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Dollarization and Banking Stability in Ecuador

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Dollarization and Banking Stability in Ecuador

An Econometric and Theoretical Analysis

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Abstract

This thesis examines the relationship between dollarization and banking stability in Ecuador. Through an econometric analysis I find that the main variables that affect banking stability in Ecuador are GDP, liquidity, financial efficiency, the proportion of productive assets, the percentage of past-due loans, the ratio between total assets and total liabilities, and the degree of concentration of the banking sector. All these variables have improved in the past decade thus strengthening banking stability. Furthermore, the four main effects of dollarization on a small, open, and developing economy include: i) the statistically significant decrease in inflation, ii) the removal of the figure of the lender of last resort, iii) the removal of currency risk, and iv) the increased credibility of regulatory institutions. These positive effects are proven to have a direct connection to independent variables, and thus on financial stability.

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Introduction

By the end of the 1990s, the world had reached an unprecedented level of financial integration. World stock exchanges were interconnected to the point that, with one click, a broker in England could buy a share of an American company listed in the New York Stock Exchange. But the financial integration was not only prevalent among industrialized countries. Investing in emerging markets became popular in order to maximize gains and minimize risk through portfolio diversification. It all seemed to be going well with the birth of powerful emerging actors such as Thailand and Brazil, but most importantly, China.

It was then that the world realized that financial systems integration also meant an increased risk of contagion. This was clearly demonstrated by the fact that the effects of the Thai baht crisis were not limited to Thailand. Upon the collapse of the Thai economy in 1997, investors from all over the world fled both Asian markets and all emerging markets, intensifying the downfall of affected economies (Krugman, 2009). Facing high risk, investors restricted loans to emerging economies. In 1997, the Asian financial crisis became endemic and economies were highly set back in their growth.

The contagion of the Thai baht crisis led to severe financial and banking crises in Latin America (Krugman, 2009). It led, for example, to the collapse of the Brazilian, Argentinean, Mexican, and Ecuadorean economies. With the collapse, these countries were left in a state of economic distress. This is why countries in emerging markets started thinking of new policies and interventions that fitted their particular needs.

In Ecuador in particular, the banking sector had been deteriorating for the past twenty years (Jácome, 2003). The contagion effect pushed the banking sector into a full-

fledged crisis. Before the year 2000, banks were overexposed and undercapitalized and could not meet their commitments. Inflation ran rampant and the government tried to alleviate the problem by printing even more money causing the sucre to depreciate. This development further undermined banks, as most of the loans made in the country were denominated in dollars. Several banks went under, including the largest one, *Filanbanco*. The government was forced to freeze the banks' assets in order to prevent a run on the banks and a widespread contagion effect (Jácome, 2003). These conditions brought about the collapse of the sucre, which then forced Ecuador's President, Jamil Mahuad, to adopt the dollar as legal tender.

The purpose of this paper is twofold. The first goal is to explore how the stability of the Ecuadorean banking system has changed in the past decade, and to explain the causes of the change. Its second goal is to understand the effect of dollarization on the stability of the system. To answer these questions, I develop a model of banking stability that I estimate for the years 2000 to 2011. The econometric analysis shows that the banking system has in fact become more stable in the past decade and, coupled with a theoretical analysis, it shows that dollarization is the underlying reason for the improved financial stability in Ecuador.

My research contributes to the literature by submitting a case-study that focuses on the stability of the banking system of Ecuador. It is exactly the type of analysis that economists suggest in order to properly understand policy implications of drastic measures, such as dollarization, to minimize the negative unexpected consequences of said interventions. Furthermore, it is an important first step to understand how dollarization affects the banking sector in particular.

Chapter one is a brief overview of the literature on the main effects of dollarization and determinants of financial stability. While there is abundant literature on both topics, their relationship has been less analyzed. Most of the literature on dollarization was written at the beginning of the 21st century and there are not sufficient case studies of small, dollarized economies such as Ecuador.

Chapter two summarizes Ecuador's economic history from its independence from Spain until the financial crisis of the late 1990s. It focuses on three economic periods, each defined by the main export commodity of the time: the cocoa bean from early republican times until the 1920s, followed by bananas (of which Ecuador is still the world's largest exporter) until the late 1960s, and oil since the 1970s when it was first produced. In addition, I analyze the "lost decade" of the 1980s, and the turmoil of the 1990s that led to the dollarization process in early 2000.

Chapter three presents the model that helps me develop my work. The model was proposed in a thesis written by Luisa Ericka Pérez Hernández (2009). Her model attempts to answer the question on whether more stability or more fragility is brought about by an increased concentration of the banking system in the Dominican Republic. Using this model as a starting point, I redefine a few relationships, definitions, and scope of the estimations, and I estimate the overall stability of the entire banking system in Ecuador. In contrast to Pérez Hernández's model, I include aggregate data from all banks rather than focusing on selected banks. In addition, the definitions of certain variables were amended trying as best as possible not to alter their meaning. Also, in order to simplify the model, this study is a time-series analysis rather than a cross-sectional analysis of all banks operating in Ecuador's financial system in the time period between 2000 and 2011.

Chapter four presents the results and estimations of the model. It is important to note that the biggest hurdle in the construction of the model was the large serial autocorrelation of the dependent variables. To address this shortcoming, I used the Cochrane-Orcutt method of estimation to run the regressions. With this method, it is clear that the results are very significant and relevant for the Ecuadorean financial system.

In chapter five, I engage in a theoretical analysis of how dollarization affects both the system wide financial stability of Ecuador and the stability of the Ecuadorean market for credits. This establishes a theoretical connection between the dollarization process and the stability of the financial system. I had to do this because I could not find information of the period before dollarization in Ecuador. This meant that I was not able to conduct an empirical analysis on how dollarization has affected the financial system. I conclude the chapter with a brief discussion on what other variables, such as the oil price, may have affected the banking system in this particular period of time.

I close my analysis with a short summary of findings, explain why they are relevant, and forward suggestions on how my analysis could be improved. I also discuss recommendations for Ecuador and other countries that might consider dollarization in the future.

Chapter 1- Review of the Literature

The topic of dollarization was popular at the end of the 1990s and early 2000s when several economists advocated that emerging countries should adopt a foreign currency in order to stabilize their economies. The main argument in favor of dollarization is the immediate price stability and trust in the economy that the adoption of the US dollar as legal tender will bring, particularly if the value of the domestic currency is in jeopardy.

In the article "Strict Dollarization and Economic Performance" Sebastian Edwards and I. Igal Magendzo note, "the probability of being a dollarized country depends on regional, geographical, political and structural variables" (Edwards & Magendzo, 2003). Kenneth P. Jameson in his article "Dollarization: Wave of the Future or Flight to the Past" further argues that dollarization, without being imposed by external actors, is likely to occur under three circumstances. First, dollars to the domestic economy must be available in large quantities. Second, domestic instability must affect the functioning of the financial system and the confidence of domestic actors. Third, there has to be an important dollarized sector of the economy (Jameson, 2001).

In their article "Dollarization, Bailouts, and the Stability of the Banking System," Douglas Gale and Xavier Vives also suggest that, in order for dollarization to be beneficial for countries, it has to meet four main characteristics. First, the costs of liquidating projects for banks have to be relatively small. Second, the monitoring effort of bankers is important in improving the returns of the banks. Third, the costs of establishing a reputation for the Central Bank must be deemed high. And fourth, moral hazard cannot be too extreme in order for dollarization to be effective (Gale &Vives,

2002). Jameson further argues that dollarization is nearly irreversible and that four additional criteria need to be met for it to be beneficial. These criteria are: economies should be tightly integrated and should experience similar shocks; the adopting country is small, open, and its prices are largely set in dollars; the adopting market has flexible labor markets that can adjust to shocks; and finally the adopting country's Central Bank has low credibility in undertaking stable policy. The author later analyzes the case study of Ecuador and claims that in this case dollarization was the only alternative (Jameson, 2001).

Douglas Gale and Xavier Vives also list a set of benefits and costs associated with dollarization. They claim that an economy benefits from dollarization because it "reduces the transaction costs of trade, and if the country adopts a stable currency it commits to a stable monetary policy." The authors point out that dollarization "has the potential cost of abandoning monetary policy and the exchange rate as policy instruments and compromising the capacity to bail out the domestic banking system." They claim this is dangerous because the banking crises can be very damaging as a bailout often costs up to 20 percent of a country's GDP (Gale & Vives, 2002).

Sebastian Edwards disputes the idea proposed by many economists that dollarization is the best scenario for developing nations in his article "Dollarization and Economic Performance." Like Gale and Vives, Edwards agrees that a more careful analysis is needed in order to decide whether a dollarization process is beneficial or detrimental for an economy. Edwards concludes that the dollarization by itself does not reduce risk; to be effective it has to be accompanied by other policies and/or events that increase the stability of the system. He also claims that because the exchange rate is

fixed, countries cannot adapt to external shocks, and that the Central Bank loses the ability to print money. This signifies the loss of seignorage - the profit Central Banks gain when printing money (Edwards, 2001).

Sofia Castillo (2006) disagrees with the abovementioned statements of Edwards and Magendzo. She claims that increased dollarization (financial) is positively associated with economic growth. She also states that the process has a stronger impact on inflation than on any other variables. Furthermore, Castillo argues that dollarizing the economy helps attract foreign direct investment, lowers interest rates, and makes trade easier, especially for smaller countries in Latin America that trade predominantly with the United States (Castillo, 2006).

Castillo also presents the view that dollarizing the economies is the only way to achieve economic stability in Latin America. According to her "multivariate econometric analysis," dollarization has brought greater economic stability and economic progress to Latin America. She ends her analysis by listing the negative effects: the loss of monetary policy and the decline of the national identity represented by the national currency (Castillo, 2006).

Roberto Chang and Andrés Velasco claim in their article "Dollarization: Analytical Issues" that the costs of dollarization are due both to the fixity of exchange rates and the loss of seignorage. The benefits are the amelioration of time-inconsistency problems and the increasing of credibility of regulatory institutions; meaning that trust and credibility are built on the Central Bank and other regulatory institutions. The implication, then, is that the loss of seignorage can only be "unambiguously interpreted as real losses to the economy if policy credibility problems are assumed away." They

argue that currencies are national symbols that would be costly to get rid of due to the sense of pride that a country's citizens invest in them (Chang &Velasco, 2001).

Edwards and Magendzo summarize the debate and note that those in favor of dollarization claim that it will result in lower inflation, lower interest rates, higher investment, and faster growth. They note that those opposed to dollarization assert that it will result in difficulties accommodating external shocks including terms of trade and world interest rate disturbances. Finally, Edwards and Magendzo conclude that other economists simply state that the exchange rate does not affect growth but rather that growth is determined by other variables (Edwards & Magendzo, 2003).

Perhaps one of the most disputed topics within the debate of dollarization is the effect of the loss of a Lender of Last Resort (LOLR). Gale and Vives discuss how bank bailouts might not always be beneficial and they provide the following four main reasons:

1. The threat of bankruptcy and loss of private benefits can motivate managers to exert effort and improve the performance of the firm.
2. The possibility of a bailout reduces this incentive effect and indirectly encourages managerial shirking and risk taking.
3. In emerging markets, moral hazard problems are widespread, and the economy relies in an important way on the monitoring effort of bankers who provide finance to entrepreneurial projects.
4. A time-consistent policy by the Central Bank may lead to excessive bailouts. Anticipating this lack of financial discipline, bankers will not make sufficient effort to screen and monitor projects. The result will be excessive financing of inferior projects, inadequate monitoring, and poor project performance.

