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Analysis of trade on El Salvador post dollarization

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ANALYSIS OF TRADE ON EL SALVADOR POST DOLLARIZATION

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ABSTRACT

Dollarization has been suggested as an option for emerging economies. This policy might, among other goals, promote trade between a country adopting the dollar and the United States. Recent research suggests that adopting a common currency increases bilateral trade. Those findings have been widely critiqued for the lack of consistency over different currencies specially the case of dollarization.

This thesis is primarily concerned with the impact of dollarization in El Salvador regarding bilateral trade flows. Utilizing the framework of the Gravity Model, bilateral trade flows for 13 trading partners of El Salvador were examined. This study found that dollarization has had a positive effect on bilateral trade flows. The findings were not only large but statistically significant.

CHAPTER 1. INTRODUCTION

In 2001, El Salvador engaged in full dollarization to assist in reforming its economic and financial systems. El Salvador followed Ecuador in adopting the U.S. dollar as its currency for completely different reasons: In Ecuador (2000) full dollarization occurred in the middle of an economic and banking crisis. “In El Salvador full dollarization was expected to enhance the set of previous structural reforms put in place to support economic stability and thus attract foreign investors” (Quispe- Angoli and Whisler, 2006)**.** This paper will evaluate the impact of dollarization on El Salvador’s international trade.

Under full or official dollarization, a country adopts as legal tender another country’s currency (in this case the U.S. dollar). The adopted currency takes over all the functions of domestic currency: a unit of account, medium of exchange, and store of value. The country’s policymakers thus give up any possibility of monetary and exchange rate policies. Official dollarization is equivalent to pegging the domestic currency to the U.S. dollar, but it is different from a peg or a currency board because it is irreversible. This irreversibility theoretically makes full dollarization a credible economic policy and a way to avoid currency and balance-of-payments crises (Quispe- Angoli and Whisler, 2006). A balance of payments crisis occurs when a country with a currency board runs out of foreign reserves. Its investors then anticipate that a devaluation will occur in the near future; causing capital owners to convert their liquid assets into foreign currency to protect them. An example is Mexico's 1994-1995 balance of payment crisis, better known as the “tequila crisis.”

It is worth noting the differences between a currency union and dollarization. A currency union like the European Monetary Union (EMU) involves the establishment of a new central

bank that may be administered by representatives from all countries using the new transnational currency. Dollarization, in contrast, implies the adoption of the currency of another country (typically the US dollar). Sometimes "currency unions" between emergent and industrial nations are called cases of dollarization. Our analysis will focus on official or full dollarization.

The following definitions are taken from Quispe- Angoli and Whisler (2006), who define Official or full (de jure) dollarization as a country's adoption of another country's currency as legal tender. Another type of dollarization is partial (de facto). This is when a country's domestic currency remains the official legal tender, but transactions can also be carried out in foreign currency, effectively giving the country a bicurrency system.

Other types of dollarization can be distinguished:

- **Currency or payments dollarization**, sometimes referred to as currency substitution, is a country's use of foreign currency for transaction purposes.
- **Real dollarization** is the indexing, formally, of prices and wages to the dollar.
- **Financial dollarization**, also called "asset substitution," occurs when a country's residents hold financial assets and liabilities in foreign currency. Financial dollarization can be external (using the dollar in claims between residents and nonresidents) or domestic (using the dollar in claims between residents).

El Salvador, the smallest country in Central America, has been hit with many difficult situations, yet has the third largest economy and is one of the most stable economies in the region (CIA, 2006). After signing the peace agreements of their civil war in the early 1990's, El Salvador decided to undertake structural reforms to stabilize and rebuild its economy. In 1993 the central bank adopted a fixed exchange rate policy with respect to the U.S. dollar to minimize exchange rate risk and promote price stability (IMF, 1998) .By exchange rate risk we refer to the risk that a business operation or an investment's value will be affected by changes in exchange rates. Hypothetically, by fixing the exchange rate of their currency to the U.S dollar, price

stability is obtained by controlling for devaluation of the local currency to the U.S dollar and leaving it fixed.

In the decade that followed, El Salvador's economy was stabilized and steady growth was experienced (Quispe- Angoli and Whisler, 2006). Exports from the country started to diversify from coffee into other sectors like maquila industries**.** The maquila industries are mainly multinational corporations that outsource labor intensive activities to plants located in countries with abundant cheap labor endowments. Remittance money, or money sent home by El Salvadorian natives working in foreign countries, also flourished during this time growing at an accelerated rate. Remittances have grown approximately 155% from 1992 to 2000. These remittances have helped to offset the trade deficit and are equivalent to more than 15% of GDP (CIA, 2006). El Salvador's GDP growth averaged 6% between 1990 and 1995. Just when the economy was recuperating from an 11 year civil war, Hurricane Mitch in 1998 slowed its growth. The hurricane affected agriculture and destroyed infrastructure like housing and main roads. During the period of 1998 to 2000 GDP growth averaged 3.7%. During that decade the government of El Salvador looked at the possibility of replacing the local currency with that of the U.S dollar.

On January 1, 2001, El Salvador's Monetary Integration Law (Ley de Integración Monetaria) was put into action. The decision had been taken on November 30, 2000 under decree No. 201 of the legislative assembly of El Salvador. This law established a fixed exchange rate of 8.75 colones (the domestic currency) per U.S dollar, and replaced the colon with the dollar as the legal tender for this country. El Salvador then became the second country in the new millennium to adopt this monetary policy. At this point, many Latin American countries

considered this monetary policy as an option. This led to the "bipolar view" that countries should either allow their currency to float or opt for a hard peg.

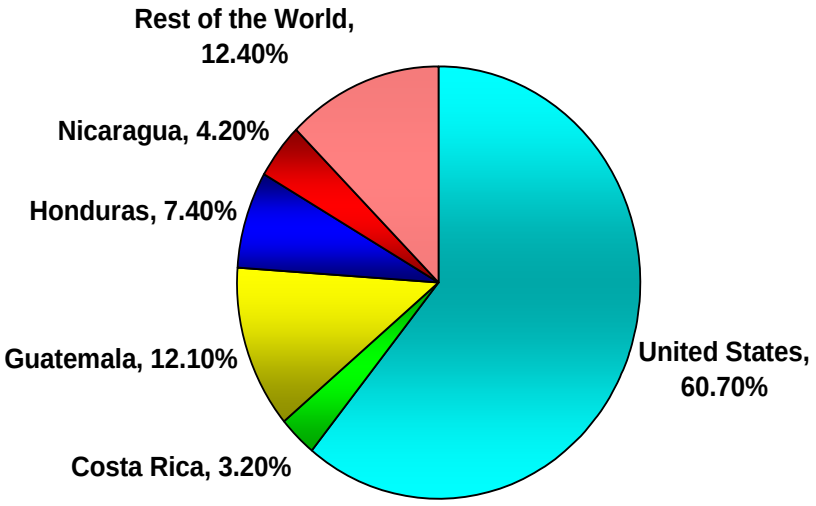
Some economists emphasize the risks of currency floating for emerging economies. This idea is supported by the lack of good monetary policy conducted in many emerging economies, pointing out that dollarization is a good option [Calvo (2002), Alesina and Barro (2001)]. On the other hand, some economists point out that dollarization cannot solve the fundamental problems of emerging markets and may end up being more of a straitjacket than an anchor of salvation (Larrain and Velasco 2002).

