluding maquila and outlays from insurance and freight, we can observe that the sum in absolute value of the export and import elasticities of goods and services for the short run is 1.14 and for the long run is 1.35. Therefore, even considering the indirect effects the Marshall-Lerner Condition is satisfied for the Mexican case. Finally, we found that there are certain items in the balance of goods and services that, in the short run, are insensitive to changes in the real exchange parity, such as maquila exports, inflows derived from tourism, and maquila imports. Moreover, these same items, in addition to other

inflows derived from factor services have no fluctuations due to changes in the real exchange parity, in the long run.

From the specified and estimated equations, we ran a behavioral simulation of the variables in question with two alternative scenarios. In the first one, we make several assumptions that can be considered “realistic” with respect to the exogenous variables. In the second one, the exchange rate is modified such that there is an additional devaluation, *caeteris paribus*.

From the results reported by the elasticity values we concluded that the international exchange market, for the Mexican case, can be characterized as stable. That is, the Marshall-Lerner Condition is satisfied. The implication of the previous statement is that when there is a real devaluation of the exchange rate, the adjustment path of the balance of goods and services does not resemble a J-Curve. In this chapter, we verified this hypothesis when we increased the devaluation in the real bilateral exchange rate over a base forecasting scenario by an additional one percent. The result obtained is consistent with economic theory, given that when faced with a devaluation of the real exchange rate we can observe a reduction in the deficit of the balance of goods and services. However, economic theory does not specify the adjustment path of the balance of goods and services, situation that can be determined from the results presented here.

Finally, some of the issues that were not included in this research are the impact of monetary and fiscal policies, the type of expectations economic agents form, and the impact of maquila programs, among others, on the real bilateral exchange rate and the balance of goods and services. Including these issues into the analysis would go beyond the scope and objectives established in this paper.

Future research on this topic has the obligation to employ a methodology that can surpass the theoretical and analytical flexibility of the one used here or employ the technique and results presented in this paper. However, in the short run we can only think that future

research will be using a similar methodology because we incorporated the most recent innovations in econometric theory and time series analysis.

Finally, the new commercial alliances that Mexico has managed to create, technological change, and even the development of electronic commerce will generate a future need to revise the results of this research in order to produce adequate and useful foundations for forecasting and possibly to avoid drastic changes in the economic well being of all Mexicans.