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# The Macroeconomics of Dollarization : A Cross-Country Examination of the Effects of Dollarization in Ecuador and El Salvador

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The Macroeconomics of Dollarization: A Cross-Country Examination of the Effects of  
Dollarization in Ecuador and El Salvador

By

Lia Anastasia Kopar

This thesis is submitted in partial fulfillment of the requirements for Honors in the Discipline in  
the Department of Business and the Elizabethtown College Honors Program.

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# THE MACROECONOMICS OF DOLLARIZATION

**A Cross-Country Examination  
of the Effects of Dollarization in  
Ecuador and El Salvador**

## ABSTRACT

This paper seeks to compare and contrast the effects of official dollarization on three broad macroeconomic variables: interest rates, inflation and GDP growth, in Ecuador and El Salvador. The paper will facilitate a better understanding of how the same alternative to monetary policy was expected to change the macroeconomic situation in two different countries with distinct pre-dollarization circumstances by analyzing the context in which the decision to dollarize was made, what happened before and after each country implemented the USD as official currency, and evaluating dollarization's macroeconomic costs and benefits so as to provide a prescription for countries considering dollarization.

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## **Abstract**

This paper seeks to compare and contrast the effects of dollarization on three macroeconomic variables: interest rates, inflation and GDP growth, in Ecuador and El Salvador. In order to facilitate a better understanding of dollarization, the context in which the decision to dollarize was made and what happened before and after each country implemented the USD as official currency are analyzed in order to critically evaluate dollarization's macroeconomic costs and benefits.

### **I. Introduction**

The United States dollar (USD), is the world's most popular currency for international transactions. The USD is the de facto global currency<sup>1</sup> that is used as a benchmark in the foreign exchange market, is converted more than any other currency, and is held by almost every central bank in the world.<sup>2</sup> The influence and value of the USD have spread throughout the globe, thanks in part to a process known as 'dollarization.'

Economists Eduardo Levy Yeyati and Federico Sturzenegger eloquently introduce the topic as follows:

“With the persistent instability of international financial markets, emerging economies are exploring new ways to reduce exposure to capital flow volatility. Some analysts argue that financially open economies are best served by more flexible regimes, while others argue in favor of extreme exchange rate regimes that have a strong commitment to a fixed parity or dispense with an independent currency.”<sup>3</sup>

According to a Joint Economic Committee report, despite its history, “dollarization is little understood.”<sup>4</sup> The monetary regime a country uses makes up an essential aspect of the

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<sup>1</sup> Amadeo.

<sup>2</sup> “USD – US Dollar.”

<sup>3</sup> Sturzenegger & Yeyati.

<sup>4</sup> “Official and Unofficial Dollarization.”

framework upon which its economic policies are based and is also a crucial feature in macroeconomic performance.<sup>5</sup> The goal of this research is to provide a comprehensive, in-depth analysis of dollarization from both theoretical and empirical perspectives, specifically focusing on dollarization as it occurred in two Latin American countries: Ecuador and El Salvador.

## **I. Background**

### **A. Dollarization as an Exchange Rate System**

Today in 2018, there are four broad types of exchange rate systems: fixed, freely-floating, managed float, and pegged. Full dollarization, or *de jure dollarization*, refers to the replacement of a domestic currency with a foreign currency. In a process referred to as official dollarization, the foreign currency is officially adopted as the legal tender in the domestic country in lieu of the national currency and is used as a medium of exchange, store of value, and unit of account. In contrast, unofficial dollarization, known as *de facto dollarization*, refers to the use of a foreign currency as a medium of exchange in a domestic economy, where foreign cash is used as legal tender along with the domestic currency. With de facto dollarization, domestic citizens may denominate wealth in foreign assets, despite this foreign currency not serving as the official legal tender in the domestic country. Foreign currency's use in transactions has historically been used to protect against domestic inflation.<sup>6</sup>

### **B. Dollarization Versus Currency Boards**

Dollarization is often compared to the system of a currency board, in which the value of a local currency is pegged to the value of some other specified currency. Currency boards may only tie the value of the local currency to one other specified currency, so the local currency will move in

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<sup>5</sup> Swiston, 3.

<sup>6</sup> "Official and Unofficial Dollarization."

tandem with only the currency it is pegged to. Furthermore, currency boards restrict control over local interest rates; these rates are required to be aligned with those in the country of the currency peg. The currency board must then be able to maintain reserves of the other specified currency in order to function properly. Dollarization, however, takes the idea behind currency boards one step further and refers to the adoption of a foreign currency for transactions in the home country.<sup>7</sup>

Dollarization normally refers to the United States dollar; however, dollarization in general refers to the replacement of a local currency with a foreign currency, not in specific the USD. When referring to this form of currency substitution, the assumption is that dollarization does not have to involve the use of the USD. There have been cases of ‘Euroization’ and currency substitution involving the use of the Australian dollar. Despite these other phenomena, in this research it is implied that official dollarization refers to the use of the USD.

Both systems, currency boards and dollarization, attempt to peg the value of the local currency in order to provide the country with increased stability and less volatility in the foreign exchange markets.

### **C. Evolution of Dollarization in Latin America**

Unofficial dollarization has existed for decades in Latin America. After the dissolution of the Bretton Woods monetary system in 1971, the international exchange rate regime transformed. This transformation manifested itself in the signing of the Smithsonian Agreement, which sought

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<sup>7</sup>Heysen.

to peg the USD to gold, thus causing dollar reserves to pour into foreign banks and exerting downward pressure on the USD. Amid an international currency crisis in which other nations enabled their currencies to float, developing nations with prevalent inflation attempted to peg their local currencies to a major currency in hopes of bringing about stability.

In the 1990s, as capital flows into these countries increased and inflation decreased, a new threat emerged: speculative attacks. This fear of assets being acquired by speculators and the local currencies consequently suffering from devaluation eventually led to the belief that pegged systems may not be as reliable as originally thought, hence the move towards more drastic exchange rate regimes being implemented (currency boards or free floats).