As noted by many experts, there are three main advantages of dollarization. First there is a reduction in the transaction cost between the countries that share the same currency. Second there is an enhanced credibility by eliminating unanticipated inflation, eliminating the inflationary financing of any government deficit, thereby strengthening the financial system. Third it reduces a country's risk by eliminating any speculative attack [Rose and Wincoop (2001), Calvo(2002), Yeyati and Sturzenegger (2003), Alesina and Barro (2001), Glower (2001)].

On the other hand we can also list the three main disadvantages of dollarization. First, there is a loss of the exchange rate instrument which removes the ability to isolate the economy from external shocks. Second, the loss of the central bank removes its capacity of becoming a lender of last resort. This refers to the ability to provide liquidity in the case of financial crisis or natural disasters. Finally, we have the loss of seignorage or the net revenue derived from the issuing of currency [Yeyati and Sturzenegger (2003), Glower (2001)].

After having underlined the different points of view regarding this policy we can now discuss why this policy should be beneficial to El Salvador. By referring to Figure 1.1 we can see

that El Salvador's main trading partners. The United States purchases 60% of El Salvador's exports. As previously mentioned, one of the main advantages of dollarization is to eliminate transaction costs and therefore increase bilateral trade with the host currency country and all common currency countries.



Source: Central Bank of El Salvador

Figure1.1Total Market Share the U.S. Represents for El Salvador

In a series of papers Andrew Rose and his coauthors have concluded that bilateral trade will increase by up to four times with the common currency countries, everything else held constant. Based on those results, Rose and van Wincoop (2001), conclude that currency unions like EMU or dollarization in the western hemisphere will increase international trade. This paper will analyze the effect on trade of dollarization on a country (El Salvador) with a previously fixed currency.

Problem Statement

Dollarization is a monetary policy with an uncertain outcome. One of the main aims of this policy in El Salvador was to increase bilateral trade with the United States and countries using the same currency. There is some controversy related to the topic of currency unions and trade. Some experts like Andrew Rose et. al (2000, 2001, 2002), argue that through currency unions trade should increase up to 4 times more. Michael Klein (2005) contradicts this by showing that there is no robust evidence that dollarization promotes trade in the western hemisphere. On the other hand, there is wide agreement that countries that adopt and implement this policy will in effect experience lower inflation than countries that float their currency [Rose (2002), and Edwards and Magendzo (2004)]. This paper will use an augmented gravity model to measure the impact of a common currency, focusing on the case of dollarization in El Salvador and its international trade.

Justification

Assessing the impact of dollarization on trade due to the lower transaction cost is imperative. Many developing countries are taking this option into consideration, but do not engage it because of its uncertain outcome. The effect of common currencies has been examined in several papers. While some studies find evidence for a significant increase in trade between common currencies, others fail to provide support to that relationship. All the previous studies conducted used data sets that date from 1948 to 1997. None of them have included El Salvador.

Many of the previous papers take into account the EMU. The case of the EMU is a totally different scenario, because of the way it is organized. As previously mentioned EMU has a European Central Bank, with representatives from each of the member countries. In a dollarized economy like the case of El Salvador there is no consensus of monetary policy with the United

States. Other differences are that most of the countries in the EU have common borders, very similar technologies, and similar tastes. Adopting a common currency would be very clearly beneficial to international trade in that situation. In the case of developing countries it is not very clear yet as to what the outcome of adopting the policy of dollarization will be. An empirical analysis on this aspect will help researchers and policymakers evaluate dollarization's impact on bilateral trade.

Research Objectives

The goal of this study is to determine the impact of dollarization on international trade for El Salvador during 2001-2006, and compare it to the period of 1994-2000, previous to dollarization. To do this we will use an augmented gravity model with a dummy variable for common currency, in this case the dollar.

The specific objectives of this research are:

- Conduct a literature review of the gravity equation as it relates to measuring the impact of common currencies.
- Construct a Gravity Equation that captures the bi-lateral trade of El Salvador.
- Investigate the impact of dollarization on international trade between El Salvador and its trading partners.
- Provide policy recommendations based on the proposed analysis.

Rationale for Using a Gravity Model

The gravity model is a very simple empirical model that explains the size of international trade between countries. It models the flow of international trade between a pair of countries as being proportional to their economic mass or GDP and inversely proportional to the distance between them. The gravity equation acquired its name from a similar function which describes the force of gravity in Newtonian physics. The physics function describes the attraction between

two forces as the result of the product of the mass of the two bodies divided by the squared distance between the two bodies multiplied by a gravitational constant. (Rose, 2002)

The usage of gravity models to analyze international trade date back to Tinbergen (1962), Pöyhönen (1963) and Linnemann (1966). These studies were without any serious attempt to justify the gravity equations from the point of economic theory. Following Tinbergen-Pöyhönen-Linnemann's work, the theoretical foundations of gravity equations explaining international trade flows have been widely discussed and developed within the last three decades. These foundations are mainly based on theories of international trade. Classical trade models explaining the existence and structure of international trade rely on comparative advantage and relative factor endowment differences. In these models no attention was paid to the presence of increasing returns to scale, monopolistic competition and transportation costs. The consideration of these issues characterizes the new trade theories (e.g Krugman 1980; Helpman and Krugman 1985; Helpman 1999). The new trade theory supports Linder's (1961) hypothesis that trade flows between countries with similar relative factor endowments are larger than trade flows between countries that differ considerably in this respect. This hypothesis is supported by the evidence that intra-industry trade accounts for a large share of total trade nowadays, especially if the developed countries are considered. This is controversial to the view of Heckscher, Ohlin and Samuelson, who state that the inter-industry trade should be dominating.

CHAPTER 2. LITERATURE REVIEW

Dollarization

Many economists have tried to analyze the outcome of dollarization. While some support it, others oppose it, and a few remain neutral, stating that what might work for one country might not work for others. Different approaches have been made to examine this policy. Most of the research in this area however has been theoretical; few empirical analyses have been made. The primary reason for this is the lack of data. We will continue by summarizing the conclusions of several papers on dollarization.

Yeyati and Sturzenegger (2003) in their book "Dollarization", examine the many issues that countries should concentrate on before adopting full dollarization. The book is made up of a recompilation of articles that are part of a study commissioned by the Central Bank of Argentina. The main message from this book is that dollarization should not be regarded as a universal remedy, and that the results from it are uncertain.

Hinds (2004), former minister of Finance from El Salvador, maintains that dollarization is a great option for developing countries. He claims that there is a one-sided argument against dollarization in which the positive effects are not taken into account. He then argued that the ability to print money has not provided any stability to the Latin American countries, but rather has led to more unstable economies, with higher interest rates, and short term financial operations. He also pointed out the advantage of dollarization in integrating into deeply globalized financial markets. This advantage can be exemplified by two dollarized economies, Panama and El Salvador whose interest rates are comparable with that of the international market. Hinds then provided examples of financial or spontaneous dollarization, which is when a

country allows bank deposits in dollars. This showed how people in developing countries try to protect themselves from actions of their country's central bank. He then concluded by showing how El Salvador has benefited from this policy by lowering lending interest rates from 16% to 5%, and presenting the availability of long term loans.

Quispe- Angoli and Whisler (2006) evaluated the outcome of dollarization on the banking system of Ecuador and El Salvador. They examined how dollarization and other macroeconomic variables have affected bank performance. To do this they used panel data, including all banks in Ecuador and El Salvador from 1995 to 2004. They used a multiple linear regression in which the dependent variable is bank performance. The explanatory variables are a dollarization dummy and some macroeconomic variables like economic growth rates, inflation rates, interest rates, per capita GDP, and trade as a percentage of GDP. They conclude by stating that both in Ecuador and El Salvador, the banking system has initially benefited from a dollarized economy. Even though the reasons to undergo this policy were totally different the banking sector has improved in both countries. They also state that it is too early to determine if this outcome will remain constant in the long term.