Thus, dollarization represents a commitment by the Central Bank to a limited use of the Lender of Last Resort (LOLR) and of Central Bank independence. Furthermore, the perceptions of a market-default diminished when dollarization was implemented possibly indicating that "banks were market-disciplined and responded to increases in risk perception by being more prudent" (Gale & Vives, 2002).

One of the main questions Barry Eichengreen poses in his paper "What Problems can Dollarization solve?" is whether dollarization is more likely to speed up or slow down economic and financial reform. He states that there are two versions to the argument. The first one says that dollarization will compel bank owner-managers to acknowledge that they are no longer protected by the financial safety net. The other argument is that dollarization enhances financial stability by promoting the development of domestic financial markets. This enhancement is mainly achieved through the disappearance of currency risk associated with smaller, more volatile currencies (Eichengreen, 2001).

In addition to the theory mentioned above, economists have conducted empirical analyses and shown differing results. Gale and Vives end their analysis with a set of empirical results for countries that have adopted the dollar (or other important currencies) as their legal tender. Regarding Ecuador in particular, they claim that dollarization could be advantageous, as it fits the characteristics mentioned above. They do note, however, that their article should only be used as a starting point for policy implementation and that a more thorough analysis of individual case studies is needed to make a final decision (Gale &Vives, 2002).

Edwards also conducts an empirical analysis of whether dollarization has helped countries that have adopted it. He states that "when compared to other countries, the dollarized nations have had a significantly lower inflation" as well as a "significantly lower growth rate of GDP per capita." He states that these countries have had a similar fiscal record, have not been spared from major current account reversals, and that the costs of external shocks are higher in terms of investment and growth (Edwards, 2001).

A critical aspect to consider is Edwards's and Magendzo's finding that "GDP per capita growth has not been statistically different in dollarized and in non-dollarized ones but volatility has been significantly higher in dollarized than in non-dollarized economies." They also reiterate the idea presented in the other articles that inflation is significantly lower in dollarized countries (Edwards & Magendzo, 2003).

In terms of financial stability, Luisa Erika Pérez Hernández (2009) presents an analysis of two models that are intended to measure the stability of the banking system of the Dominican Republic. She specifies two dependent variables; one refers to the system wide stability, and the other to credit risk. Both models have the same seven independent variables. It is important to note, however, that the main purpose of her analysis is to show the relationship between concentration and stability of the banking system as well as the shape of this relationship (Pérez Hernández, 2009).

To summarize, economists agree that dollarization brings about lower rates of inflation and an increase in stability of the country. They also agree that the credibility of regulatory institutions is enhanced and that the currency risk disappears along with the currency itself. They also agree that with the loss of monetary policy and the national currency countries lose a measure of sovereignty that might affect the country both

economically and politically. The matter is not so clear in terms of macroeconomic growth. Economists disagree on whether more growth is achieved or if there is no difference. They also disagree on how growth volatility is affected. Surprisingly, there is no focus on specific sectors of the economies that might help answer some of these questions.

My present paper adds to the literature an important case-specific econometric analysis that explains the banking stability of Ecuador. I link the stability of the banking system to dollarization both directly and indirectly, in order to understand how dollarization has affected the evolution of banking. My hypothesis is that gains in greater strength and efficiency of the banking sector- in any country that dollarizes- may more than outweigh the costs of seignorage loss and limited opportunity for LOLR by the Central Bank.

Chapter 2: Economic History of Ecuador

The economic history of Ecuador between the 19th and the late 20th centuries is not a happy one. It is marked by short periods of bonanza based on the exports of a single commodity, followed by a large and detrimental crisis with the deterioration of the terms of trade and loss of market share. This cycle between economic prosperity and crisis has led to widespread political instability and political tensions between the two most powerful economic regions within the country, coupled with growth volatility.

There are three major economic periods in the history of Ecuador: the cocoa period, when Ecuador clearly distinguished itself as the main producer and exporter of the good for international markets; the export of bananas and Import Substitution Industrialization (ISI) policies; and the extraction and sale of crude oil since the early 1970s . Each period is followed by long crises defined by the fall in price of the product, the increase in competition, and vulnerability to the competition and volatility of international markets. In the following sections, I analyze each of these periods in addition to the effects said period had on the politics and distribution of power within the country. Next, I address the lost decade and the crisis of the late 1990s, since these were of particular significance for the dollarization process and the evolution of the banking system in the country.

The Cocoa Period: Beginning of the Natural Resource Curse in Ecuador

After achieving political independence, Ecuador's economy was based primarily on agriculture. Most of the economic activities performed in the country were grounded in the "*hacienda*" system of exploitation, where the land was distributed in large

latifundia among the elites. Paul Henderson quotes Ivar Erneholm, author of the book *Cocoa production of South America* when he notes that, "seldom has a single product for such a long time dominated the economic life of a country as did cocoa in Ecuador" (Henderson, 1997). Production of cocoa in the coast started in the 1830s, and immediately became the major source of income for the country. Because of its regional production, it set the economic regional elites of the coast against the political and economic elites of the highlands. During the late 19th century and beginning of the 20th century, the market for the good was flooded with a large increase in competition from other regions of the world. This international development plunged Ecuador into an economic crisis and recession that lasted until the onset of the Great Depression in the United States.

The Cocoa Bonanza

During the mid 19th century, Ecuador was able to establish itself as the major producer of cocoa in the world, which allowed for a period of economic growth and prosperity. Indeed, international observers were optimistic about Ecuador's future performance due to its large market share of this product (Henderson, 1997).

The cocoa trade expansion ensued during the decades between 1870 and 1910. In England, demand and consumption of cocoa increased eightfold despite the rise in prices, as the then new beverage, hot chocolate, became very popular (Henderson, pg. 171). Exports of cocoa rose from 8,380 kilos in 1860 to 18,120 kilos in 1880 and 36,305 kilos in 1910. In this period, the production expansion was attributed not only to land redistribution and more effective agricultural practices, but also to the claiming of previously unused territories in the Ecuadorean lowlands by large families. In fact,

around 70 percent of the cocoa producing land in the coast belonged to between 10 and 20 families (Henderson, pg. 174).

Labor force exploitation was also predominant during this period. Most of the labor employed both in the production of cocoa beans in the coast and other agricultural products in the north, was based on a semi-servile system and semi-waged labor force. In exchange for small parcels of land, workers were required to work for the large estate holders. They were not paid salaries and had no benefits. Furthermore, workers were tied to the lands they worked on by a system referred to in Ecuador as "concertaje." With this system, inherited from colonial times, the landowner elites granted loans to their serfs that were very difficult (if not impossible) to repay. Debt repayment forced workers and their families to be tied down to the estate, because if the original debtor could not pay, their children and family members inherited the land, along with their obligations. The one big change that occurred during the cocoa economy was the introduction of seasonal waged labor. During harvesting times, some workers were given wages in order to supply all the labor required to gather the crops. This, however, was an insignificant percentage of the labor force, as the labor environment remained mainly an adaptation to the feudal system seen in the centuries before.

The Decline in the Cocoa Trade and the Collapse of the Economy

Up until the 1920s, cocoa exports represented a large amount of the Ecuadorean GDP, and then the economy began to suffer. As all single-export commodity oriented economies, Ecuador was hit by a crisis in its cocoa industry. Several factors contributed to its decline: exogenous factors such as the increase in international competition, internal

collapse of the political system, and irresponsible use of the revenues by the controlling elites.

During the early 20th century, Ecuador's cocoa trade took a turn for the worse. With increased competition coming from African countries and Brazil, Ecuador saw a large decrease in its market share for cocoa production. This development was later accentuated by the fall of demand due to the Great Depression. Before 1910, exports of cocoa from Ecuador accounted for well over 20 percent of world production. In 1914, even though Ecuador saw a particularly high harvest, its market share accounted for only 15.3 percent of world production (Henderson, 1997). Large plagues hit the Ecuadorean crops during the post WWI period. The diseases Witches' Broom and Monilia Pot Rod largely decimated crops in Ecuador and created large losses for the exporting elites (Henderson, 1997). World over-production of cocoa drove the price down which accounted for large losses for the economy.

Use of cocoa revenue by the elite was a major factor in the failure of the exporting cocoa boom because they failed to reinvest it in the local economy and squandered it abroad instead. During the boom, several of the most prominent exporter families chose to reside outside of Ecuador, predominantly in Paris. This practice was so prevalent that, between 1900-1913, almost 20 percent of export income was transferred to family members who lived abroad (Larrea and North, 1997). The economic elites did not invest in Ecuador; rather, they preferred to buy imported non-essential goods. This large increase in imports destroyed national enterprises, which led to a failure of the economy to diversify and accentuated the dependence on cocoa for its survival.

The fall in the cocoa economy left a large vacuum in Ecuador and the economy did not recover until the 1940's when the increase in banana production replaced that of the cocoa bean. During the time of the cocoa trade, the economy clearly did not diversify and relied on a single crop that was easy to produce and transport with little backward and forward linkages. Even though cocoa production lost all of its significance and the bankruptcy of several of the largest producers led to the abandonment of large estates, the economic core of this elite survived to recover its economic power. The old elite, along with some new members, started the production of bananas after World War II (WWII).

Ecuador after World War II: The Banana Republic

Even today, Ecuador is known as a predominant example of a banana republic. The country is still the largest exporter of bananas in the world and despite its diminished importance, bananas still constitutes the largest agricultural export of Ecuador. In 1948, after World War II, the economic elite of the coast reengaged in significant banana production. Cooperation between multinational corporations and the Ecuadorean government created a partnership for a new stage of economic growth. The economy finally showed some signs of economic and structural reform, both in the export and internal sectors of production. Unlike cocoa, banana production revolutionized how the economy functioned because large revenues allowed the country to implement ISI. The banana boom only lost its momentum with the emergence of the oil sector in the early 70s.

The Banana Boom

After two decades of economic stagnation, the Ecuadorean economy finally showed some signs of recovery in the 1950's due to the export of bananas. This commodity was vastly different from cocoa and allowed diversification and industrialization. Banana production replaced the old system of haciendas with a system of plantations, and most of the production came from small to mid-sized plantations that were primarily nationally owned.

The banana production industry differs from the cocoa industry because it is labor intensive and works mostly with paid workers. Rafael Correa, an economist and current constitutional President of Ecuador, claims that this was one of the main milestones achieved by the banana bonanza (SOURCE?). Prior to it, the wage-labor in the country was negligible. In the period after WWII, a massive migratory movement from the Ecuadorean highlands, where the system of "concertaje" was in place, to the coastlands took place. Here, the demand for labor was immense and owners used wages as an incentive for workers. This migratory movement also reflected the high unemployment in the aftermath of the fall of the cocoa trade and the opportunities that banana production offered. The government, whose interests lay with the large producers of bananas, backed the shift in employer-worker relations. It promoted large programs of development of previously unoccupied and therefore unproductive territories. This meant that the banana sector encouraged the appearance of a sizable rural middle class in parts of the export zone (Correa, 2008).