And so it follows that throughout different points in history, various countries in Latin America have depended upon the USD as a means of financial security and stability. Panama became the first country in Latin America to fully dollarize, after giving up the use of its domestic currency, the balboa. Other countries, like Cuba and Mexico, then began using the USD in regular transactions. Exchange rate regimes, such as hard and soft pegs, are inherently vulnerable to aggregate market shocks and therefore unsustainable in the long-run,<sup>8</sup> an idea that is supported by the deterioration of soft peg regimes in Latin America in the early 1990s as well as “the recent adoption of the U.S. dollar as legal tender in Ecuador and El Salvador.”<sup>9</sup>

While both nations chose to implement dollarization around the same time (2000 and 2001, respectively), the background as to why each country made this choice differs greatly; Ecuador

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<sup>8</sup> Yeyati and Sturzenegger.

<sup>9</sup> Yeyati and Sturzenegger.



dollarized to prevent further economic meltdown, and El Salvador dollarized from a position of strength.

## **II. The Case of Ecuador**

This diverse Latin-American nation has a population of more than 16 million and a GDP of approximately \$195 billion USD. Ecuador used the Ecuadorean sucre (ECS) as its national currency until 2000, when the country switched to the USD.<sup>10</sup>

In the late 1990s, Ecuador was in the midst of a severe banking, economic, and financial crisis. The origins of the crisis can be characterized by three interdependent factors: the country's increasing dependence on oil exports, increasing wages in the public sector, and the low tax base.<sup>11</sup> As this crisis developed, more severe effects in the banking and financial sector played a serious role in the eventual decision to adopt a completely new currency. The following three sections will explore, in-depth, the factors that brought about Ecuador's crisis.

### **A. Oil Exports and Low Non-Oil Tax Base**

Historically, Ecuador has been heavily dependent on volatile commodities, and oil is no exception. The oil production in Ecuador enabled the country, for the first time in history, to exceed the average GDP growth rate in Latin America.<sup>12</sup> In 1973, Ecuador joined the OPEC and immediately negotiated to increase its share of oil proceeds.<sup>13</sup> In just two years, from 1972 to

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<sup>10</sup> World Bank, Databank, "Population, total."

<sup>11</sup> Fischer.

<sup>12</sup> Jameson, 5.

<sup>13</sup> Ecuador Facts and Figures.

1974, petroleum revenues went from 2% to 8.4% of the country's GDP, demonstrating a growing reliance on oil as a revenue source.<sup>14</sup>

As the ratio of petroleum exports to GDP began decreasing, the government experienced a budget deficit because it had been so cripplingly dependent on oil. This trend continued, and the Ecuadorean government began borrowing more and more from other countries to finance the increased spending brought about from the oil revenues. As oil prices dropped worldwide throughout the 1980s and 49% of the country's fiscal budget was financed entirely by oil export revenues,<sup>15</sup> Ecuador was confronted with economic stagnation.

## **B. Natural Disasters**

The geographic location of Ecuador makes it prone to earthquakes, landslides, volcanic activity, and periods of heavy rain or drought, which caused rain-related damage to the country's infrastructure system in both 1975 and 1983.<sup>16</sup> The effects of other natural disasters such as the 1995 drought and two volcanic eruptions in 1999 disrupted oil transportation lines and caused more than \$700 million USD worth of losses in oil revenue,<sup>17</sup> causing the government to print money, thus triggering the onset of inflation. By disrupting economic activity, causing uncertainty in the market, delaying recovery, and hindering further progress, these natural disasters helped contribute to President León Febres Cordero's 1988 decision to default on Ecuador's excessive foreign debt.<sup>18</sup> The lack of forethought and preparatory economic policies on behalf of the government enabled these natural disasters to contribute to economic disaster.

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<sup>14</sup> "Ecuador – The Economy."

<sup>15</sup> "Ecuador – The Economy."

<sup>16</sup> Beckerman & Solimano, 39.

<sup>17</sup> Hanratty, "Fiscal Policies."

<sup>18</sup> Albornoz & Anda, 145.

### **C. Public Sector Wages and Spending**

During the period from 1972 to 1977, the public sector experienced a rapid expansion, increasing roughly 65%<sup>19</sup> due to the influx of funds the country was receiving as a result of its oil exports.

When oil revenue began to decline, high levels of foreign borrowing financed expansions in public-service employment, which saw annual increases of 7% from 1974 to 1982, more than double the rate of increases in the rest of the labor force.<sup>20</sup>

In the wake of decreased oil prices, the government neither wanted to raise non-oil taxes nor decrease its spending and use of subsidies, so it resorted to unwarranted amounts of foreign borrowing to finance the deficit. In 1989, 38% of the country's expenditures went to fulfilling foreign debt obligations.<sup>21</sup>

### **D. Banking Sector Problems**

The macroeconomic conditions that had developed in previous decades contributed to volatile government revenues while expenses were maintained at high levels. Sources of income were not the only volatile aspect of the 1990s; in this decade, Ecuador went through six presidents. Access to international capital markets was limited and the country had already defaulted on international debt, which brought about the onset of the banking crisis in 1998. The country had nowhere else to turn to to finance its spending except domestic markets, mainly made up of local financial institutions. Domestic debt reached nearly one-fifth of GDP in 1998 (it had been about 2% in 1990), contributing to the incredible 90% of GDP that was comprised of public debt.<sup>22</sup> In

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<sup>19</sup> "Ecuador – The Economy."

<sup>20</sup> "Ecuador – The Economy."

<sup>21</sup> Hanratty, "Fiscal Policies."

<sup>22</sup> Jácome, 19.