Minda (2005), through a theoretical and social analysis, concluded that dollarization is a policy with too much uncertainty to be viewed as a feasible solution for emerging countries. Minda argues that the loss of monetary sovereignty and national identity are big losses for a country, and recommends more public debates on this issue.

Edwards and Magendzo (2004) developed a totally different empirical study on dollarization. Their study measures economic performance by using a treatment regressions technique to analyze the probability of being a dollarized country. They also used this technique to measure the effects of dollarization on GDP per capita growth and volatility. Their data set

ranged from 1970-98. It was made up of a control group of non-dollarized countries, and dollarized countries. They concluded that GDP per capita growth was not statistically significantly different in dollarized and non-dollarized countries, but that dollarized economies have experienced higher volatility.

Alesina and Barro (2001), are more theoretical in their study, pointing out that through the increase in volume of world commerce we are bound to see the number of currencies in the world reduce, resulting in an increase of currency unions and economic integration. They point out that a country that wishes to undergo dollarization should have the following characteristics: "A history of high and variable inflation, which we take as an indicator of a lack of domestic commitment ability; a large actual potential volume of international trade, particularly with the anchor country; a business cycle that is correlated substantially with the potential anchor; reasonably stable relative prices (gauged by real exchange rates) with respect to the potential anchor"(Alesina and Barro, 2001). They concluded that dollarization should be considered by both Central and South American countries, and that El Salvador and Ecuador did well in adopting that policy.

Lange and Sauer (2005) examined the loss of seigniorage revenue in dollarized countries. Seigniorage revenue loss can be the main cost associated with dollarization. To do this, they developed a cluster analysis in which they measured the seigniorage cost and policy implications for 15 Latin American countries to dollarize their economies. They concluded that the costs were high and varied greatly between countries. They also suggested that the United States should provide aid through a share of seigniorage revenue, since these countries would benefit from this action.

As previously mentioned, not everyone favors dollarization. Towers and Borzutzky (2004) criticized dollarization in El Salvador. Their study focused on the socioeconomic impacts of the policy, and they argue that even though there might be gains, the poor will not be raised to a better position. To back up their argument, they mention the unequal distribution of wealth and its concentration in a very rich upper class. The political party in charge of dollarization is closely allied to the upper class. This policy according to them was aiming only to benefit the banking sector. They also conclude that the poor are affected through inflation from the rounding up of prices, and confusion of money conversion. The only benefit for the country would be from the attraction of foreign investment.

To the previous criticism we can add a paper by Ibarra et al. (2004). They point out that El Salvador should have consulted with neighboring economies before implementing this policy, because this policy will have an impact in the Central American Region. They concluded by stating that dollarization is not a magic cure and that the country is very susceptible to external shock which may lead to long periods of recession.

Trade and Dollarization

It is a basic principle of trade theory that countries engage in international trade because they benefit from doing so. The gains from trade take place because trade allows countries to specialize their production in a way that allocates their resources in the most productive way. Economists have formulated several different models to predict patterns of trade and to analyze the effects of trade policies. David Ricardo developed the first, and one of the most important models of international trade (Yarbrought, 2006). The Ricardian model is based on the concept of comparative advantage, a simple extension of the concept of opportunity cost. Country A for example has a comparative advantage in production of a good X if $(a_{LX}/a_{LY}) < (b_{LX}/b_{LY})$. This is

showing that country A has a comparative advantage in the production of good X if, to produce an additional unit of good X in A, it is necessary to forgo fewer units of good Y than it would be necessary to produce an additional unit of good X in country B. In this model, countries specialize in producing what they produce best. The complete specialization according to the Ricardian model would occur assuming that the tastes for the goods traded and the size of the countries do not differ too much. If tasted is strongly biased towards one good (good X) both countries trading this good will produce it, but only the country with the comparative advantage will completely specialize. If for example a small country trades with a large country, the small country may not be able to supply all of the large country's demand. If this is the case the small country will fully specialize on its comparative advantage and the large country will not. Unlike other models, the Ricardian framework predicts that countries will fully specialize instead of producing a broad array of goods. The Heckscher-Ohlin model which followed David Ricardo's model was developed by Eli Heckscher and Bertil Ohlin at the Stockholm School of Economics. This model was built on David Ricardo's theory of comparative advantage by predicting patterns of trade and production based on the factor endowments of a trading region. The model essentially says that countries will export products that utilize their abundant factors of production and import products that utilize their scarce factors. To this model were added evolved trade theories. "For example Mundell (1957), who allowed capital mobility in the basic formulation; the Neo-Heckscher–Ohlin structure of Kemp (1966), who further innovated by incorporating technological differences between countries, in conjunction with traded capital and the model of Norman and Venables (1995), who added trade costs to the growing list of features (Tombazos et al., 2005)."

It has long been acknowledged that bilateral trade patterns are well described empirically by the gravity equation of trade (Tinbergen, 1962, Deardorff, 1995 and Rose, 2000). Recently, gravity model studies have achieved empirical success in explaining various types of inter-regional and international flows, including labor migration, commuting, customers, and hospital patients (Cheng and Wall, 2004). The gravity equation of trade acquired its name since a similar function describes the force of gravity in Newtonian physics. In 1687, Newton proposed the "Law of Universal Gravitation." It held that the attractive force between two objects *i* and *j* is given by

$$F_{ij} = G\frac{M_i M_j}{D_{ij}^2} \qquad \textbf{(2.1)}$$

where:

• F_{ij} is the attractive force.

• M_i and M_j are the masses.

• D_{ij} is the distance between the two objects.

• G is a gravitational constant.

The gravity model of trade in international economics is similar to other gravity models in social science in that it predicts bilateral trade flows based on the economic sizes of (often using Gross Domestic Product) and distance between two countries.

The model was first applied to international trade by Jan Tinbergen in 1962. Tinbergen's equation uses "flow" between country *i* and country *j* (monetary value of the sum of bilateral trade or imports and exports separately) as the dependent variable. The flow of trade is equal to the product of the relative economic sizes (GNP) of country *i* and country *j*, divided by the measured distance between country *i* and country *j* (usually distance between capitals) and finally multiplied by a constant. Subsequent to Tinbergen's studies, Pentti Pöyhönen in 1963 did

some of the first econometric studies of trade flows based on the gravity equation. Both economists gave only an intuitive justification for the model.

Linnemann (1966) went towards a more theoretical explanation in terms of Walrasian general equilibrium. The Walrasian model includes too many explanatory variables for each trade flow to be easily reduced to the gravity equation. Linneman's study included the trading patterns of 80 nations. The model he proposed had as explanatory variables population, GNP, distance and a preferential trade variable. The preferential trade variable differentiated between favored trade in three areas of influence: British, French and Portuguese/Belgian. Linneman found a significant relationship between the import/export volumes; he found this relationship by conducting separate regressions for both exports and imports. The coefficients for GNP and population had the highest explanatory power in describing bilateral trade between countries. The remaining variables added less significant explanatory capability to the model. Linneman then refined his model by taking into account the commodity composition of trade between nations as an additional independent. He stated that differentiated production of goods between countries encouraged trade between these nations and homogeneous production inhibited trade. Linneman also spoke of 'psychic distance' in an attempt to include cultural tastes into his model. He underlined that a common cultural background would promote a closer understanding between countries, and since these countries have similar cultural tastes, production would tend to be in goods that both nations would deem desirable and thus further stimulate trade (Hilbun, 2006).