The result of this shift was not only a more mobile labor class, but also large degrees of urbanization. With the elimination of the hacienda system through a reform,

the labor force that was once tied down to large estates could now move freely. This meant that a large amount of previously unemployed or underemployed individuals moved to large cities, mainly Quito and Guayaquil.

Another important shift in Ecuador's economy during the banana period was that banana production, as opposed to cocoa production, required large amounts of investments in infrastructure, telecommunications, and commercialization. The government owned stakes in the production of bananas and facilitated trade with other countries. The boom, therefore, allowed Ecuador to engage in several industries that were previously neglected. Larrea and North (1997) claim that tax revenue derived from the substantially increased import capacity generated by the new export boom facilitated modernization of public institutions as well as the expansion of public investment not only in infrastructure but also in promotional activities (Larrea and North, 1997).

The government of Ecuador decided to follow the current economic trend in Latin America and began to implement ISI. The economic surplus created by the banana trade provided the economy with the first opportunity to engage in such policies. While the extent to which the policies implemented can truly be defined as ISI is debated, it is clear that the government incentivized local production in order to encourage industrialization. International institutions such as the United Nations directly supported ISI. In fact, in 1954 Raúl Prebisch addressed the organism and presented his report entitled "The Economic Development of Ecuador" in which he emphasized the importance and urgency of implementation of ISI policies in the country (Correa, 2008). That same year in May, the "Junta de Planificación" was created. This organism had the mandate to

foment ISI. The ISI model of economic development, however, had its main impacts in the following decade during the oil boom.

The Decline of the Banana Trade

Even though Ecuador is still the largest banana exporter in the world, the staple has lost relative importance in the local market for several reasons. First, the discovery of oil in the mid 1960s, and its production starting in 1972, led the commodity to become second in importance to government and international investors. Also, important technological advances in the 1960s had detrimental effects on the banana production labor force. In fact, in one coastal province alone, the labor force decreased from 90,000 to 55,000 workers from 1965 to 1976 and to 36,500 workers in 1983. This led to higher unemployment, urbanization, and growth of the informal sector as the large amount of unemployed workers moved to large urban centers.

Wages decreased as unemployment was rampant. Economies of scale of new technological processes meant that the banana plantations would only achieve this efficiency with large plantations similar to those seen in the cocoa boom. In fact, there was a large drive both from multinational corporations operating in Ecuador and the government itself to centralize the production of bananas in a small number of firms in order to increase productivity. Thus as the 1960s and 1970s unfolded, banana production was centralized into four larger producers (one owned by the state and the other three by foreign investors). This meant that previously large number of small to midsized firms lost considerable market share and these firms were driven out of business, so banana production ceased to play a central role before the 1970s.

The Oil Boom: Ecuador's Future Redefined

During the mid-1960s, large oil fields were discovered beneath the Amazon rain forest. This represented the single most important discovery in Ecuadorean economic history and it shaped how Ecuador approached the world. It redefined Ecuador from an agricultural exporter of bananas into an economy focused largely on crude oil extraction. In fact, Ecuador became a member of the Organization of Oil Producing Countries (OPEC). The economic model for Ecuador, however, remained one based on the export of one primary commodity, though revenues from oil led Ecuador into a period of unprecedented growth, industrialization, and development.

The Oil Boom

During the 1960s, when banana exports were significantly changing with the increase of technology and formation of large estates, the oil discovery marked the beginning of a new economic period. ISI policies that started during the banana boom were further accentuated with the massive inflows of petrodollars to the economy. The large oil sector expansion allowed for massive amounts of foreign direct investments (FDI) as well as large loans to the government.

One of the most notable effects of the sudden oil extraction surge was the substantial increase in living standards. “Ecuador grew 14 percent in 1972, 25 percent in 1973, and 8 percent on average between 1971 through 1981 which meant that GDP more than duplicated in these ten years” (Correa, 2008). This unprecedented expansion led to large increases in population, urbanization, and population wellbeing. GDP per capita grew by 72 percent due to the oil boom during this period (Correa, 2008). Illiteracy fell

from 23.7 percent of the population in 1974 to 14.8 percent in 1982 (North and Larrea, 1997). In terms of urbanization, Correa states "in 1965, 65 percent of the labor force was rural whereas in 1982 this number dropped to 48 percent. This means that urban labor force grew by 137 percent in 20 years" (Correa, 2008). All these indicators show that the Ecuadorean society was revolutionized with the exports of oil.

ISI measures first implemented during the banana era were expanded. Correa (2008) states that industrial exports grew 28 percent per year in the 1970s due to economic reforms going from 29 to 490 million dollars. This large industrialization push was managed not only through the promotion of national industries but also through a large increase in the net amount of industrial imports. Imports increased from 181 to 1.318 billion dollars during this period. Thus, despite significant growth of industrial exports, industrial imports increased almost tenfold causing a large non-oil current account deficit accentuating the reliance on revenue gained from oil in order to maintain a stable government balance (Henderson, 1997)

The Impacts of the Oil Boom

As mentioned above, the reliance on oil for growth meant that the amount of imports dramatically increased. As the economy became increasingly reliant on international markets for oil, it also needed the high crude oil prices brought about by the oil shocks. The large amount of capital required for oil extraction led the government to engage in heavy borrowing, which later led to the debt crisis of 1983. Also, the large levels of urbanization promoted by the oil boom meant that there were not enough workers in the agricultural areas of the country and too many unemployed workers

settling in the city, which was detrimental for both urban and rural societies alike. Lastly, Ecuador is a clear example of the Dutch disease in action. When the price of oil fell, the fundamental weaknesses of the country's economy were evident.

Policies intended to promote ISI were also unable to create their expected economic growth due to the large amount of imports promoted by the large revenues of oil exports. It is ironic that during a period that was supposedly dedicated to the promotion of national production and industrial development, industrial imports increased more than sevenfold (Correa, 2008). This caused a complete lack of vertical integration between the different companies of the country. Production of one good was still dependent on the exchange rate, as the raw materials needed to expand, or even continue production, were imported and thus, the country's industrial production varied when the exchange rate varied. This is why economists that focus on Ecuador claim that ISI was not viable.

The Lost Decade of Latin America: The Tragic Example of Ecuador

When Mexico defaulted on its loans in 1982, most Latin American countries found themselves facing a precarious future. In Ecuador, the government's capacity to borrow from international capital markets diminished, the internal banking system was highly indebted and about to collapse, and a number of external factors were affecting the country's exports. These developments led to large social and political unrest, as well as an economic recession.

A variety of factors affected the government's capacity to borrow during the 1970s and the 1980s. First, there was a large increase in liquidity in international markets, which led international banks and creditors to consider developing regions as potential markets for their investments and loans. Interest rates charged to developing countries were low, which lowered the cost of borrowing money. In theory, international banks wanted to maximize their returns through investing in high yield development programs in Latin America. They also had to find a market for their extra cash in order to offer the returns they promised their clients. In Ecuador, this meant that loans owned by international banks and financial institutions grew from 82 billion dollars to 440 billion dollars.

The largest growth period in public debt in Ecuador started in 1976. Public debt went from 229 million dollars in 1970 to 4.416 billion dollars in 1981. This change translated into a very large increase in government spending. In fact, Correa calculates that public spending grew threefold during this period (Correa, 2008). As a percentage of GDP, this change translated into an increase from 12 to 16 percent of GDP, causing private investments to drop to only 6 percent of GDP. Due to the large availability of funds, most of the loans were contracted at flexible interest rates within the range of 4 to 6 percent, but were subject to revision. Thus, when the Mexican government defaulted on their loans and banks lost confidence in emerging markets, loan interest rates contracted by Ecuador went up to 20 percent. These loans were virtually impossible to pay. The government used the price of oil as backup in order to contract more loans. During the 1970s, the nominal price of oil reached levels above the US $40 per barrel mark. After

the oil booms and with the reentry of countries that had not been producing during the last decade into the market, the price collapsed to below US $15 per barrel in 1983. With the increase in the interest rates and the decrease of revenues of oil (which accounted for at least 50 percent of GDP at the time) Ecuador found itself in a highly detrimental debt trap (Correa, 2008).

Most of the Ecuadorean debt contracted from 1976 onwards was public, but the private sector also assumed large debts. Since the year 1976, private debt went from 57 million dollars to 1.452 billion dollars in 1981. The government sponsored substantial portions of this massive increase in debt in order to implement ISI. When the oil price fell, the Ecuadorean government was no longer able to maintain the exchange rate that it had previously stabilized after the rise in oil price. When this change ensued, the exchange rate grew from 25 sucres to US$1 in 1979 to 42 sucres to US$1 in 1983, almost doubling the amount national private debtors had to pay: debts had been contracted in dollars but firms earned in sucres. The exchange rate entered a downward spiral and, by the beginning of the 1990's, it stood at 800 sucres per US$1. This measurable drop drove the government to take extreme and, perhaps, mistaken policies that would generate further indebtedness of the public sector (Correa, 2008).

Ecuador through the "Lost Decade"

After the collapse generated by the debt crisis in 1983, Ecuador faced a period of stagnation and economic hardship. During the 1980s Ecuador saw its economy shrink, its political institutions weaken, and its banking sector in need of a bailout. To make matters worse, the winter of 1983 disrupted exports of agricultural products from the coast

(bananas, shrimp, etc.), and the earthquake in 1987 broke the pipeline through which most of the oil extracted from the Amazon was transported to the coast to be shipped. Both disasters caused huge losses in the country's export capacity.

The debt crisis' most critical effect was on the country's standard of living. Between 1981-1990, the GDP grew only 18 percent, so GDP per capita decreased by 5.67 percent annually back to mid-1970's levels (Correa 2008). The 1990 minimum wage was only 41 percent of that in 1981. The industrial sector was also affected; during this decade, industrial GDP decreased by 3.78 percent and industrial exports were lower in 1990 than in 1978 (Correa, 2008).

As the sucre depreciated and interest rates on loans contracted, the oil boom continued, while the debt held by private institutions (mainly banks) reached such high levels that it threatened the entire financial system. The government of Osvaldo Hurtado adopted what it became known as the Sucretización of private external debt. The government assumed responsibility for the dollar debts of the private sector, which amounted to 1.476 billion dollars, and allowed the private institutions to pay the government back in sucres. This move helped banks and financial companies, for it prevented the continuing depreciation of the exchange rate to increase their private debt. In addition, the government froze what interest rates companies had to pay at 16 percent when the international interest rates surpassed 28 percent, and extended the period companies had to pay their loans from three years to seven years. External debt increased from around $4 billion in 1981 to upwards of $12 billion by 1990 due to refinancing and capitalization of interests that were late. These measures helped limit the extent to which

investments fell, which ultimately proved to be only 14 percent of GDP, of which only 3 percent was public investment (Correa, 2008).

The Decade of 1990 and the Financial Crisis

After the disappointment and hardships of the lost decade, world-renowned economists backed by the IMF and the World Bank suggested a set of policies of economic liberalization, commonly referred to as the Washington Consensus. Once again, Ecuador was fully committed to implement the reforms and liberalized its economy extensively during the presidency of Sixto Durán Ballén (1992-1996). Durán Ballén restructured the state-owned oil producing companies, granted more independence to the Central Bank, forbade the funding of financial expenditure with its funds, privatized the previously state-owned electric and telecommunications industries, and deregulated the banking and financial systems (Jácome, 2004).