1999, the government of President Jamil Mahaud publicly announced it would delay the payment of more than \$94 million USD of Brady bond interest. At that point in time, Ecuador had \$13 billion USD worth of foreign debt, which exceeded the country's GDP at the time.<sup>23</sup>

Ecuador's inability to establish an efficient regulatory environment for financial liberalization, inefficient fiscal policy, and lack of fiscal modernization and reform drastically diminished trust in the country as an investment destination.<sup>24</sup>

The 1998-1999 Ecuador Banking Crisis was characterized by a more than 7% decrease in economic activity, a 195% depreciation in the value of the sucre, and the closing of more than 70% of all of the financial institutions in the entire country.<sup>25</sup> Major banks became insolvent thanks to fund diversion, corrupt practices, and mismanagement of assets. When \$1.6 billion USD of Ecuadorean government funds were used in an attempt to bailout Ecuadorean banks as part of the "bank rescue program," it was still not enough to rescue the crippled system. Even other drastic measures, like the March 1999 freeze on bank deposits exceeding \$500 USD, could not prevent the liquidity squeeze from hitting the financial system.<sup>26</sup>

The Agencia de Garantía de Depósitos (AGD), an independent agency of the Ecuadorian government created in 1998, then attempted to restore the public's confidence in the banking system by replacing the national income tax with a 1% tax on all financial transactions, known as the transaction tax.<sup>27</sup> This AGD law only made the situation in Ecuador worse, as it accelerated the collapse of numerous banking entities, including the largest bank, Banco del Progreso.<sup>28</sup> In

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<sup>23</sup> Romero.

<sup>24</sup> "Banking, Currency, and Debt Meltdown: Ecuador Crisis in the Late 1990s."

<sup>25</sup> "Ecuador," USAID.

<sup>26</sup> Jameson, 7.

<sup>27</sup> Jácome, 19.

<sup>28</sup> Jácome, 19.

the beginning of 1999, 4,000 ECS could buy 1 USD; by the end of the same year, it required 28,000 ECS to buy 1 USD in the foreign exchange market, a percent change of more than 600%.<sup>29</sup> Ecuador postulated that dollarization would be a “way to cope with a widespread political and financial crisis rooted in massive loss of credibility in its political and monetary institutions.”<sup>30</sup>

### **III. The Case of El Salvador**

With a population of 6.34 million and a GDP of \$26.80 billion USD, El Salvador is the smallest country in Central America.<sup>31</sup> Despite being the smallest, the country boasts the third-largest economy in the Central American region.<sup>32</sup> After the passing of the Monetary Integration Law in November 2000, the sponsors of this legislation promised a “lowering of interest rates and strengthening of the Salvadorian economy.”<sup>33</sup> The USD replaced the colón as the official legal tender on January 1, 2001.

After suffering through a brutal civil war in the 1980s, the country sought to reinvigorate their economy (subsequently spurring foreign investment, trade, and economic growth) by three main methods: privatization of the banking system/communications system/electricity distribution system, more lax economic restrictions and trade liberalization, and dollarizing their economy.<sup>34</sup> In contrast with Ecuador, the macroeconomic situation El Salvador faced was more stable. After 1993, when inflation had peaked at 18.5%, the annual rate had decreased to more stable levels of

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<sup>29</sup> Valero and Vásquez, 44.

<sup>30</sup> Yeyati and Sturzenegger.

<sup>31</sup> “El Salvador” - Country Profile.

<sup>32</sup> “El Salvador: Economy.”

<sup>33</sup> *Ley de Integración Monetaria*.

<sup>34</sup> Vaux.

about 5% in 1997.<sup>35</sup> However, interest rates for loans denominated in colones remained relatively high (about 12.41% in 2001<sup>36</sup>), so by eliminating the risk of currency devaluation, the government of President Francisco Flores had hoped dollarization would assist in promoting foreign investment. Then Finance Minister Juan Jose Daboub claimed the decision was part of economic reforms in the nation, though there is speculation that the true rationalization for dollarization was political in nature and associated with the Alianza Republicana Nacionalista (ARENA) political party of then president Flores.<sup>37</sup> Support for the program, the Economic Stabilization and Structural Adjustment Program, came in part due to the belief that “dollarization reduces interest rates and increases predictability, which is a boost for investment.”<sup>38</sup>

### **A. Civil War and Economy**

In the 1970s, El Salvador was experiencing overpopulation, an inequitable social system, and political unrest. Terrorism and murders by left-wing guerrillas and right-wing death squads were common facets of everyday life.<sup>39</sup> After numerous fraudulent elections, the government was overthrown and a civil war between government forces and the left-wing political group, Frente Farabundo Martí para la Liberación Nacional (FMLN) erupted in 1979.<sup>40</sup> This violent war, which killed more than 70,000 Salvadorians, ended in 1992 with a peace treaty, but not before it adversely affected the economy of El Salvador.<sup>41</sup>

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<sup>35</sup> Lucas, 29.

<sup>36</sup> Lucas, 29.

<sup>37</sup> Lucas, 30.

<sup>38</sup> Emmot.

<sup>39</sup> “El Salvador History.”

<sup>40</sup> “El Salvador History.”

<sup>41</sup> “El Salvador Economy.”

## **B. Privatization**

In an attempt to reduce public expenditures, the government instituted the privatization of previously state-owned and operated enterprises in a program known as “Program for Modernization of the Public Sector”.

In 1989, the national banks were privatized to “reduce the size of the fiscal deficit, render better services, and to provide the State with immediate resources that would be used to cancel short-term debt and invest in social infrastructure.”<sup>42</sup> By 1998, electricity-distribution, telephone services, and the nation’s social security system had all become privatized.<sup>43</sup> Privatization played a vital part in the attraction of foreign investment in electricity generation/distribution, telecommunications, and pension funds.<sup>44</sup>

## **C. Trade Liberalization**

As part of another round of economic reforms, El Salvador focused on increasing its international trade through implementing additional trade agreements and reducing and eliminating tariffs and other trade barriers. In 1987, the nation’s average tariff was 23%; by 2004, the duty on imports had been reduced to a mere four percent, boasting the lowest tariff rate in Central America.<sup>45</sup> El Salvador signed free trade agreements with more than five countries and, in 1990, joined the General Agreement on Tariffs and Trade (GATT) (and, eventually, its successor, the World Trade Organization). The Dominican Republic – Central America Free Trade Agreement (DR-CAFTA), further assisted the nation in its quest to diversify the economy

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<sup>42</sup> “Privatization – Summary Report,” 2.