Beginning in the mid 1970s several theoretical developments appeared in support of the gravity model. Linneman's research served as a facilitator for others investigating the theoretical underpinnings of the gravity equation. Leamer in 1974 used both the gravity equation and the

Heckscher-Ohlin (HO) model to conduct a regression analysis of trade flows, but was not able to integrate the two approaches. In 1979, Anderson proposed his theoretical justification for the Gravity Model by modeling preferences over traded goods only, first assuming Cobb-Douglas preferences and then constant-elasticity-of substitution (CES) preferences. In both cases he used imperfect substitution between home and foreign goods in consumption (often called the Armington assumption). The Gravity Model was derived in both cases, and therefore Anderson's proof for theoretical foundations for the Gravity Model was set forth (Deardorff, 1995).

Jeffrey Bergstrand would follow Anderson in 1985, where Bergstrand found out that, like Anderson, by assuming CES preferences and accepting Armington Assumption for traded goods, a reduced form equation for the estimation of the flow of goods between nations was obtained. Bergstrand employed GDP deflators as an alternative for price indices and then estimated his system, testing the assumption of product differentiation. Estimates obtained by Bergstrand supported his allegation that imported goods were better substitutes, but not as originally claim perfect substitutes (Bergstrand, 1985). More recently Deardorff (1995) has found empirical evidence can link the gravity equation with different or even alternative theoretical structural trade models, ranging from Ricardian to constant returns to scales Hecksner-Ohlin neoclassical models. Given that, an increase in popularity of the gravity model has labeled it the "workhorse" of empirical trade studies.

As mentioned previously, this model has been proven to work in a wide variety of applications in social sciences. Even in international trade it can be used to evaluate the impact of different issues, for instance the existence of trade creation or diversion from regional free trade agreements, the main factors affecting the foreign trade of a country, or the degree of trade potential of a country. Andrew Rose (2000) used the gravity model to address the following

question: What is the effect of a common currency on international trade? Using a cross sectional approach he analyzed how much more countries within the currency union trade than non-members. To answer this question he used a large cross-country panel data with 33,903 bilateral trade observations with five year intervals (1970, 1975, 1980, 1985, and 1990). He then showed that two countries with the same currency trade more than equivalent countries with their own currencies. He showed that countries with the same currency will trade up to three times more.

Glick and Rose (2001) measured the impact of a common currency on international trade, but in this paper they examined the time series question "What is the trade effect of a country joining (or leaving) a currency union?" The panel data set used covered 217 countries from 1948 to 1997. During this time frame large numbers of countries left currency unions. According to Glick and Rose the countries leaving the currency unions experienced economically and statistically significant declines in bilateral trade, after accounting for other factors. They concluded by stating that a pair of countries that begin using a common currency will double its bilateral trade.

In a later paper Frankel and Rose (2002) measured the effect of a common currency on trade and income per capita. They used bilateral trade observations with five year intervals (1970, 1975, 1980, 1985, 1990, and 1995). This cross sectional approach was the same used by Rose (2000). They also used the same data set but added 1995 data to it. In their analysis they found there was a positive impact on trade from a currency union and a currency board. The coefficients for both were very similar, and they failed to reject the hypothesis that they are equal. They commented that this did not make economic sense; nevertheless, the empirical evidence seemed very strong. As with Rose (2000) they found that belonging to a currency union and board tripled trade amongst its members. They also found no evidence of trade diversion, but

rather evidence of trade creation among members of the currency union or board. The second estimate of this paper consisted of estimating the impact of trade on income per capita. To do this Rose and Frankel used a gravity equation with an instrumental variable. In their estimation they found that for every one percent increase in a country's overall trade (relative to GDP) income per capita rises by at least one-third of a percent. They combined those estimates with the first gravity equation estimation and concluded that there are important beneficial effects that are derived from trade through a currency union.

Rose, et al. results have been widely criticized by several authors because of the strikingly large effect found in those studies. Among them is Volker Nitsch (2002), who criticized Rose's paper directly by reexamining the original data. Nitsch found many mistakes in the data used and corrected them. He also analyzed the impact of a common currency using different currencies, in which he found some currencies did not have a significant effect on trade. The U.S Dollar was one of the common currencies that did not have a significant impact on trade, meaning that dollarization had not really impacted trade positively. He then examined the model without separating each currency union. In conclusion Nitsch found that currency unions can increase trade by doubling it, but not tripling it.

Klein (2005) focused on the effect of the U.S dollar as a common currency in the western hemisphere. His data was a subset from the original data set from Glick and Rose (2001), and the same methodology of the gravity model was used in his paper. He found that currency unions do not significantly promote trade of Western Hemisphere countries that have replaced their currency with the U.S dollar, or have any effect on bilateral U.S trade with Western Hemisphere countries.

CHAPTER 3. METHODOLOGY

Data Description

The observations for estimating the gravity equation on bilateral trade of El Salvador consist of 13 countries. The countries included in the data set are, (apart from El Salvador): Brazil, Costa Rica, Ecuador, Germany, Guatemala, Honduras, Japan, Mexico, Netherlands, Nicaragua, Panama, Spain, and United States. Their trade with El Salvador corresponds to more than 80% of total Salvadorian trade during the sample period. This research included in the data set El Salvador's major trading partners. In terms of country selection for the data set in this paper it was verified that a criticism made by Greenaway and Milner, (1986) was not present. Their criticism to the gravity model consisted in the possible inverse correlation between income similarity and distance. In our sample the tendency of countries with similar per capita income to cluster geographically is not strong: the correlation coefficient of El Salvador's trading partners' GDPs and distance is equal to .29.

El Salvador's imports and exports data were obtained from the Central Bank of El Salvador and are recorded in U.S Dollars. To deflate I used the U.S 1982-1984 CPI index (http://www.census.gov.) Real GDP (in constant dollars) and population data for all the countries were obtained from the World Development Indicators (2007) database. Distances and common language were obtained from Jon Haveman's (2007) International Trade Data base.

Gravity Equation Methodology

As mentioned previously the gravity equation has been proven to work in the area of international trade. In this paper an augmented gravity equation is used, including some extra controls. It is important to state that according to Kalirajan, (1999) a country-specific gravity

model is better specified than a cross country model. The explanation for this is that a cross country model masks large differences across countries. Mainly for that reason the gravity model used in this paper will be country specific. The following equation (Equation 3.9) shows our country specific panel data double log gravity model:

$$\ln\left(TT_{ElSalvador,,j}\right)_t = \alpha + \beta_1 \ln\left(GDP_{ElSalvador} * GDP_j\right)_t + \beta_3 \ln\left(Dist_{ElSalvador}\right)$$
$$\beta_2 \ln\left(GDP_{ElSalvador} / pop_{ElSalvador} * GDP_j / pop_j\right)_t + \beta_4 \left(LANG_{ElSalvador,,j}\right)$$
$$+\beta_5 (CACM_{ElSalvador,,j}) + \gamma_1 \left(Dollar_{ElSalvador,,j}\right)_t + \mu_{(ElSalvador,j),t} \qquad \textbf{(3.9)}$$
$$t = 1994,.....,2005$$
$$j \in N = 1,.....,13$$

where $TT_{ElSalvador,j}$= Total trade defined as the sum of real imports and real exports between El Salvador and country *j*; GDP_j = Real Gross Domestic product of Country *j*; $Dist_{ElSalvador,j}$= Distance between San Salvador and the capital of country *j* measured in thousands of kilometers; $LANG_{ElSalvador,j}$= Binary variable indicating that country *j* is Spanish speaking; $CACM_{ElSalvador,j}$= Binary variable indicating that country j belongs to the Central American Common Merket; $Dollar_{ElSalvador,j}$= Binary variable indicating the if El Salvador and country *j* use the same currency at time *t*. The $\mu_{(ElSalvador,j)t}$ represents the countless influences on bilateral exports, assumed to have a mean of zero and constant variance error term. The time period covered by the data is from 1994 to 2005.