As in earlier periods, external factors affected extensively Ecuador's development. In 1995, Ecuador engaged in a military conflict with neighboring Peru. Due to fear of inflationary and contractionary forces, the clash incited the fleeing from the country of large amounts of capital. As if to make matters worse, El Niño, a meteorological phenomenon, hit Ecuador in early 1990s, impacting greatly agricultural productivity and the price of oil per barrel. The dual downturn engendered a large reduction of export revenues. Lastly, the Asian financial crisis, which started in 1997, brought about renewed investor uncertainty with regards to emerging markets. All of this combined led to a period of instability in the financial sector (Jácome, 2004).

The deregulation of the banking and financial system designed to address the crisis created internal problems in the banks. It brought about the deterioration of balance sheets, a lack of reserves and therefore liquidity, and the default of risky and bad credits. In order to avoid the collapse of these private institutions, the Central Bank, in conjunction with the government, created an agency for the guarantee of deposits (AGD). With AGD in place, 100 percent of deposits were held in banks with no limit in the nominal value, as it is customarily done in most countries (Correa, 2008). And yet, a measure that was intended to stabilize the financial system led to renewed problems of moral hazard and an increase in the approval of risky loans. With the government serving as the ultimate guarantor responsible for all deposits made to the banking system, whenever a debtor defaulted on its loans, the government would reimburse the bank for its original investments in the form of client deposits (Jácome, 2004).

The only way the government could control the financial crisis was through the use of monetary policy, which it used in a very irresponsible manner. It printed large amounts of sucres in order to counter the lack of liquidity faced by banks. In 1998, the monetary base increased by 41 percent and 136 percent during the following year. This measure led to high levels of inflation, which in turn affected the exchange rate. The average Consumer Price Index went from 23 percent in 1995 to 52 percent in 1999 and 96 percent in 2000 (Jácome, 2004). These increases, combined with negative expectations of investors and the newly adopted floating exchange rate regime (as the crawling peg could no longer be sustained), led to a large and rapid depreciation of the exchange rate. It went from 800 sucres per dollar in 1990 to around 2,565 sucres per dollar in 1995, and to a shocking 11,787 sucres per dollar in 1999. From then to the

moment dollarization was put in place in January 2000, the price of the US dollar in terms of sucres soared up to 25,000 sucres per dollar, at which the country's government set a cap and adopted the dollar as the legal tender in Ecuador (Jácome, 2004).

Another factor that made the crisis even worse was the application of a tax of 1 percent to all capital movements, no matter their size. This action was combined with an income tax elimination, which was said to put a burden on people that could not afford payment. As a result, people withdrew as much cash as they could in order to use it and not be taxed. The resulting run on the banks had large inflationary consequences on everybody throughout Ecuador. This tax had to be revoked in 2000, when those in power realized that it was unsustainable and detrimental for the economy Furthermore, to prevent the collapse of banks, the government froze assets held as deposits by their customers. This action brought renewed social unrest from people demanding access to their funds. The government froze the assets when the exchange rate was 10,350 sucres per dollar, and unfroze them after dollarization was introduced, when the exchange rate had gone up to 25,000 sucres per dollar.

In short, the social costs of the crisis were immense. Population living under the poverty line increased from 4.2 to 5.54 million people between 1995 and 1999 and the GDP per capita fell by 7.6 percent in one year. Income inequality also increased- during the early 1990's the lowest quintile got 4.4 percent of income and upper quintile got 52 percent, whereas in 2004 the percentages were 2.7 percent and 60 percent respectively. Lastly, a massive surge of migration ensued. It is estimated (though the exact number is difficult to know due to illegal migration) that between 300,000 and 1 million people emigrated from Ecuador after the crisis.

Though economists still disagree on the quality of the policies adopted by the government during the crisis, the consensus among neoliberal economists seems to be that the adoption of the US dollar as legal tender was the only solution. They saw it as the better of two evils: default of the banks and collapse of the system or an attempt to stabilize the economy without completely destroying the wealth held in banks. It was unclear, however, if the Ecuadorean economy was ready for such a move and its effects on the banking sector.

Chapter 3- The Models

In this chapter, I present the banking stability models that will be estimated in chapter 4. These models are based on those presented by Luisa Ericka Pérez Hérnandez and are intended to measure the stability of the financial system as a whole, and the stability of the market for credits in particular.

The aim of the model presented by Luisa Ericka Pérez Hernández (2009) is to measure the level of competition in the Dominican financial system, and to determine: a) if the level of competition of the financial system is positively correlated with its stability; and b) if this correlation is linear or if it is "U" shaped (parabolic). The core intent of her thesis is to use the Panzar and Rose H-statistic in order to determine the relationship between competition and the stability of the financial system. Panzar and Rose define their statistic as the sum of the elasticities of total income in respect to the cost of inputs (Pérez Hernández, 2009) and they use it to calculate the shape of the relationship between the competition and the stability of the financial system. Understanding the shape of the relationship has important policy implications. If it is determined that the shape of the relationship is parabolic, then there is an optimum level of concentration and competition at which the financial system would operate best. If the relationship is linear, one of the extremes will be the optimum depending on the sign of the correlation.

Pérez Hernández uses cross-sectional data and analyzes all the banks in the financial system of the Dominican Republic. Her model uses two different dependent variables to measure stability: The Z index and the NPL variable. The Z index measures the probability that the losses of each bank exceed the amount of productive assets. The

NPL index is a measure of risk focused on the loan quality each bank holds in its portfolio (defined as the irrecoverable losses plus loans considered risky over the total amount of loans at period t). Each one of these dependent variables is explained in the following section.

The independent variables for both models are the same: H_t that measures the level of concentration of the banking system; GDP_t measures the rate of growth of GDP at time t; and CA_{it}, LC_{it}, CIR_{it}, CVC_{it},EO_{it} are all financial control indicators that measure the ratio of productive assets, liquidity, market share in terms of loans, ratio of loans on default, and financial efficiency, respectively. Thus, the two theoretical models the author estimates are the following:

1. $Z_{it} = \beta Z_{it-1} + \varphi_1 H_t + \varphi_2 H_t^2 + \theta GDP_t + \gamma_1 CIR_{it} + \gamma_2 CA_{it} + \gamma_3 LC_{it} + \gamma_4 CVC_{it} + \gamma_5 EO_{it} + \mu_i + \varepsilon_{it}$ And,
2. $NPL_{it} = \beta NPL_{it-1} + \varphi_1 H_t + \varphi_2 H_t^2 + \theta GDP_t + \gamma_1 CIR_{it} + \gamma_2 CA_{it} + \gamma_3 LC_{it} + \gamma_4 CVC_{it} + \gamma_5 EO_{it} + \mu_i + \varepsilon_{it}$

Banking Stability Models

For this analysis, I modified Pérez Hernández's (2009) model in the following way. First, I transformed the H-statistic and use it as an independent variable to measure the level of concentration of the banking system in Ecuador. Second, I slightly changed the mathematical definition of the variables due to data constraints. Furthermore, I have simplified aspects of Hernández's analysis because I do not take into consideration the data of individual banks. Instead, I focus the analysis on the system-wide, aggregate data, which leads to important transformations.

Also, because I rely on time-series analysis, I cannot have too many dependent variables in each regression. If I were to include too many variables, I run the risk of trivializing the results and misconstruing the model. Thus, for each of the two models (both for Z_t and for NPL_t) I have selected variables that best provide a theoretical explanation of the variation. I use some of the variables in both models and some in only one of them.

The information for the time period before July 2002 and the period afterwards are presented by the "*Superintendencia de Bancos"* in two distinct ways. Before July 2002, the observations were much higher than the observations thereafter. There are two plausible explanations for this occurrence. First, there was some sort of structural change in either the economy or the financial system itself that brought about a change in the economy. An example of this possible change would be a cleansing of portfolios from loans on default aided by an increase in capital from the government in order to stabilize the banking industry and bring security into each bank. A second explanation is that the entity in charge of collecting the information for each bank (the "*Superintendencia de Bancos*") changed their methodologies to calculate data after July 2002.

Variable Specification

In this section I discuss the two main dependent variables. Though I intend to explain what each dependent variable measures and how it does so, I also present a graphical representation of the observations as well as the mathematical formula for each. My analysis is accompanied by a short discussion on some of the problems encountered

when attempting to define the variables. After discussing the two dependent variables, I define the independent variables and what they measure.

Z_t: Overall banking risk and the potential for financial collapse

The first dependent variable as explained by the original model is the probability that the losses of each particular bank exceed the return on assets for each institution. For this analysis, the variable attempts to measure the probability of system-wide banking failure. It is defined as the total nominal value of productive assets (TPA_t) minus the total nominal value of unproductive assets (TIA_t) over the total nominal value of assets (TA_t) in the system. The equation then, is:

The intent of this variable is to measure the stability of the banking system since the year 2000. The higher the proportion, the more stable the system because the percentage of assets rendering income for the banks is higher.

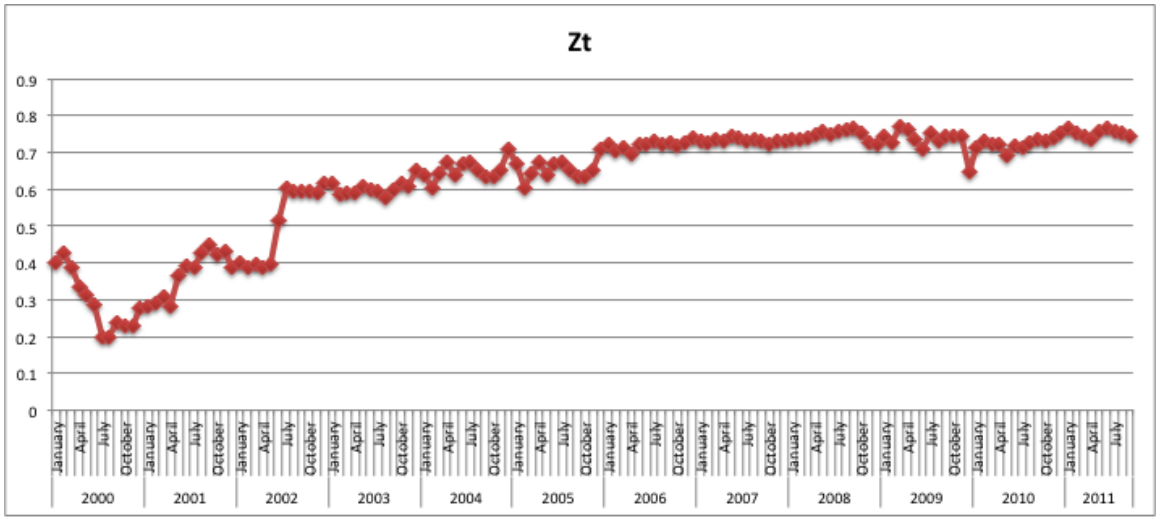

Figure 1: Z

The second dependent variable in the original model measures the credit risk for each bank. Pérez Hernández (2009) defines NPL as "risky loans." More specifically, she defines it as the nominal value of short-term loans plus the nominal value of past-due loans over the nominal value of total loans. In this analysis, this variable is misleading, as loans in Ecuador are mostly short-term (that "roll-over) and their value has increased. The value of past-due loans has decreased significantly and thus it is clear that the country's credit risk has decreased, which is why I define NPL_t as the nominal amount of loans on default over the total amount of loans in the system. The lower the proportion, the higher the quality of the loans held by the banks, since the risk of default is lower.