<sup>43</sup> Towers & Borzutzky, 32.

<sup>44</sup> 2011 Investment Climate Statement – El Salvador.

<sup>45</sup> Hidalgo, 8.

and augment trade revenues. From 1991 to 2007, trade went from 42.1% of GDP to 62.1% and in the three years after the ratification of the DR-CAFTA, annual foreign direct investment (FDI) was 37.8% higher than the average annual levels in the three years before the agreement.<sup>46</sup>

President Flores said the following of the dollarization decision:

“The only monetary policy that works is the monetary policy that best caters to a country’s development objectives. In El Salvador what happened was that the international banking system had no interest in entering the country. This created a tendency towards exchange rate monopolies and greatly damaged the country’s development prospects. In El Salvador private banks made their money by borrowing money at 2.5 percent interest rates in the United States and then relending them in El Salvador at 25 percent. So El Salvador had entered into a speculative exchange rate spiral. [...] So dollarization aimed to protect Salvadorans’ savings and ensure lower interest rates to foster new projects. [...] In a sense, when we dollarized our economy, we were simply coming to terms with a reality: the dollar had become El Salvador’s exchange currency.”<sup>47</sup>

## **IV. Literature Review**

### **A. Costs and Benefits**

From an economic perspective, the perceived benefits of dollarization include the elimination of exchange rate instability, the reduction of real inflation rates, facilitation of long-term economic planning, increased domestic access to foreign investment and funding, and accelerated economic growth.<sup>48</sup> These actions are believed to help induce greater economic productivity, lower unemployment rates, faster economic growth, reduced costs for lending internationally, and more stable capital flows in and out of the country.

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<sup>46</sup> Hidalgo, 9.

<sup>47</sup> Flores.

<sup>48</sup> Lucas, p. 5.



Government loss of seigniorage abilities, the initial cost of implementing the USD and retiring the domestic currency, increased vulnerability to external shocks and economic volatility, and decreased long-term economic growth at the expense of monetary dependence are some of the perceived costs of dollarization.<sup>49</sup> Critics also argue that from a political perspective, dollarization may bring about resentment due to a perceived decrease in economic and political independence and power as well as serve as a deterrent to a feeling of national pride and sentiment.<sup>50</sup>

### **B. Early Research: 2001-2005**

Edwards' study, *Dollarization and Economic Performance: An Empirical Investigation*, investigates the view of dollarization where the country that dollarizes will experience "lower interest rates, higher investment, and superior economic performance."<sup>51</sup> He uses GDP per capita growth, inflation, fiscal deficit, and current account deficit as variables and conducts a series of tests for equality of means and medians as well as a non-parametric Kruskal-Wallis  $\chi^2$  test on the equality of distributions. The results indicated that GDP growth has been significantly lower in dollarized nations than in non-dollarized nations, inflation has been significantly lower under dollarization, and there are no statistical differences in the behavior of fiscal deficits/current account balances across dollarized and non-dollarized nations.<sup>52</sup> However, Goldfajn and Olivares (2001), in their research on Panama, conjecture that the lower domestic interest rates may be a result of a more competitive banking system, not of dollarization.<sup>53</sup>

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<sup>49</sup> Lucas, p. 9.

<sup>50</sup> Lucas, p. 10.

<sup>51</sup> Edwards, 1.

<sup>52</sup> Edwards, 5.

<sup>53</sup> Goldfajn & Olivares, 1.

In their paper *Dollarization, Inflation, and Growth*, Edwards and Magendzo used a matching estimator technique to analyze macroeconomic conditions surrounding dollarized economies. Their research “suggests quite strongly that inflation has been significantly lower in dollarized nations than in non-dollarized ones.”<sup>54</sup> Furthermore, regarding economic growth, their research suggests that “dollarized nations have had a lower rate of economic growth than non-dollarized ones<sup>55</sup>,” which they attribute to the dollarized nations’ inability to accommodate external disturbances.

### **C. Additional Research: 2006-2010**

In *A Pro-Market Agenda for El Salvador*, Engel (2005) found that due to the country’s economic reforms both lower and more stable interest rates were achieved, helping the country achieve ‘investment grade.’<sup>56</sup> In *Examining the Distribution of the Costs and Benefits of Official Dollarization*, Lucas found that results suggest success of dollarization in Ecuador, as both interest rates and inflation were reduced and stabilized, leading to accelerated levels of economic growth.<sup>57</sup> In El Salvador, though dollar-denominated interest rates decreased shortly after dollarization, Lucas finds that economic growth measured in terms of GDP growth per capita have been “even more moribund in the wake of dollarization.”<sup>58</sup> However, lower bank lending rates have given the Salvadorian banks a comparative advantage over other local banks.

### **D. Recent Research: 2011-2017**

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<sup>54</sup> Edwards & Magendzo, 1.

<sup>55</sup> Edwards & Magendzo, 3.

<sup>56</sup> Engel, 2.

<sup>57</sup> Lucas, 25.

<sup>58</sup> Lucas, 33.

Dornbusch's research (2001) hypothesized that dollarization helped achieve growth for the dollarized economy because it meant "lower interest rates, higher investment, and faster growth."<sup>59</sup> In their research with both Ecuador and El Salvador, Benoni and Lindahl (2014) compared mean values and volatility and found that interest rates decreased and stabilized in both countries after the implementation of dollarization, confirming two of their hypotheses.<sup>60</sup>

Swiston (2011) uses a variety of methods to estimate the impact of dollarization (compared to their previous fixed exchange rate regime) in El Salvador on commercial bank interest rates. He found that the effect of moving from the colón to the USD reflects "a lower currency risk premium, thus representing a lowering of real interest rates" that "occurred independently of the reduction in U.S. interest rates in the 2000s relative to the 1990s."<sup>61</sup> In his analysis of dollarization's effects on nominal interest rates in El Salvador, numerous accounts of research (Hidalgo, Engel, and Rivera-Solis) support Swiston's claim, based on an uncovered interest parity framework, that "adopting the USD lowered commercial bank interest rates by an average of 4 to 5 percentage points."<sup>62</sup> Furthermore, Swiston found that "U.S. monetary policy has contributed to the cyclical stability of inflation and output in El Salvador to a greater degree under official dollarization than it did under the peg."<sup>63</sup>

Most economists agree that "with the use of the dollar, inflation tends to stay low."<sup>64</sup> In

*Dollarization in Ecuador and El Salvador*, Benoni and Lindahl used the gravity regression

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<sup>59</sup> Dornbusch, 240.