Gravity Model Variables

Economic theory supports the hypothesis that income, population, transaction costs, and the presence/absence of trading agreements will affect bilateral trade of a country. In the gravity model a country's income or economic size is measured by both GDP and per capita GDP. Trade should theoretically increase when GDP increases, so the latter is expected to have a positive effect on trade. This positive relationship according to Deardorff (1995) is due to specialization

and not new trade theory or old trade theory. If a country is specialized then consumers in country *i* will want to consume things from country *j* that are not available, or not abundantly available, at home. Therefore the more country *i*'s industries produce the more country *j*'s consumers will want to buy that country's products all things constant. Also the more money country *j*'s consumers earn the more money they will be willing to spend on country *i*'s products. Distance in the gravity model is used to measure the transport length and cost or other physical obstacles to trade. Therefore distance is seen as a restriction or friction to trade and is expected to have a negative relationship towards trade. As noted by Frankel (1998), distance could be related to a lack of knowledge of the legal and institutional characteristics of far away countries. The variables explained, so far, constitute the basic gravity model.

Another variable included in the augmented gravity model is common language, which not only indicates that the country shares the same language, but in some cases it was colonized by the same country, leading to shared cultural linkages. Therefore, a common language between any two countries is expected to increase their bilateral trade. The variable CACM is used to indicate a Regional trade agreement (RTA). RTAs have proliferated in the last 20 years These eliminate trade barriers and also lower transaction costs. Therefore RTAs are expected to have a positive impact on trade. In our specification of the gravity model a binary variable, *dollar,* was included indicating the existence of a common currency among El Salvador and a trading partner. According to Rose (1999), the increase in trade generated from a common currency is one of the few undisputed gains from dollarization. The reason for this is that it is cheaper to trade for two countries that have the same currency, than between countries that have their own currencies since some transaction cost is eliminated.

Econometric Procedures

Gravity Equations can be estimated using cross sectional data and by combining time series and cross section data, also called panel data. For this estimation the model was computed using panel data. Panel data was considered because it allows overcoming some statistical criticisms that have been raised against the purely cross-sectional formulation of the gravity model. For example Glick and Rose mentioned that when using cross sectional data we are only analyzing how much more countries with the same currency trade than countries with their own currency. However for policymakers it is more important to analyze the impact of joining a common currency, and therefore the use of panel data is required. Some problems with panel data are that outliers and heteroskedasticity problems arise from group wise differences. The use of a White heteroskedasticity consistent covariance estimator with ordinary least squares estimation in fixed effects models can yield standard errors robust to unequal variance along the predicted line (Wooldridge, 2002). According to Baltagi (1995), there are several benefits for panel data.

These include the following:

- Panel data relate to individuals over time controlling for individual heterogeneity
- Panel data gives more information, more variability, less collinearity among the variables, more degrees of freedom and more efficiency.
- Panel data are better to identify and measure effects that are simply undetectable in pure cross section or pure time series data.
- Panel data models allow us to construct and test more complicated models than purely cross – section or purely time series data.

Dealing with variation amongst individuals, in this particular case country data that also vary over time is not always a simple task, for it may require addressing some particularities in data.

The selection of the model that best estimates the relationship may require some complex specifications.

The basic framework is a pooled Ordinary Least Squares (OLS) in which space and time dimensions are not taken into account. The OLS can be written as model (3.1):

$$y_{jt} = a_1 + \beta' X_{jt} + \varepsilon_{jt} \quad \textbf{(3.1)}$$

A full set of year specific binary variables were included to take into account differences over time in the pooled OLS estimation. This procedure is called a one way fixed effects model. This means that the intercept may differ across time, although it does not vary across countries. Equation (3.1) is then rewritten as:

$$y_{jt} = \alpha_1 + \alpha_2 D_{2t} + ...\alpha_{11} D_{11t} . + \beta' X_{it} + \varepsilon_{it} \quad \textbf{(3.2)}$$

The estimation of the two way fixed effects model is then considered to take into account variation between countries and time. Here the intercept is allowed to vary across time and across countries. To do this equation (3.2) is rewritten as:

$$y_{jt} = \alpha_1 + \alpha_2 D_{2t} + ...\alpha_{11} D_{11t} . + \lambda_1 Dum_{j1} + ...\lambda_{12} Dum_{j12} + \beta' X_{it} + \varepsilon_{it} \quad \textbf{(3.3)}$$

Statistically, fixed effects is one way to model panel data, since they always give consistent results, but they might not be the most efficient model to run. We must ask ourselves if losing so many degrees of freedom and the loss of some explanatory variables that are constant over time is worth the use of a two way fixed effect model.

There is an alternative modeling procedure that will give better standard errors and more efficient estimators. This panel data procedure is the random effects model. Instead of using dummy variables to represent lack of knowledge, the random effects model incorporates this lack of knowledge through a disturbance in the error term. We start again with the basic idea of equation (3.1)

$$y_{jt} = a_{1j} + \beta' X_{jt} + u_{jt} \quad \textbf{(3.4)}$$

In this case instead of treating α_{1j} as fixed, we assume that it is a random variable with a mean value of α_1. The intercept for an individual country can be expressed as

$$a_{1j} = a_1 + \varepsilon_j \qquad j = 1,2....,N \quad \textbf{(3.5)}$$

where ε_j is a random term with a mean value of 0 and a variance of σ_ε^2.

This implies that the countries included in our sample are drawn from a large sample size of countries and that they have a common mean value for the intercept, so the individual differences in the intercepts for each country are included in the error term ε_j.

Substituting (3.5) into (3.4), we obtain:

$$\begin{aligned} y_{jt} &= a_{1j} + \beta' X_{jt} + u_{jt} + \varepsilon_j \\ y_{jt} &= a_{1j} + \beta' X_{jt} + \omega_{jt} \end{aligned} \quad \textbf{(3.6)}$$

where

$$\omega_{jt} = \varepsilon_j + u_{jt} \quad \textbf{(3.7)}$$

The error term ω_{jt} consists of two components, ε_j, which is the cross sectional error component and u_{jt}, which is the combined time series and cross sectional error component.

The usual assumptions that are made in the random effects model are:

$$\begin{aligned} &u_{jt} \sim N(0, \sigma_u^2) \\ &\varepsilon_j \sim N(0, \sigma_\varepsilon^2) \\ &E(\varepsilon_j u_{jt}) = 0 \quad E(\varepsilon_j \varepsilon_i) = 0 \quad (i \neq j) \\ &E(u_{jt} u_{js}) = E(u_{jt} u_{it}) = E(u_{jt} u_{is}) = 0 \quad (i \neq j; t \neq s) \\ &E(\omega_{jt}) = 0 \qquad \text{var}(\omega_{jt}) = \sigma_\varepsilon^2 + \sigma_u^2 \end{aligned} \quad \textbf{(3.8)}$$

From equation 3.8 the individual error components are not correlated with each other and are not correlated across both cross-section and time series. However if σ_ε^2 is equal to 0 then that would imply there is no difference between the pooled OLS and the random effects model.