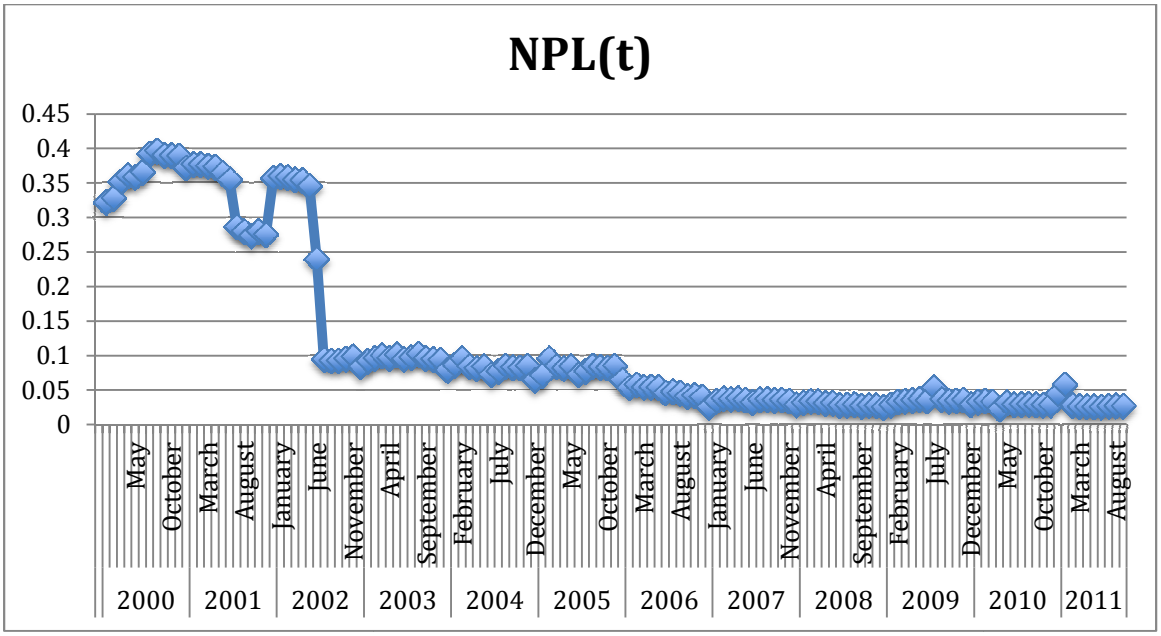

Figure 2: NPLt

Independent Variables

There are seven independent variables in the models introduced in this analysis. Below I present a brief description of each variable, including how it is defined, what it attempts to explain, as well as a graphical representation of the observations throughout the period of analysis.

GDP_{t-1}

The first independent variable is GDP_{t-1}. I used the natural log of the real value in order to make the coefficient more manageable. I also adjusted the data from quarterly to monthly in order to have the same number of observations as in all other variables. Furthermore, I lagged the data one month since, theoretically, the stability of the financial system is as likely to be affected by current and lagged GDP. If only current values were used, there is the statistical risk of mutual causation between the dependent and the independent variables. To avoid this problem I lagged GDP; in this way, GDP of the month prior to the one being analyzed cannot depend on the stability of the financial system and thus, the causation can only be in one direction.

Lt: Liquidity

This variable is defined as the available funds at time t divided by the short-term deposits held by the bank. I did not change this variable, but I took into account the information for the whole system.

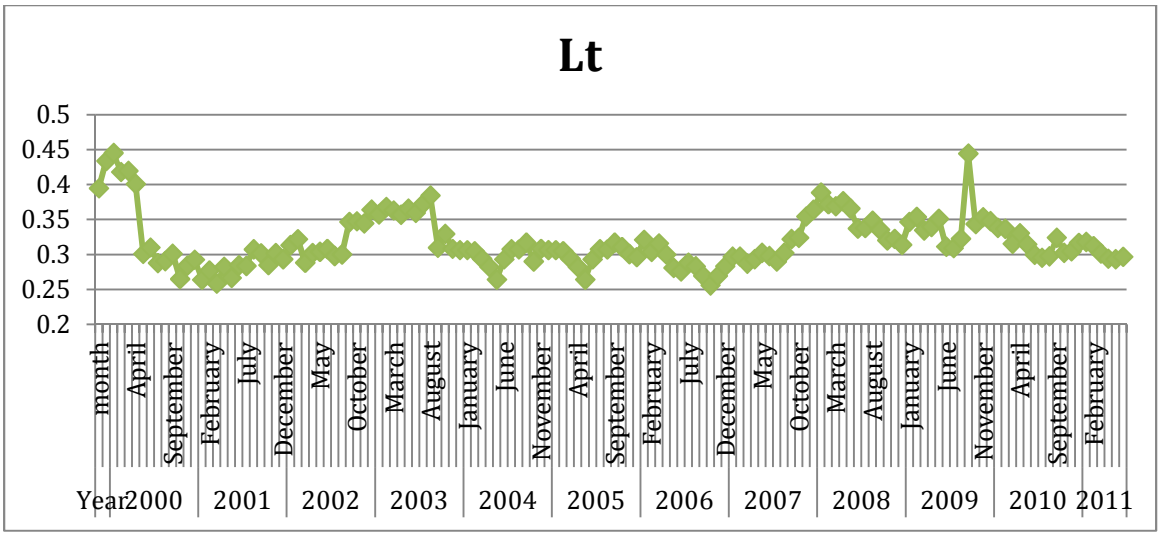

Figure 3: Liquidity

H_t: Degree of concentration of the financial system

In the original model, this index variable measured the market power of each bank in the credit market of the Dominican Republic to capture the degree of concentration of the financial system. In this analysis I did not consider the data of individual banks, and thus I had to adapt the variable. To do so, I considered the aggregated values of the assets of the four largest banks in the system. Ideally, the variable would be defined as the income sum from the four largest banks over the total income of the system, but that information was not available for the period of analysis. Thus, I defined the variable as the sum of the total assets of the country's four largest banks over the total value of assets of the system. The formula is:

$$H_t = \frac{\sum TABB_t}{TA_t}$$

where $TABB_t$ stands for the Total Assets of Big Banks and TA_t stands for total assets in the system. My objective was to capture the degree of concentration in the Ecuadorean

financial system by measuring the percentage of assets that are held by those institutions that have the most assets in their balance sheets.

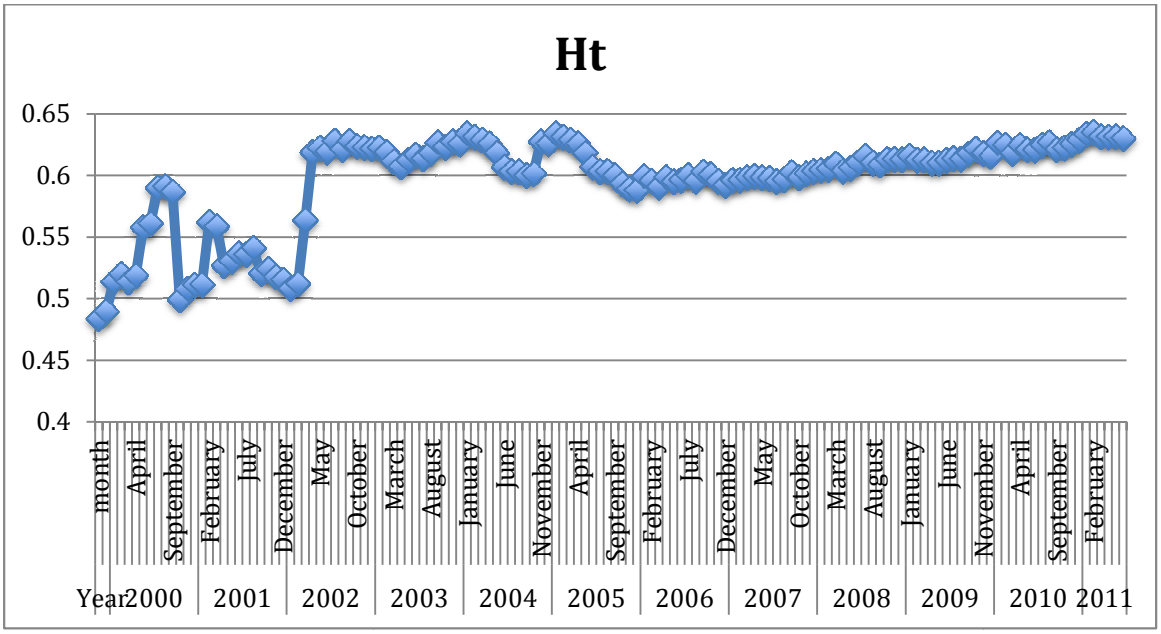

Figure 4: Assets of the 4 largest banks

It should be noted that a first look at the variable H_t could lead to a misinterpretation. In order to understand the significance of the sign of the coefficient, it is necessary to understand the regulations of the financial system. It is hard to understand the impact of the degree of concentration at a more regional level because a bank may have a strong presence in one region but not in another. Thus, it is important to keep the level of analysis at which the study is being conducted clearly defined in order to understand the variable's on the financial system's stability. In other words, conclusions about the effect of the concentration of the financial system at a national level should not be extrapolated from this study, especially because of the aggregate and macroeconomic nature of the data being considered.

CIR_t: The balance sheet of the banks

Since my data are defined at the macro-level, it is hard to have a variable that measures the market share of each bank in terms of loans. Instead, the variable measures the structure and stability of the banks' balance sheets. CIR_t is the total nominal value of assets in the system (TA_t) over the total nominal value of the liabilities in the system (TL_t). The formula for this ratio is:

$$CIR_t = \frac{TA_t}{TL_t}$$

This variable seeks to capture two issues: a) to assess the level of soundness in the banking practice of the financial system in Ecuador. One of the basic accounting principles is that total assets are equal to total liabilities plus patrimony and, as such, the ratio should always be higher than one. Thus, a ratio in which total assets are higher than total liabilities shows promise of growth and expansion of the financial system. And b) too high a ratio shows that the system might be gravitating towards more risk of both systemic collapse due to a run on the banks and illiquidity to pay what it owes the people.