<sup>60</sup> Benoni, & Lindahl, 1.

<sup>61</sup> Swiston, 9.

<sup>62</sup> Swiston, 9.

<sup>63</sup> Swiston, 22.

<sup>64</sup> Towers and Borzutzky, 37.

model to find that inflation was confirmed to have decreased and stabilized in both Ecuador and El Salvador after the implementation of dollarization.<sup>65</sup> Both mean inflation rate and inflation volatility were lower post-dollarization than pre-dollarization in El Salvador and in Ecuador in this study.

### **E. Methodology and Data**

Because it is theorized that under a full dollarization regime, there will be changes in variables surrounding inflation levels, interest rates, and GDP growth, this research found the average percent change in variables before and after the quarter when the country dollarized. Then, a comparison of means test was conducted and the t-score of a series of variables for each country were calculated in order to determine if there was a significant change.

The null hypothesis was that the averages before dollarization and after dollarization would be equal to one another, meaning there would be no statistical change in the variable before and after dollarization. The alternative hypothesis stated that the values before and after dollarization would not be statistically equal, meaning that there would be a statistical change in each variable after dollarization.

<b>Null hypothesis:</b>	<b><math>H_0 = \bar{X}_{bar1} = \bar{X}_{bar2}</math></b>
<b>Alternative hypothesis:</b>	<b><math>H_1 = \bar{X}_{bar1} \neq \bar{X}_{bar2}</math></b>
<b>H<sub>0</sub>:</b>	<b>average inflation/GDP growth/interest rate is equal before and after dollarization</b>

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<sup>65</sup> Benoni, & Lindahl, 1.

**H<sub>1</sub>: average inflation/GDP growth/interest rate is not the same before and after dollarization**

For Ecuador, in addition to the inflation (annual percentage), the deposit rate, and annual percent change in GDP per capita, the study conducts a further comparison of means on the following supplemental variables: lending rate, government consumption, current account, exports, imports, trade balance, gross fixed capital consumption, and degree of openness were examined. For El Salvador, in addition to the three main variables, exports, imports, government liabilities, cash inflow from government operations, and trade balance were examined as supplemental variables. The comparison of means test is calculated using the following equation:

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

where:

- n<sub>1</sub>**: number of observations in the period before dollarization
- n<sub>2</sub>**: number of observations in the period after dollarization
- s<sub>1</sub>**: variance in period before dollarization
- s<sub>2</sub>**: variance in period after dollarization
- $\bar{x}_1$** : mean of the variable before dollarization
- $\bar{x}_2$** : mean of the variable after dollarization

The corresponding t-values of each variable examined are then compared to the critical values found in a t-table in order to determine significance. If the null hypothesis is rejected, then there is evidence to believe that dollarization played a role in the change in the variable.

## **F. Results**

In this section, the results of the comparison of means test are presented for both countries.

<b>Ecuador</b>	<b>Periods</b>	<b>Before \$</b>	<b>After \$</b>	<b>t-score</b>
<b>Inflation (annual %)</b>	<b>1989-2016</b>	42.59	6.70	<b>7.28</b>
<b>Interest Rates (Deposit Rates %)</b>	<b>1991 Q2-2007 Q4</b>	34.40	5.36	<b>13.524</b>
<b>% Δ GDP per capita (USD)</b>	<b>1989-2016</b>	0.03682	0.09546	<b>-1.259</b>

As indicated in the tables, for Ecuador, the t-scores for inflation and for interest rates are statistically significant, meaning the null hypotheses have been rejected and there is reason to believe that, in these situations, the changes in the variable might have occurred because of dollarization. However, with percent change in GDP per capita, the value was not significant. Percent change per capita was used in order to account for the time series adjustment for variables that normally increase over time, but, surprisingly, this value was still not significant which leads to the conclusion that dollarization did not have a statistically significant effect on per capita GDP growth.

<b>El Salvador</b>	<b>Periods</b>	<b>Before \$</b>	<b>After \$</b>	<b>t-score</b>
<b>Inflation (annual %)</b>	<b>1987-2013</b>	12.19	3.26	<b>4.01</b>
<b>Interest Rates (Deposit Rates %)</b>	<b>1987-2016</b>	13.66	3.62	<b>14.03</b>
<b>% Δ GDP per capita (USD)</b>	<b>1990-2016</b>	1,604.64	3,394.11	<b>3.233</b>

For El Salvador, all of the values have been shown to be statistically significant, meaning that there is sufficient reason to believe that dollarization may have played a role in the changes in these variables during this time period.

The results of the further comparison of means tests that this study conducted for both countries may be found in the appendices. It is interesting to note that, while official dollarization lowers transaction costs and is expected to encourage trade<sup>66</sup>, the Ecuadorean t-scores for exports, imports, trade balance, and degree of openness are all not significant, suggesting that the results

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<sup>66</sup> Quispe-Agnoli & Whisler, p. 58.

of this particular study indicate that dollarization may not have played a role in increasing trade in the country, which is consistent with Benoni and Lindahl (2014).

## **G. Conclusions**

Numerous studies have analyzed, criticized, praised, and questioned the macroeconomic costs and benefits of a dollarization regime. However, this analysis has demonstrated that understanding the true costs and benefits may require information that is outside of the scope of purely economic analyses. Both the supporters and the opponents of dollarization have overstated the policy's effects on the economy. Dollarization affects various income levels within an individual economy differently; therefore, the costs and benefits vary from person to person and are therefore ambiguous. Dollarization is not a catch-all remedy for economic issues and each variable of economic success cannot be wholly attributed to this phenomenon; rather, policies need to be carefully thought-out in order to facilitate economic stability.