The question now is how to decide between what model to use, the fixed or the random effects model. As mentioned previously the random effects model will give more efficient estimators, but random effects should only be used if there are random effects in the model. A statistical test devised by Hausman (1978) test for orthogonality of the random effects and the regressor. The null hypothesis in this case was that the random effects model was the correct specification. Furthermore to check for random effects in the model we can use the Lagrange multiplier test developed by Breusch and Pagan (1980) to test if σ_ε^2 is equal to 0. This tests whether or not random effects are present.

Expected Results

Table 3.1 summarizes the expected signs of the coefficients in our estimation.

Table 3.1 Variables and Expected Results

Variable	Description	Expected Sign
$Lntt_{ij}$	Natural logarithm of bilateral trade flow from i to j	
α_1	Intercept term	+/-
ln*gdp*	Natural logarithm of the product of GDPs	+
ln*py*	Natural logarithm of the product of per capita GDPs	+
ln*dist*	Natural logarithm of distance	-
LANG	Dummy variable for language commonality	+
CACM	Dummy variable for RTA	+
Dollar	Dummy variable for common currency	+

Dummy variables for each year were omitted in the specification of the model because they have no economic interpretation and are only used to take into account the year's effect.

CHAPTER 4. RESULTS AND DISCUSSION

Summary Statistics

Table 4.1 provides the descriptive statistics used in the aggregate analysis; GDP and GDP per capita were not included in this table. The reason for the exclusion of those variables is due to the lack of information these variables add to the descriptive statistics. These variables are usually the log product of importing GDP and Exporting GDP (or GDP per capita) in the gravity model, and therefore it was impossible to separate them into non currency union and currency union due to the time series and cross-sectional nature of the data. In table 4.1 we can observe that the mean for total trade is larger in the common currency subset. This would point out that El Salvador trades more between the common currency countries than amongst the countries with their own currencies. We can also see that El Salvador on average imports more from the common currency members. This is not surprising since the United States is the main trading partner for El Salvador. This explains the higher standard deviation for the common currency mean of imports. It is also worth noting that El Salvador tends to export more to common currency countries. Nonetheless there is always a big gap between imports and exports. Countries that have a common currency tend to be closer to El Salvador than the average trading partners for this country. The dummy variables included in the descriptive statistics show how some members of the currency union share the same language and also how some of the main trading partners for El Salvador share common language. The CACM dummy variable shows that El Salvador has no RTA with any of the countries that share as a common currency the U.S dollar.

Table4.1 Summary Statistics

	No Common Currency		Common Currency	
Variable	Mean	St. Dev	Mean	St. Dev
Total Trade $_{ij}$	112,646,947.3	175,305,703.9	377,972,050	402,156,935
Imports	78,102,074.38	136,779,278.2	322,601,976	345,025,906
Exports	34,544,872.91	52,305,982.53	55,370,074	58,156,292
Distance	4,142.906367	3836.916814	2,066.4712	823.94418
LANG	0.6099291	0.48950485	0.666667	0.48795
CACM	0.3076923	0.463025	0	0

Gravity Model Estimates

As mentioned in the previous chapter the first estimation of the gravity equation was by OLS. Table 4.1 presents the results from this estimation.

Table 4.2 Pooled OLS Gravity Equation Estimates

Variable	**Coefficient**	**S.E**	**t**	**P>| t |**
ln*gdp*	.4263	.0702	6.07	0.000
ln*dist*	-1.0380	.0760	-13.66	0.000
ln*py*	.2738	.1240	2.21	0.029
LANG	.1003	.1972	.51	0.612
CACM	.3034	.2188	1.39	0.168
Dollar	.9085	.1683	5.40	0.000

R^2 = .78; F(17,138)= 29.85; Root MSE= .569; Number of Obs.= 156
Intercept and year controls not recorded
Robust HC3 standard errors reported

The OLS estimates make economic sense, yet some of the variables are not statistically significant. The model fits the data well, the R^2 = .78 indicating that 78% of the variation in El Salvador's bilateral trade is explained by the gravity equation. As we can see from the table ln*gdp* is positive and significant (p<.05) showing that as El Salvador and its trading partners become economically larger and richer trade increases. The variable representing distance (ln*dist*) also has the expected sign and has statistical significance (p<.05) showing that El Salvador trades less with more distant countries. From the table above we can also see that bilateral trade is impacted positively as consumers from each country increase their income. This can be observed through the positive relationship between per capita GDP variable (ln*py*) and El

Salvador's bilateral trade. The variables for common language (LANG) and the variable denoting the RTA of the Central American Common Market are signed correctly but are not significant at the 5% confidence level. However the binary variable of dollarization (Dollar) is statistically significant ($p<.05$) delivering an estimate of .91. The estimate implies that El Salvador trades over two times as much with the countries that share the U.S dollar ($e^{.91}=2.48$), everything else held constant.

The Results obtained from the pooled OLS regression presented on table 4.1 are comparable to those presented by Glick and Rose (2002). They estimated that countries that joined a currency union traded over three times as much with each other ($e^{1.3}=3.7$), everything else held constant. Our estimate showed that in the case of El Salvador, trade increased by more than two times as much. The estimate is smaller than the previous estimate from Glick and Rose, but is still economically large, and statistically significant. These results contradict Klein (2005) and Nitsch (2005). In their studies they both found that currency unions in the Western Hemisphere did not significantly promote trade.

To corroborate the estimates presented from the OLS estimation it was decided to estimate the model using only cross sectional data. This paper focused on the years when dollarization was already in effect. However since there were only 13 cross-sections for the estimation some variables were dropped due to the lack of degrees of freedom, and the most relevant ones to the study were included. From table 4.2 we can see that all the coefficients have the expected signs and only in 2005 did one coefficient lose significance. The estimate for GDP varied very little showing the same positive impact. Distance was also very consistent and showed the same negative impact. The CACM binary variable increased a lot from the pooled OLS estimation and became significant except in 2005, but it maintained its positive relationship

with trade. It was also found that the dollar binary variable remains significant and also increased its impact over some years diminishing in the last two years.

Table 4.3 Cross-Sectional OLS Gravity Equation Estimates

2001				
Variable	**Coefficient**	**S.E**	**t**	**P>| t |**
ln*gdp*	.4970	.0661	7.52	0.000
ln*dist*	-.8905	.1756	-5.07	0.001
CACM	.9850	.4066	2.42	0.042
Dollar	1.34	.2776	4.81	0.001
R^2 = .91; F(4,8)= 15.16; Root MSE= .4367; Number of Obs.= 13				
2002				
Variable	**Coefficient**	**S.E**	**t**	**P>| t |**
ln*gdp*	.4760	.0704	6.76	0.000
ln*dist*	-.8731	.1721	-5.07	0.001
CACM	.8935	.3288	2.72	0.026
Dollar	1.34	.2604	5.15	0.001
R^2 = .90; F(4,8)= 11.84; Root MSE= .4414; Number of Obs.= 13				
2003				
Variable	**Coefficient**	**S.E**	**t**	**P>| t |**
ln*gdp*	.4959	.0742	6.68	0.000
ln*dist*	-.8963	.1753	-5.11	0.001
CACM	.8128	.2847	2.85	0.021
Dollar	1.26	.2727	4.62	0.002
R^2 = .89; F(4,8)= 11.31; Root MSE= .4786; Number of Obs.= 13				
2004				
Variable	**Coefficient**	**S.E**	**t**	**P>| t |**
ln*gdp*	.5226	.0850	6.15	0.000
ln*dist*	-.9543	.2111	-4.52	0.002
CACM	.6787	.3012	2.25	0.054
Dollar	.9089	.3029	3.00	0.017
R^2 = .82; F(4,8)= 12.45; Root MSE= .6061; Number of Obs.= 13				
2005				
Variable	**Coefficient**	**S.E**	**t**	**P>| t |**
ln*gdp*	.4966	.0724	6.86	0.000
ln*dist*	-1.01	.1857	-5.45	0.001
CACM	.2389	.3343	0.71	0.495
Dollar	.6565	.2864	2.29	0.051
R^2 = .84; F(17,138)= 16.03; Root MSE= .5453; Number of Obs.= 13				