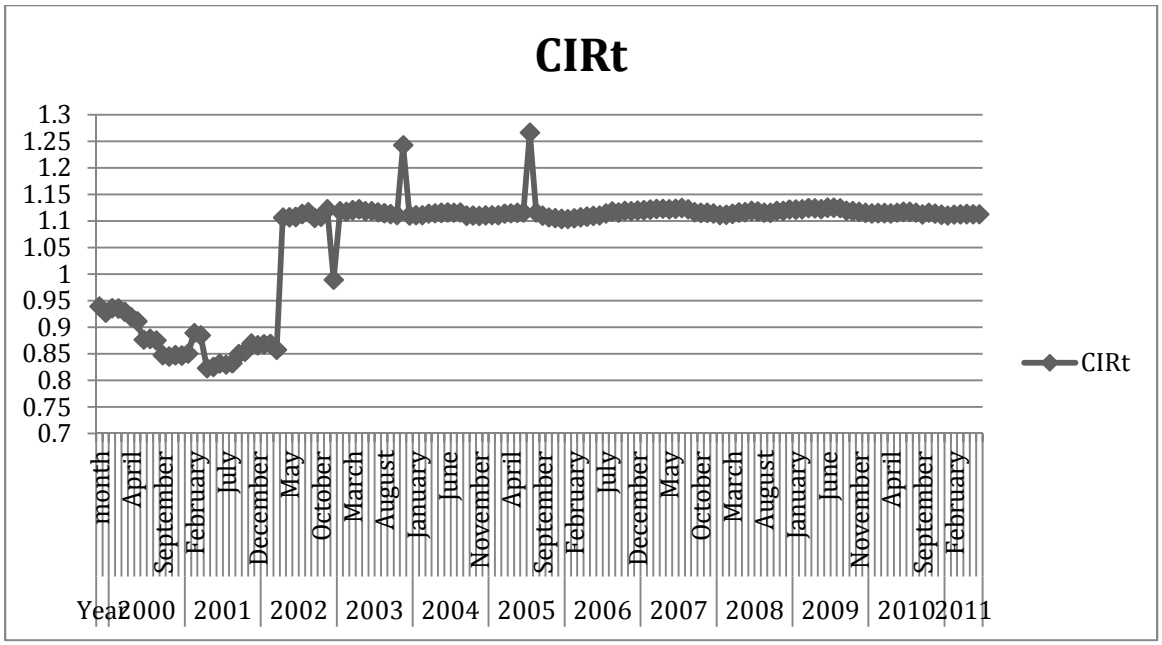

Figure 5: assets over liabilities

A value much greater than 1 could mean irresponsible behavior because banks could be lending excessively and carelessly. Likewise, a ratio far below 1 could show that banks are unwilling to lend money because they think that there is too much risk in the system, or that individuals are unwilling to take out loans due to high interest rates. It is important to understand the limitations of this variable's explanatory power to not infer misleading conclusions.

CA_t: Productive assets

Just like the previous variable, CA_t measures the quality of the balance sheet of the banks, but it does so in terms of the quality of the assets banks hold at a particular point in time. I define this variable in the same way it is defined in the original model, that is, as the proportion of assets that produce income and revenue for the financial institutions. Thus, the equation reads as follows:

$$CA_t = \frac{TPA_t}{TA_t}$$

where TPA_t stands for the total nominal value of productive assets at time t and TA_t as usual stands for the total nominal value of assets at time t in the system. Clearly, the higher this proportion, the better banks should be performing and thus, the system should be more stable.

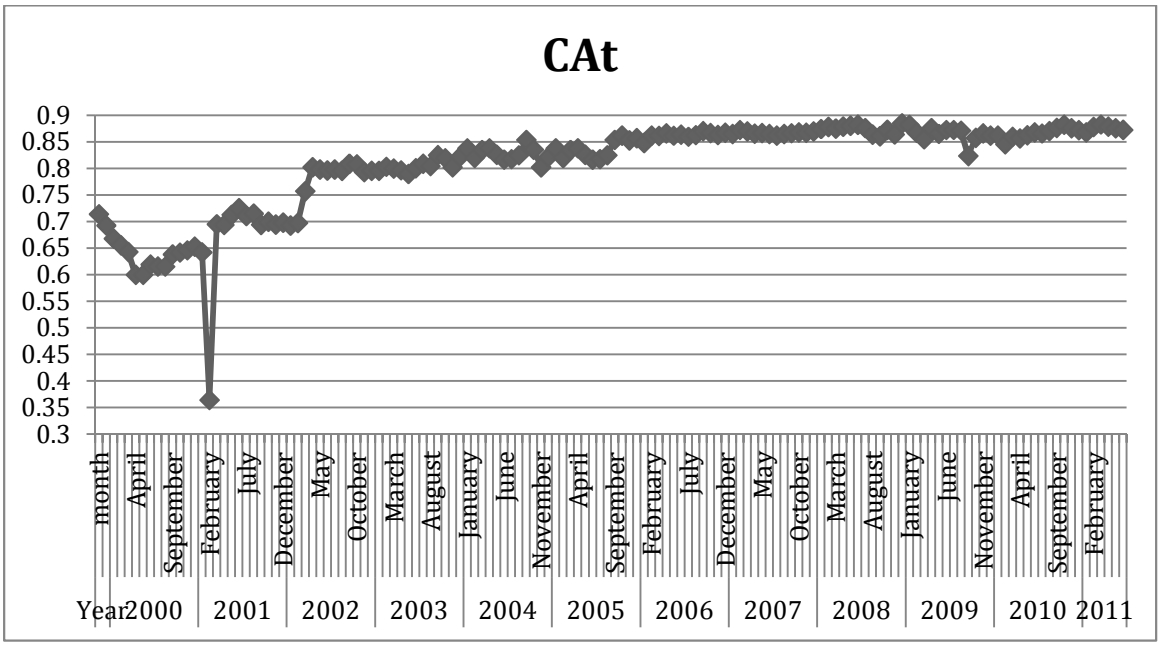

Figure 6: proportion of productive assets

CVC_t: Proportion of past-due loans

Banks risk clients failing to repay their loans.. In the original model, this variable is defined as the proportion of loans that are late on their payments. Due to complications with the data and differences in the countries studied, I redefine the variable CVC_t as the percentage of loans that have become past-due. This variable represents the percentage of loans that the bank considers as losses and does not expect to collect. This measure is

important for both dependent variables, because it captures the risk level in the economy. If the level of past-due loans goes up, there is a problem with the country's economy, and vice versa. It is clear that the lower the value measured in this variable, the better it will be for the stability of the system.

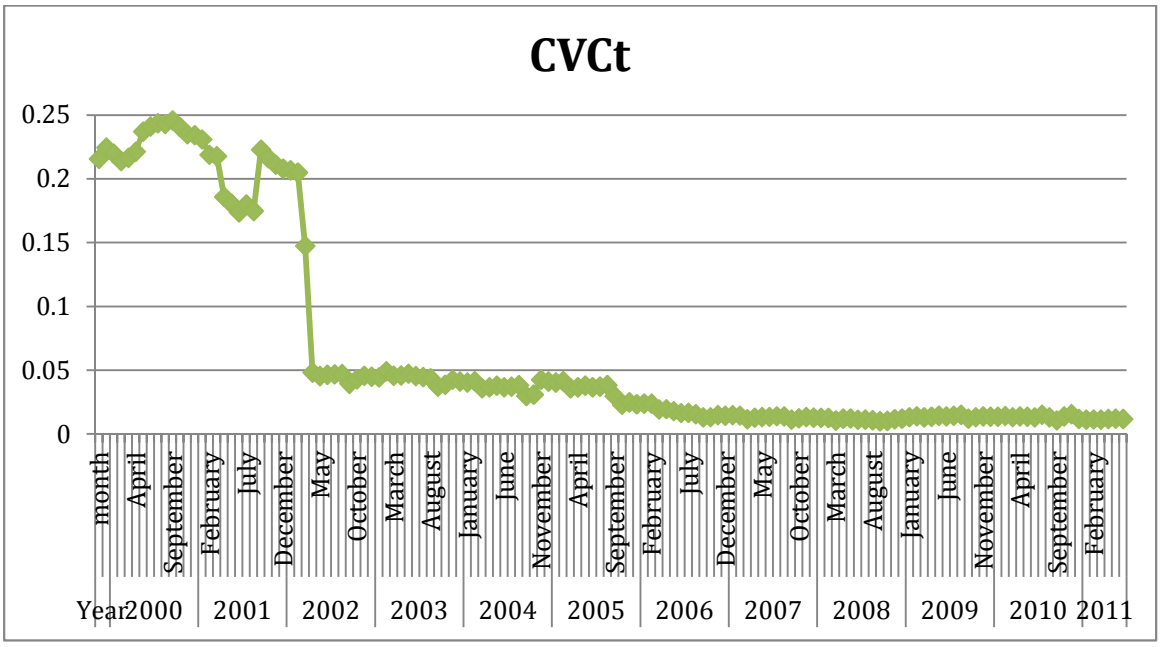

Figure 7: Proportion of Expired Loans

EO_t: Financial efficiency

EO_t portrays the level of financial efficiency in the system at a certain time t. The technical definition of the variable is the gross financial margin at time t (GFM_t) over the total nominal value of income for the banks at time t (I_t). The equation is the following:

$$EO_t = \frac{GFM_t}{I_t}$$

This variable is critical to this analysis because financial efficiency is one of the most important aspects of financial stability. The more efficient the banks, the more stable the system in general -- or at least that is what should be expected.

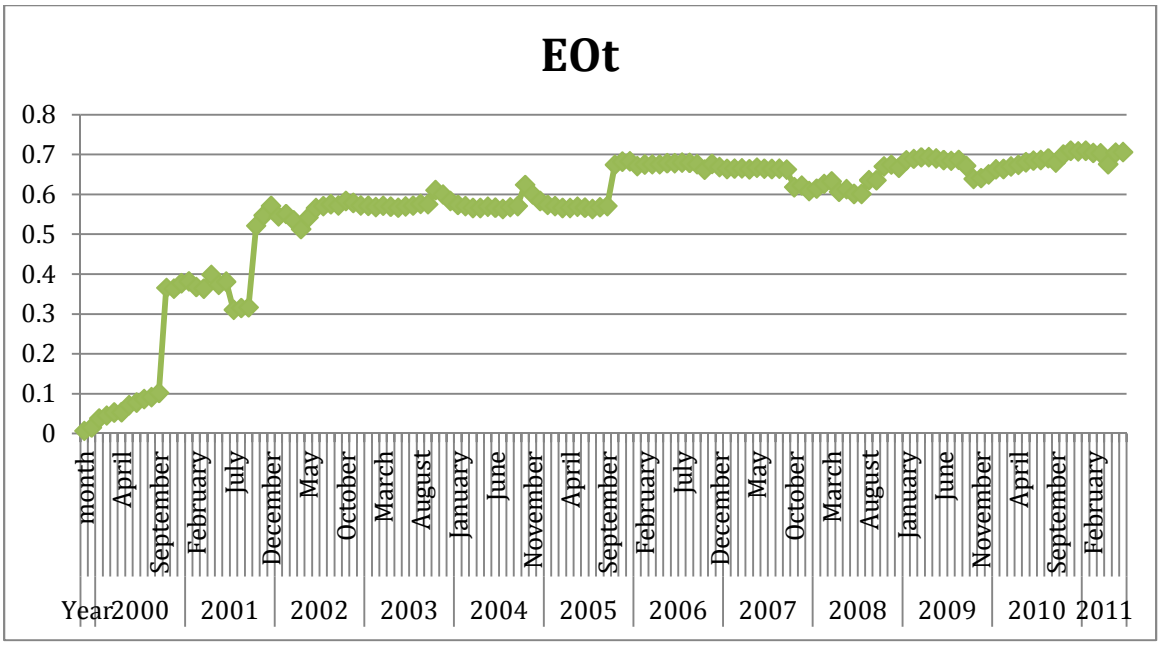

Figure 8: Efficiency of the financial system

The Data

Data for both models was taken from the "*Superintendencia de Bancos'*" monthly reports[1]. This institution is in charge of regulation and oversight of all financial institutions in the country and, as such, it has monthly data from January 2000 onwards. For GDP[2] and oil prices[3], I consulted the database "Indexmundi," a database with information for most countries of the world. The models use monthly observations beginning in January 2000, and ending in September 2011.