In Ecuador, dollarization has helped bring about numerous macroeconomic benefits, such as lower inflation rates and less volatile inflation, increased confidence in the banking system, an increased GDP growth rate, and economic openness.<sup>67</sup> In El Salvador, some of dollarization's positive effects include the cyclical stability of inflation and output, increased revenue for importers, net annual savings for the economy, increased capital mobility, and strengthened financial stability.<sup>68</sup> These benefits are not enough to conclude that these dollarization regimes have overall had a positive effect on the respective economies. An analysis of numerous other

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<sup>67</sup> Anderson, p. 681.

<sup>68</sup> Rivera-Solis, p. 14.

factors including the impact on income inequality, poverty, and social reforms serves as a useful supplement to understanding dollarization's effects.

### **A. Social Policy Implications**

Examining dollarization as an equality-enhancing measure must focus on the benefits to the most economically-disadvantaged members of the nations, especially in two nations like Ecuador and El Salvador where about 22.9% (2016) and 34.9% (2015) of the respective populations still live in poverty.<sup>69</sup> For example, in Ecuador, the poorest workers stood to gain the most from dollarization's increase in price stability because this group was most affected by the decreased purchasing power brought about by pre-dollarization inflation levels.<sup>70</sup> The Ecuadorean case demonstrates that these positive distribution of income effects may be present only due to the underlying situation when domestic currency instability combines with high inflation levels to hinder domestic economic performance to a startling degree. However, the Salvadorian case demonstrates that these distribution of income effects are not present for the poorest members of the Salvadorian economy due to the persistence of the idiosyncratic costs of dollarization. The poor populations have suffered as a result of the "conversion inflation" phenomenon in which prices end up increasing for these individuals.

There needs to be policies in place to ensure that the higher wages that come along with increased stability are passed on to the most economically-disadvantaged members of society, or else the income gap will persist. The Ecuadorean banking sector and importing firms gained from dollarization due to the decreased risks and increased profitability post-dollarization. The

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<sup>69</sup> "Ecuador" and "El Salvador," *Data Bank*, The World Bank Group.

<sup>70</sup> Lucas, p. 11.



poorest members of society are generally without bank accounts and can therefore not reap the benefits of increased financial sector stability. The loss of seignorage and cost of conversion to USD may also result in the need for increased tax income, which will adversely affect the poorest members of society. These idiosyncratic costs result in lower purchasing power for the poorest members of society and this issue must be addressed in further economic policymaking.

## **B. Fiscal & Economic Policy Implications**

Despite increasing government spending before implementing the USD, since dollarizing, Ecuadorean government expenditures have continued to increase,<sup>71</sup> reaching a peak of \$44.3 million in 2014. While certain government expenditures encourage economic activity, going forward the government of Ecuador needs to ensure that the government spending does not displace either resources from the public sector or financial resources from the credit market, as this will likely hinder economic progress. Due to the nation's continued dependence on oil revenue, another recommendation is to implement policies that facilitate and augment levels of regional trade. This action would further Ecuador's regional competitive position in some of its most common exports, such as flowers and bananas.

In El Salvador, due to the low income levels of a large percentage of the population, foreign remittances from those working abroad have become an increasingly important income source; in 2016, they represented about 17% of GDP.<sup>72</sup> Therefore, the government should seek to implement policies that will benefit the citizens who heavily rely on these payments. Key policy recommendations include focusing on policies that increase security and crackdowns on

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<sup>71</sup> Figures 2 and 3.

<sup>72</sup> Matsangou.

corruption and policies that seek to augment the levels of foreign investment into the nation. These policies will work in tandem, as the more gang violence is reduced, the more attractive the nation will be for foreign investment. In a small nation where additional taxing significantly burdens the population, investment opportunities provide an attainable means for helping to life vulnerable Salvadorians out of economically-disadvantaged situations.

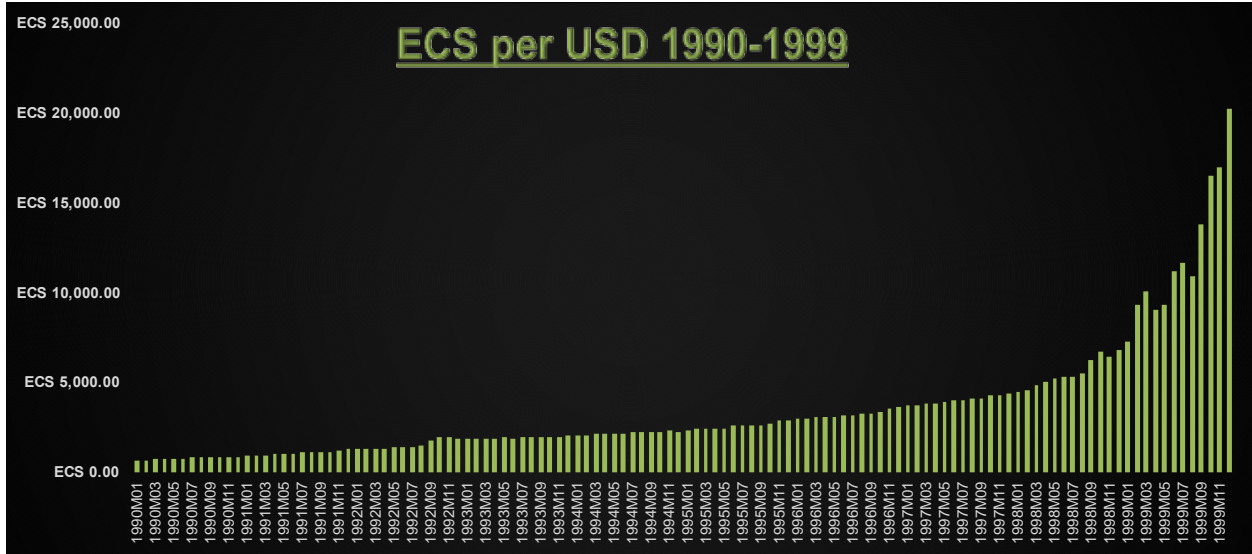
### **C. Final Conclusion**

The results of this study are perplexingly mixed; while dollarization in both Ecuador and El Salvador seemed to be a significant factor in reduction of interest rates and changes in annual inflation rates, it did not have the expected, positive effect on percent change of GDP per capita in both nations (only in El Salvador did dollarization have a statistically significant effect on this variable). Furthermore, some of the results of the additional analysis in the appendices indicate that its effects on international trade are ambiguous, which goes directly against one of El Salvador's reasons for implementation of the policy.