Intercept not recorded; two variables were dropped, due to lack of degrees of freedom
Robust standard errors reported in all regressions

The results obtained from the cross-sectional estimations show how much more El Salvador trades with countries whose currency is the U.S Dollar each year. As we can see from table 4.2 El Salvador traded almost twice more ($e^{.66}$=1.94) with countries who use the U.S Dollar in 2005. This ranged to an increase of almost four times ($e^{1.34}$=3.82) in 2001. These estimates are all in the range of what Rose et al. had computed. These findings are not surprising since El Salvador's main trading partner is the United States. It is also worth noting that the CACM coefficient from the cross-sectional data regression is providing more information than when included in the panel data regression. The reason for this is that the CACM is present during the entire time series analyzed; therefore there is no previous period to compare it to. However when analyzed individually by year we can analyze how much El Salvador trades with the members of the Central American Common Market. From the year 2001 to 2005 the coefficient showed that El Salvador would trade more than twice as much (Year 2001, $e^{.99}$=2.69) with the member of the CACM to 27% more (Year 2005, $e^{.24}$=1.27). El Salvador bilateral trade with the CACM members seems to be declining. One reason for this decline could be that since Dollarization Salvadorian goods became more expensive for the CACM members. Dollarization could also make imports from the United States more attractive therefore also lowering trade between that RTA. Having exploited the cross-sectional variation in our data set we will now focus on the time series variation in the panel date.

We now attempt to model the panel data taking into account the both cross- sectional and time series variation. To do this we employ a two way fixed effects model. This is the most proper way to model panel data without making any heroic assumptions. The main problem with this model as mentioned in the previous chapter is the loss of degrees of freedom and the loss of variables that are constant over time, and are relevant to the model. Table 4.3 shows the

estimates for the two way fixed effects model. Here we can observe that three of the variables do not show a coefficient because they were dropped. As we can see GDP has a positive impact, but it became considerably large. However per capita GDP changed sign and shows a considerable negative relationship on bilateral trade which makes no economic sense. The reason for these coefficients to change unexpectedly in size and sign is due to the variables that get dropped when performing this estimation. This model is no longer taking into account distance, which is a fundamental variable for the gravity equation. It was no surprise that the two way fixed effect model would obscure the econometric estimates. Nevertheless the coefficient measuring a common currency had a positive impact. The impact of dollarization on trade estimated by the model shows a 42% increase ($e^{.35}$=1.42) in bilateral trade of El Salvador among the countries sharing the U.S as their currency. This estimate is 50% smaller than Glick and Rose, (2002) but is still economically large and statistically significant. This estimate once again contradicts findings from Klein (2005) and Nitsch (2005).

Table 4.4 Fixed Effects Gravity Equation Estimates

Variable	Coefficient	S.E	t	P>| t |
ln*gdp*	6.67	.0702	6.40	0.000
ln*dist*				
ln*py*	-9.98	.1240	-5.12	0.000
LANG				
CACM				
Dollar	.35	.1683	2.20	0.029

Overall R^2 = .04; F(14,129)= 6.36; Number of Obs.= 156; Annual data for 13 countries, 1994-05
Intercept and year controls not recorded
Robust standard errors reported

Table 4.4 lists the estimated coefficients from the random effects model. The test developed by Hausman (1978) does not reject the random effects model in favor of the fixed effects model. This means that there is no significant correlation between ε_j and the independent variables, implying that the random effects specification is appropriate. This test was also used by Glick

and Rose to determine what model to use. Also, the Lagrange multiplier test for random effects rejects that $\sigma_\varepsilon^2=0$, implying that the random effects model is more appropriate than OLS. We can see from the estimates below that coefficient signs all make economic sense. Significance of some variables was lost, but the coefficient for Dollarization (Dollar) remains statistically significant ($p<.05$) showing a positive impact of an increase of 52% ($e^{.42}=1.52$), on El Salvador's bilateral trade after the implementation of dollarization. This estimate is still smaller than Glick and Rose (2002) by 40%, but again it is economically large and statistically significant. After presenting all results obtained from the different estimations these results shows that there is a positive impact on trade caused by dollarization.

Table 4.5 Random Effects Gravity Equation Estimates

Variable	Coefficient	S.E	z	P>| z |
lngdp	.4487	.1437	3.12	0.002
lndist	-1.06	.1370	-7.77	0.000
lnpy	.1910	.2807	.68	0.496
LANG	.0813	.4318	.19	0.851
CACM	.1082	.1597	.29	0.781
Dollar	.4228	.3891	2.65	0.008

Overall $R^2 = .76$; $x^2(18)= 97006.2$; Number of Obs.= 156; Annual data for 13 countries, 1994-05
Intercept and year controls not recorded
Robust standard. errors reported
Lagrange multiplier test (Test for random effects) $H_o= \sigma_\varepsilon^2=0$, $x^2=65.27$, Prob> $x^2 = 0.000$
Hausman's Test (RE vs. FE)) $H_o=$ REM is the correct specification, $x^2=15.37$, Prob> $x^2 = 0.353$

CHAPTER 5. CONCLUSIONS

This study examined the relationship that dollarization had on El Salvador's bilateral trade. It was initially proposed that the use of a common currency (dollarization) would have a positive effect on bilateral trade flows. That is, if El Salvador has a trading partner whose currency is the U.S dollar, a positive relationship would be expected between the trading pair. To analyze these issues two approaches were taken: first, the time series question, "What is the trade effect of El Salvador joining a currency union?" and second, "How much more El Salvador trades with countries that share the U.S dollar?" In both cases we found dollarization had a positive effect on El Salvador's bilateral trade flow.

In this paper we used a panel data set that includes the most recent information on bilateral trade to estimate the early effect of dollarization on El Salvador's trade. The data set included annual bilateral trade from El Salvador to 13 countries from 1994 through 2005. During this period El Salvador engaged in dollarization joining Panama and Ecuador. This event allowed this study to analyze the effect of a currency union on trade in the Western Hemisphere.