[1] See: http://www.sbs.gob.ec/practg/sbs_index?vp_art_id=29&vp_tip=2&vp_buscr=41#series2

[2] See: http://www.indexmundi.com/ecuador/

[3] See: http://www.indexmundi.com/commodities/?commodity=crude-oil&months=180

Chapter 4 Estimations and Results

In this chapter, I present the econometric models and show the results for the most important regressions. In addition, I describe and analyze the regressions and present conclusions.

Z_t Model Estimation

In order to maintain consistency with the original model and to use it as a starting point, the first step I took in this analysis was to run the regression as presented in Pérez Hernández (2009) for the Dominican Republic. However, I assumed that the relationship between the independent and the dependent variables would be a linear one and thus removed the variable H_t^2 from the regressions.

Table 1: Original model Z_t regression 1

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. reg zt zt1 ht cat lt cirt cvct eot gdpt1
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Source	SS	df	MS		
Model	3.27843333	8	.409804166	Number of obs	= 140
Residual	.067417208	131	.000514635	F(8, 131)	= 796.30
				Prob > F	= 0.0000
				R-squared	= 0.9799
				Adj R-squared	= 0.9786
Total	3.34585054	139	.024070867	Root MSE	= .02269

zt	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
zt1	.5191067	.0645606	8.04	0.000	.3913905	.6468229
ht	-.1525108	.1232948	-1.24	0.218	-.3964172	.0913957
cat	.1543321	.0755662	2.04	0.043	.0048441	.30382
lt	-.1396157	.0611733	-2.28	0.024	-.260631	-.0186003
cirt	-.1768602	.0642818	-2.75	0.007	-.304025	-.0496955
cvct	-.9735594	.1887569	-5.16	0.000	-1.346966	-.6001533
eot	.0195691	.029019	0.67	0.501	-.0378373	.0769755
gdpt1	.0168357	.0109327	1.54	0.126	-.0047918	.0384632
_cons	.1929163	.2618762	0.74	0.463	-.3251374	.7109699

Table 1 shows a large level of serial autocorrelation, as seen by the Durbin-Watson Statistic (DWS). The values for this statistic range from 0 to 4. The closer the statistic is to the extremes, the greater the serial correlation; the closer the statistic is to the value 2, the lower the serial autocorrelation. In the regression shown in table 1, the value of the DWS is 1.21666. An effective way to correct for this problem is to use the Cochrane-Orcutt method of estimations. Table 2 shows the results of the regression ran with the Cochrane-Orcutt method:

Table 2: Zt Cochrane-Orcutt Estimation

Cochrane-Orcutt AR(1) regression -- iterated estimates

Source	SS	df	MS		
Model	.288923311	7	.041274759	Number of obs	= 139
Residual	.058033582	131	.000443004	F(7, 131)	= 93.17
				Prob > F	= 0.0000
Total	.346956893	138	.00251418	R-squared	= 0.8327
				Adj R-squared	= 0.8238
				Root MSE	= .02105

zt	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ht	.3682368	.1874551	1.96	0.052	-.002594	.7390677
cat	.1263793	.0555818	2.27	0.025	.0164252	.2363335
lt	-.2756882	.0861026	-3.20	0.002	-.4460197	-.1053566
cirt	-.1486158	.0603256	-2.46	0.015	-.2679542	-.0292774
cvct	-1.55263	.1834089	-8.47	0.000	-1.915456	-1.189803
eot	.1552458	.0555309	2.80	0.006	.0453925	.2650992
gdpt1	.0120469	.0075237	1.60	0.112	-.0028367	.0269305
_cons	.2982144	.2404435	1.24	0.217	-.1774403	.773869
rho	.7124137					

Durbin-Watson statistic (original) 1.216666
Durbin-Watson statistic (transformed) 2.073841

The DWS has gone from 1.216666 to 2.074, which indicates that the serial autocorrelation has been addressed. Also, all the coefficients in the second table have statistically significant p-values, and thus could be included in the model. The adjusted R^2 is also fairly high (.8238) and accurate since it is no longer a biased estimator. It is best to limit a time-series regression to five variables in order to show true correlation

and a model unburdened by noise. Thus, I decided to drop GDP from the equation because it is the variable with the worse p-value and is not significant at the 5 percent confidence level. Good practice suggests that if we are to drop a variable, it should be the one with the least statistical significance. Table 3 shows the regression without GDP.

Table 3: Zt Cochrane-Orcutt estimation 2

Cochrane-Orcutt AR(1) regression -- iterated estimates

Source	SS	df	MS		Number of obs =	139
					F(6, 132) =	104.68
Model	.281517896	6	.046919649		Prob > F =	0.0000
Residual	.059167526	132	.000448239		R-squared =	0.8263
					Adj R-squared =	0.8184
Total	.340685422	138	.002468735		Root MSE =	.02117

zt	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ht	.3493496	.1882635	1.86	0.066	-.0230542	.7217533
cat	.1401988	.0551116	2.54	0.012	.0311825	.249215
lt	-.2738557	.0866317	-3.16	0.002	-.4452219	-.1024896
cirt	-.1505553	.0605973	-2.48	0.014	-.2704227	-.0306878
cvct	-1.574482	.1840192	-8.56	0.000	-1.93849	-1.210474
eot	.1509952	.0559998	2.70	0.008	.0402221	.2617682
_cons	.5597815	.1761423	3.18	0.002	.2113546	.9082084
rho	.7159548					

Durbin-Watson statistic (original) 1.107798
Durbin-Watson statistic (transformed) 2.081437

The adjusted R^2 dropped to .8184 and all coefficients, but one, are highly significant. In the case of H_t the p-value falls from .052 to .066. The DWS remains at a value close to 2 (2.081437) and the coefficients retain their signs. Since H_t is not significant at the 5 percent level of confidence, I ran another regression without including this variable. Table 4 shows these results:

Table 4: Zt Cochrane-Orcutt estimation 3

Cochrane-Orcutt AR(1) regression -- iterated estimates

Source	SS	df	MS		
Model	.348310357	5	.069662071	Number of obs	= 139
Residual	.060544101	133	.000455219	F(5, 133)	= 153.03
				Prob > F	= 0.0000
Total	.408854458	138	.002962713	R-squared	= 0.8519
				Adj R-squared	= 0.8464
				Root MSE	= .02134

zt	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
cat	.1249052	.0550461	2.27	0.025	.0160261	.2337843
lt	-.2907548	.0848748	-3.43	0.001	-.4586339	-.1228757
cirt	-.142987	.061276	-2.33	0.021	-.2641886	-.0217853
cvct	-1.782032	.1442447	-12.35	0.000	-2.067343	-1.496722
eot	.1081567	.0479521	2.26	0.026	.0133093	.203004
_cons	.8162375	.1050761	7.77	0.000	.6084011	1.024074
rho	.6796957					

Durbin-Watson statistic (original) 1.026226
Durbin-Watson statistic (transformed) 2.063334

Clearly, the results in the table above are statistically better than those in Table 3. The value of the DWS is still around the value that is supposed to be, but the R^2 value of the regression went up to .8464 meaning that the elimination of both variables increased the explanatory power of the other independent variables. Note that the elimination of the variables did not cause any change in signs of coefficients. Thus, with this final model 84.64 percent of the variation in the financial stability index (Z_t) can be explained by the variation in the ratio of productive assets (CA_t) liquidity (L_t), change in the balance sheets of the banks (CIR_t), proportion of past-due loans (CVC_t), and financial efficiency (EO_t).

The final mathematical form for this model then reads as follows:

1. $Z_t = \beta_0 + \beta_1 CA_t - \beta_2 L_t - \beta_3 CIR_t - \beta_4 CVC_t + \beta_5 EO_t + \varepsilon_t$

For which the regression is the following:

2. $z_t = .81624 + .1249ca_t - .291l_t - .143cir_t - 1.7820cvc_t + .108eo_t$

Z_t: Interpretation of results

Z_t is positively correlated with the ratio of productive assets (CA_t) and financial efficiency (EO_t) but negatively correlated with the variables liquidity (L_t), proportion of past-due loans (CVC_t), and the balance sheets of banks (CIR_t,). This means that if either CA_t or EO_t increase (which they have), ceteris paribus, the value for Z_t will increase. On the other hand, if L_t, CIR_t, or CVC_t (the first two have decreased but the latter has increased) decrease, ceteris paribus the value of Z_t will increase.

The coefficient associated with the ratio of productive assets (CA_t) is positive. As this ratio increases, so does banking stability in Ecuador. These results are fairly self-explanatory -- the larger the proportion of assets rendering income for the banks, the more stable individual banks will be, thus increasing the aggregate stability of the system. The same can be said for financial efficiency (EO_t) -- an increase in the efficiency of the banks leads to less unresolved potential, thus more stability. Even though the sign is inversed, the explanation for the variable of the proportion of past-due loans (CVC_t) is as straightforward as that of efficiency -- the higher the proportion the more unstable the system, and vice versa.

One of the coefficients that might be confusing at first glance is liquidity (L_t). In this model we see that as liquidity increases, banking stability decreases. This may seem counter-intuitive as the more liquidity there is the safer the banks are against a run on them. The problem is that when liquidity gets too high, banks are reluctant to lend money since bankers lack confidence on the stability of the financial system. Another confusing variable with a negative sign on its coefficient is the one that represents the balance sheets of the banks (CIR_t). The negative sign suggests that as the ratio of total assets over

total liabilities increases, the stability of the financial system decreases. The explanation for this is similar to the reasoning behind that of liquidity, but this time the reluctance is voiced by the consumer. When assets are too high, banks need more deposits from individuals (liabilities) in order to keep expanding their business. When the ratio is too high, it suggests that consumers of the system do not trust the banks with their money or are spending too much and not saving enough. In both cases the balance between deposits and loans is broken and the stability of the system is jeopardized.

The coefficients explain by how much the value of Z_t varies when the independent variable changes by one unit. For example, if the variable financial efficiency goes up by one percent, the value of Z_t will go up by .108 percent. Similarly, if CVC_t (proportion of past-due loans) falls by one percent, the index of financial stability will fall by 1.782 percent. The same interpretation is important for all the other variables.

NPL_t: Model Estimation

NPL is intended to measure the risk level of the financial system in terms of credits, i.e. variables that affect the type and quality of assets held by a bank. As noted in chapter three, for the dependent variable NPL_t I have redefined Pérez Hernández's variable to show the actual financial risk in terms of the Ecuadorean market of credits. Table 5 presents the original model with its redefined dependent variable.