Countries considering dollarization need to understand that dollarization is not just a macroeconomic policy, but rather one that needs to be examined from a microeconomic, socioeconomic, and policy perspective. Dollarization alone is not a solution to the economic woes of a country, but it may be able to help bring about stability after times of crisis, although the cost of that stability has yet to be determined, as the distributional effects of dollarization are both positive and negative since dollarization cannot eliminate all sources of economic and fiscal crises. As the results in my study indicated, although dollarization may be able to positively benefit the nation that implements the policy by playing a key role in positive macroeconomic

changes, the dollarization regime is often not an adequate mechanism for all the necessary changes. The key takeaway is that dollarization is not a replacement for institutional reforms and policies that should be implemented in a particular nation; rather, it is a drastic solution to problems that often may be better solved with more sound economic policies and fiscal decisions.

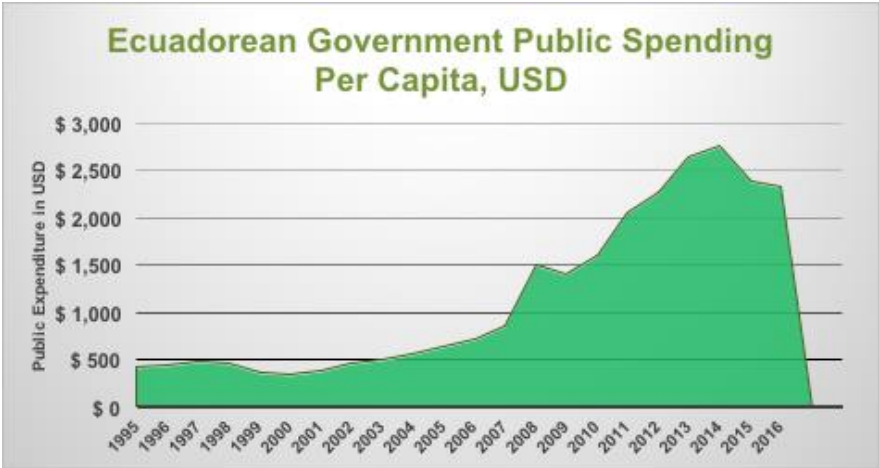
**Figure 1: Ecuadorean Sucres (ECS), Direct Quotation, monthly, 1990-1999**



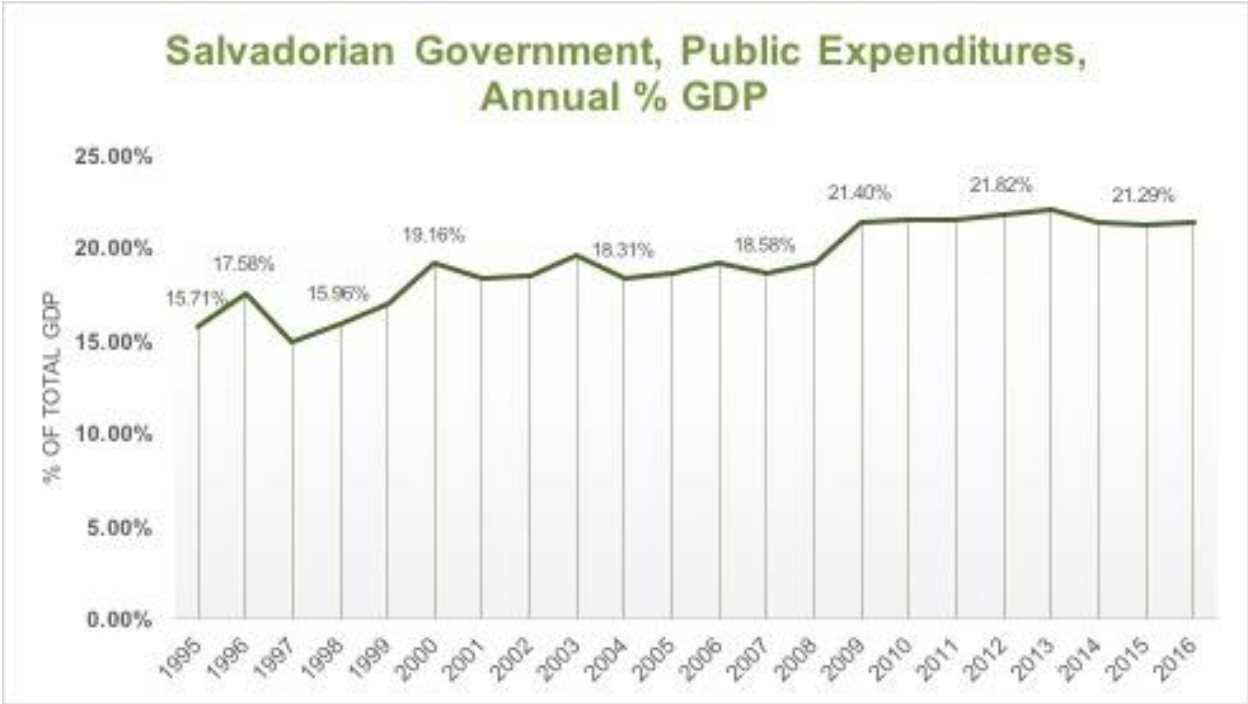
**Figure 2: Ecuadorean Government Public Expenditures, Annual % of GDP**