The estimations were carried out using an augmented gravity model and in panels of only 11 years. To corroborate the panel estimation the study also estimated cross-sectional regressions on the post-dollarization years in El Salvador. The finding from the cross-sectional regressions were not surprising, showing that El Salvador did in fact trade more by a factor of up to three with countries that share the U.S dollar. The most relevant question though was, "what is the effect on trade of El Salvador joining dollarization?" This study found that when El Salvador dollarized, trade experienced an increase of 52%. This estimate is smaller than that in Glick and Rose (2002), who studied a similar problem using a completely different sample. Additionally,

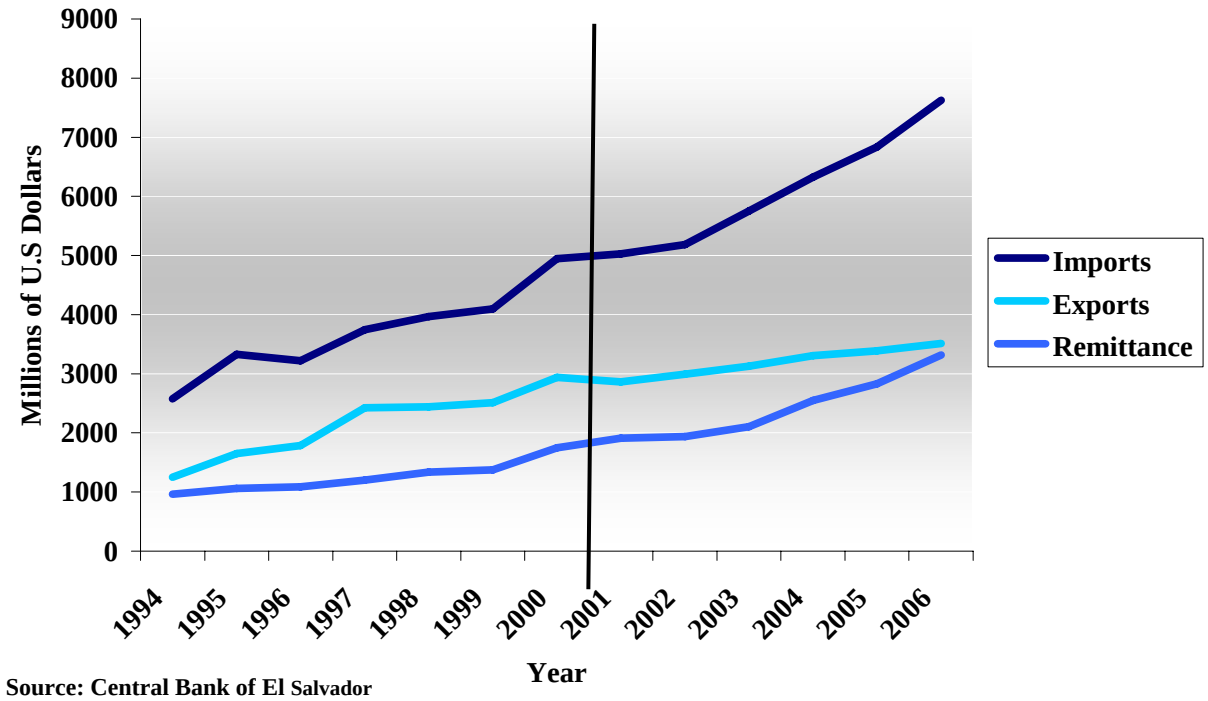
these results contradict Klein (2005) and Nitsch (2005), who both showed that currency unions in the Western Hemisphere do not significantly promote trade.

It is also important to note that the model shows that bilateral trade flows are not equal in a fixed exchange rate and in the adoption of a foreign currency. Frankel and Rose found no statistically significant difference between the coefficient of a fixed currency and the substitution of a currency. This paper shows how dollarization had a positive effect on trade even after El Salvador came from a fixed currency. This could be caused by dollarization making prices more transparent internationally than a fixed currency, and the lowering of the transaction costs. Therefore dollarization might be perceived as a more credible commitment.

The effect of dollarization on trade is significant, and economically important, particularly if we consider that our sample only covers the first five years after this policy went into effect. These results are of great importance, especially for most Central American countries. Currencies were developed in order to maximize trade. As Rose (2000) mentioned in his paper the evidence for international bias is clear. There is a huge difference between trade within a country compared to trade between countries, even well developed RTAs like NAFTA or the European Union. Countries have a number of important aspects, like common legal systems and common cultural norms. A common currency is just part of the package. According to the findings of this paper and those of Rose et. al. a common currency seems to be important. Before most of the studies preformed using the gravity equation there was very little evidence that currency unions would promote trade. Dollarization should not only be considered because of its gains from trade, but also because of the gains it could potentially bring by uniting the Central American region. This could help this region organize into a small block and obtain more synchronized business cycles. This Central American block could then make capital, goods and

labor more easily mobile, thus potentially increasing their efficient allocations. This would then result in an increase of productivity from all the economies in that region. It is true that there are some losses to dollarization; like any economic policy there are losers and winners.

This model analyzed how dollarization impacted bilateral trade of El Salvador, however this paper did not differentiate between imports and exports because of the nature of the model. In the following graph (figure 1.4) we will point out some problems that dollarization might not help fix, but could in fact make the country worse off. We can observe imports have increased over time, and a sharper increase occurred after dollarization. We can observe the same increasing pattern for remittances (money sent home by El Salvadorian natives working in foreign countries). However, exports are increasing at a much slower pace.



Source: Central Bank of El Salvador

Figure 5.1 Annual Nominal Exports, Imports and Remittances (1994-06)

This could be due to the loss of competitive advantage and/or to the effect remittance money is having in the economy. Remittance money affects El Salvador's economy in many ways: First, it creates a consumption drive because of the excess liquidity. Second, most of the good labor of both agriculture and industrial sectors is exported to countries like the United States, making it scarcer and more expensive. Third, it is possible that the most productive laborers in El Salvador may also be the most mobile and therefore there may be a resulting loss in productivity. Therefore the productivity of the country is lower, but higher salaries are being paid plus they are also getting an extra income from remittance. Therefore imports have increased dramatically, but the country's exporting sector is lagging behind. To that we can add that dollarization in fact has made it easier to send remittance money, by eliminating some of the transaction costs. El Salvador lost its competitive advantage after dollarization because everything in that country became more expensive including labor. As previously mentioned migration has helped increase wages, but also inflation caused by the rounding up of prices after dollarization and by the rise in demand for goods having no increase in production. In order to reverse this trend and help El Salvador's economy grow at a higher pace this country needs to find a way to reallocate the resources coming from remittance money in a more efficient way. More research can be done in this area and there is plenty of information for this analysis to take place.

Those points just mentioned are a weakness to this study because they are not covered, but can be a good starting point for a further study of how dollarization and trade are related. Based on the results from the previous analysis El Salvador should remain dollarized. The study established a positive relationship between dollarization and trade. There should be some caution to this recommendation, since this is merely a short run outcome. Even though there is no conclusive evidence to say that having a trade deficit or surplus is good for the economy, in the

long run the economy will always do better with a trade surplus than with a deficit. El Salvador's government should aim at motivating local production of goods by aiding or subsidizing them at the starting stages, to boost its exporting sector. This is of great importance since now this is a dollarized economy, and there is no more money printing. The country needs to keep at least an equal amount of dollars entering the country to the amount leaving the country. At this moment remittance money is helping offset this deficit, but in the future this flow of dollars from abroad will start to decrease if more measures are taken to control immigration into the U.S. It is imperative for Salvadorian policy makers to get together with policymakers of the region and analyze trade within the CACM. Other factors apart from the ones mentioned in this study could also be the cause for a reduction in the trade flows from El Salvador to CACM members. By dealing with this, bilateral trade amongst the immediate trading partners of El Salvador will continue to increase. Another recommendation from this study would be to promote a free trade agreement with the United States, but that has already been put into effect before the completion of this study. El Salvador should continue to monitor this new free trade agreement to make sure it is being followed and push for adjustments if necessary to insure free trade continues. Dollarization has given this country a great advantage in entering the age of globalization by making trade more efficient.

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