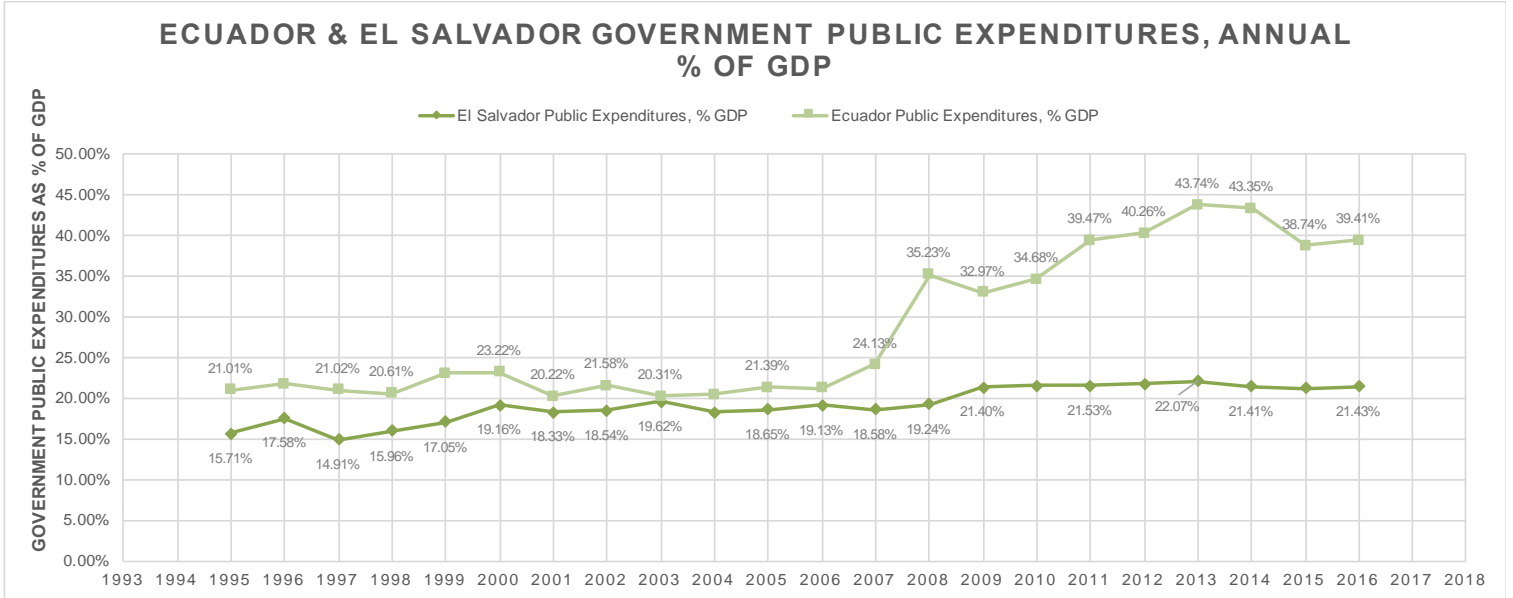
**Figure 3: Ecuadorean Government Public Expenditures Per Capita, Annual USD**



**Figure 4: Salvadorian Government Public Expenditures, Annual, % of GDP**



**Figure 5: Ecuador & El Salvador Government Public Expenditures, Annual, % GDP**



## Appendix A: Ecuador: Additional Comparison of Means Calculations

ECUADOR: ADDITIONAL COMPARISON OF MEANS CALCULATIONS						
Variable	Description	Interval & Frequency	n	Source	t-Score	Significant?
<b>Deposit Rate</b>	Rate paid by commercial banks for demand, time, or savings deposits.	1992 Q1 - 2007 Q4	63	IFS	<b>13.522</b>	Yes
<b>Lending Rate</b>	Other depository corporations rate that meets the short-term and medium-term financing needs of the private sector	1992 Q1 - 2008 Q2	65	IFS	<b>13.272</b>	Yes
<b>Government Consumption</b>	Expenditure of central government, nominal, domestic currency	1992 Q1 - 2008 Q4	67	IFS	<b>-8.259</b>	Yes
<b>Current Account (G&amp;S)</b>	Sum of a nation's balance of trade, net income from abroad, and net current transfers.	1993 Q1 - 2007 Q4	59	IFS	<b>0.77479</b>	No
<b>Exports</b>	Value of goods exported from nation, in USD.	1992 Q1 - 2008 Q4	67	IFS	<b>0.628</b>	No
<b>Imports</b>	Value of goods imported to the nation, in USD.	1992 Q1 - 2008 Q4	67	IFS	<b>0.466</b>	No
<b>Trade Balance</b>	Value of exports-imports, in USD.	1992 Q1 - 2008 Q4	67	IFS	<b>1.25</b>	No
<b>Gross Fixed Capital Consumption (GFCF)</b>	Net increase in physical assets within the measurement period.	1992Q1 - 2008 Q4	67	IFS	<b>-9.031</b>	Yes
<b>Degree of Openness</b>	X+M/(GDP)	1991Q4-2008Q4	68	IFS	<b>2.428</b>	No

## Appendix B: El Salvador: Additional Comparison of Means Calculations

EL SALVADOR: ADDITIONAL COMPARISON OF MEANS CALCULATIONS						
Variable	Description	Interval & Frequency	n	Source	t-Score	Significant?
<b>Government Liabilities</b>	Aggregate value of debt securities issued by government.	1992 Q1 - 2008 Q4	67	IFS	<b>1.647</b>	No
<b>Cash Inflow from Operations Activities</b>	Amount of money brought in by government from ongoing, regular activities.	1992 Q1 - 2008 Q4	67	IFS	<b>0.839</b>	No
<b>Exports</b>	Value of goods exported from nation, in USD.	1992 Q1 - 2008 Q4	67	IFS	<b>-11.173</b>	Yes
<b>Imports</b>	Value of goods imported to the nation, in USD.	1992 Q1 - 2008 Q4	67	IFS	<b>-12.174</b>	Yes
<b>Trade Balance</b>	Value of exports-imports, in USD.	1992 Q1 - 2008 Q4	67	IFS	<b>10.875</b>	Yes

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