Table 5: NPL_t Original model

```
. reg npl nplt1 ht htht cat lt cirt cvct eot gdpt1
```

Source	SS	df	MS	Number of obs	= 140
Model	2.09671665	9	.232968517	F(9, 130)	= 4617.93
Residual	.00655833	130	.000050449	Prob > F	= 0.0000
				R-squared	= 0.9969
				Adj R-squared	= 0.9967
Total	2.10327498	139	.015131475	Root MSE	= .0071

npl	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
nplt1	.0910318	.0320641	2.84	0.005	.0275968	.1544668
ht	.7147956	.6116855	1.17	0.245	-.495351	1.924942
htht	-.633245	.5283564	-1.20	0.233	-1.678535	.412045
cat	-.0555822	.0230894	-2.41	0.017	-.1012618	-.0099026
lt	.0436363	.0199582	2.19	0.031	.0041513	.0831213
cirt	.1203168	.0206707	5.82	0.000	.0794223	.1612114
cvct	1.561745	.0735919	21.22	0.000	1.416152	1.707337
eot	.0354884	.009264	3.83	0.000	.0171608	.0538161
gdpt1	-.0044784	.0033831	-1.32	0.188	-.0111714	.0022147
_cons	-.2169882	.2069135	-1.05	0.296	-.6263418	.1923654

Similar to the previous model, the DWS is 1.05, which means that there is a problem of serial correlation. Table 6 presents the results of the regression ran with the Cochrane-Orcutt method:

Table 6: NPL Cochrane-Orcutt Estimation 1

```
Cochrane-Orcutt AR(1) regression -- iterated estimates
```

Source	SS	df	MS	Number of obs	= 139
Model	.327297707	7	.046756815	F(7, 131)	= 1355.68
Residual	.004518147	131	.00003449	Prob > F	= 0.0000
				R-squared	= 0.9864
				Adj R-squared	= 0.9857
Total	.331815854	138	.002404463	Root MSE	= .00587

npl	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ht	-.0704707	.04966	-1.42	0.158	-.16871	.0277685
cat	-.0422649	.0161577	-2.62	0.010	-.0742286	-.0103012
lt	.0276449	.0234394	1.18	0.240	-.0187239	.0740138
cirt	.0610449	.0172856	3.53	0.001	.0268498	.0952401
cvct	1.595359	.0496953	32.10	0.000	1.49705	1.693668
eot	.012722	.013908	0.91	0.362	-.0147914	.0402355
gdpt1	-.0004636	.0022067	-0.21	0.834	-.0048289	.0039018
_cons	.0191534	.0672446	0.28	0.776	-.1138724	.1521792
rho	.6121797					

```
Durbin-Watson statistic (original)    1.053264
Durbin-Watson statistic (transformed) 2.040581
```

The regression in table 6 is considerably better and more accurate. The DWS went from 1.05 to 2.04, which is an acceptable value. In this case, though we have a very high adjusted R^2 of .9857, we can see that some of the variables are not statistically significant, so I dropped GDP for the same reasons as before.

Table 7: NPLt Cochrane-Orcutt Estimation 2

```
Cochrane-Orcutt AR(1) regression -- iterated estimates

      Source |       SS       df       MS              Number of obs =     139
-------------+------------------------------           F(  6,   132) = 1575.74
       Model |  .323715913     6  .053952652           Prob > F      =  0.0000
    Residual |  .004519631   132   .00003424           R-squared     =  0.9862
-------------+------------------------------           Adj R-squared =  0.9856
       Total |  .328235544   138  .002378518           Root MSE      =  .00585

------------------------------------------------------------------------------
         npl |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          ht |  -.0699337    .049437    -1.41   0.160    -.1677249    .0278575
         cat |  -.0427839   .0158638    -2.70   0.008    -.0741641   -.0114036
          lt |   .0274842   .0233686     1.18   0.242    -.0187411    .0737096
        cirt |   .0609528   .0172059     3.54   0.001     .0269179    .0949876
        cvct |   1.595932   .0494248    32.29   0.000     1.498164    1.693699
         eot |   .0128225   .0138841     0.92   0.357    -.0146415    .0402866
       _cons |   .0094531   .0472662     0.20   0.842    -.0840441    .1029503
-------------+----------------------------------------------------------------
         rho |   .6145175
------------------------------------------------------------------------------
Durbin-Watson statistic (original)    0.986458
Durbin-Watson statistic (transformed) 2.042468
```

Table 7 still shows improved results. Again, the results are good but there are variables that can be removed, in particular financial efficiency and liquidity. Table 8 shows the results without financial efficiency, and Table 9 without liquidity.

Table 8: NPLt Cochrane-Orcutt Estimation 3

```
Cochrane-Orcutt AR(1) regression -- iterated estimates

      Source |       SS       df       MS              Number of obs =     139
-------------+------------------------------           F(  5,   133) = 1851.98
       Model |  .316694522     5  .063338904           Prob > F      =  0.0000
    Residual |  .004548674   133  .000034201           R-squared     =  0.9858
-------------+------------------------------           Adj R-squared =  0.9853
       Total |  .321243196   138  .002327849           Root MSE      =  .00585

------------------------------------------------------------------------------
         npl |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          ht |  -.0906076   .0443244    -2.04   0.043    -.1782795   -.0029357
         cat |  -.0431624   .0158187    -2.73   0.007    -.0744512   -.0118736
          lt |   .0209095   .0223155     0.94   0.350    -.0232297    .0650486
        cirt |   .0594146   .0171332     3.47   0.001     .0255259    .0933034
        cvct |   1.564773   .0363752    43.02   0.000     1.492824    1.636722
       _cons |   .0350761   .0387129     0.91   0.367    -.0414965    .1116487
-------------+----------------------------------------------------------------
         rho |    .619127
------------------------------------------------------------------------------
Durbin-Watson statistic (original)    0.856972
Durbin-Watson statistic (transformed) 2.044701
```

Table 9: NPLt Cochrane-Orcutt Estimation 4

Cochrane-Orcutt AR(1) regression -- iterated estimates

Source	SS	df	MS		
Model	.310261059	4	.077565265	Number of obs	= 139
Residual	.004578564	134	.000034168	F(4, 134)	= 2270.09
				Prob > F	= 0.0000
Total	.314839623	138	.002281447	R-squared	= 0.9855
				Adj R-squared	= 0.9850
				Root MSE	= .00585

npl	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ht	-.0950442	.0441568	-2.15	0.033	-.1823786	-.0077097
cat	-.0458022	.0155155	-2.95	0.004	-.0764892	-.0151152
cirt	.0592299	.0171101	3.46	0.001	.0253891	.0930707
cvct	1.559457	.036001	43.32	0.000	1.488253	1.630661
_cons	.0470173	.0367407	1.28	0.203	-.0256494	.119684
rho	.6234009					

Durbin-Watson statistic (original) 0.857653
Durbin-Watson statistic (transformed) 2.027328

With the aforementioned variables removed, the model appears to be properly specified, as there does not seem to be any confounding or extra variables in the model. In the last regression, 98.5 percent of the variation of the credit risk in the banking system of Ecuador (NPL_t) can be explained by the variation of the concentration of the banking system (H_t), the proportion of productive assets (CA_t), the quality of the balance sheet of banks (CIR_t), and the proportion of past-due loans (CVC_t). One thing to note about this model is that there appears to be a large degree of multicolinearity between some of the independent variables since,even though all the aforementioned variables are significant, CVC_t appears to have an extraordinary influence on the dependent variable.

Table 10: NPLt Cochrane-Orcutt estimation 5

Cochrane-Orcutt AR(1) regression -- iterated estimates

Source	SS	df	MS	Number of obs = 139
Model	.24199176	1	.24199176	F(1, 137) = 6184.48
Residual	.005360659	137	.000039129	Prob > F = 0.0000
				R-squared = 0.9783
Total	.247352419	138	.001792409	Adj R-squared = 0.9782
				Root MSE = .00626

npl	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
cvct	1.570058	.0199648	78.64	0.000	1.530579	1.609537
_cons	.0156858	.0020073	7.81	0.000	.0117166	.0196551
rho	.6720428					

Durbin-Watson statistic (original) 0.610324
Durbin-Watson statistic (transformed) 1.879340

Table 10 shows the regression of NPL_t as the dependent variable and only CVC_t as the independent variable. Since CVC_t represents the proportion of past-due loans, this variable is largely correlated with the credit risk of the system. That being said, I am reluctant to remove all the other variables from the equation because, theoretically, they are more helpful in understanding the stability of the financial system in terms of credit risk. Thus, because they are still clearly significant and carry strong theoretical explanatory power, I have also included them in the final model for NPL_t. The final model for NPL_t reads as follows:

1. $\mathrm{NPL_t} = \beta_0 - \beta_1 \mathrm{H_t} - \beta_2 \mathrm{CA_t} + \beta_3 \mathrm{CIR_t} + \beta_4 \mathrm{CVC_t} + \varepsilon_t$

For which the estimated regression is:

2. $\mathrm{npl_t} = .047 - .095\mathrm{h_t} - .0458\mathrm{ca_t} + .0592\mathrm{cir_t} + 1.56\mathrm{cvc_t}$

NPL_t: Interpretation of results

NPL_t is negatively correlated with both H_t and CA_t but is positively correlated with CIR_t and CVC_t. These distinct correlations indicate that, as the degree of concentration of the financial system or the level of productive assets increases (both of which have increased), ceteris paribus, the level of credit risk drops. On the other hand, if the percentage of past-due loans or the ratio between total assets and total liabilities increases, so does the credit risk of the financial system. The coefficient in front of the banking system concentration variable suggests that as the concentration of the banking system increases by one percent, the credit risk decreases by .095 percent. This relationship suggests that the more concentrated the banks (meaning that banks are bigger and stronger), the greater the stability of the financial system.

Conclusions

The above analysis shows that the level of stability in the banking system of Ecuador is associated with, liquidity, the proportion of past-due loans, the balance sheets of the banks, financial efficiency, concentration of the banking system, and the ratio of productive assets. The more telling of the two models is Z_t for it shows the system-wide risk of financial collapse. The NPL model does not really tell us much that was not known before, but it is included here as a reminder of what determines the credit risk of the system.

In this chapter I did not include dollarization directly as an independent variable. Two reasons dictated my decision. First, the available data did not enable me to measure the empirical effects of the dollarization on the economy of Ecuador. Second, and

possibly more important, dollarization is not just one more independent variable to consider. Dollarization, as it pertains to this analysis, is the main context variable that has affected the financial system.

In the following chapter I explain the effects of dollarization on the previously considered independent variables. I hope that by the end of next chapter, the link between dollarization and the banking system will be understood. For now, however, it suffices to say that the banking system of Ecuador has become vastly more stable and that this stability is significantly correlated with the variables presented in this analysis.

Chapter 5: Effect of the Dollarization on the Banking System

What is the relationship between the stability and strength of the financial system in Ecuador and dollarization in 2000? This question is the one I intend to tackle in this chapter. But how do I answer this question? Due to the collapse of the currency in 2000, there is little information (economic, banking, and financial) before the dollarization was introduced. Thus, it is impossible to conduct an econometric analysis on how dollarization affected the dependent variables. In their paper "Dollarization: Analytical Issues," Roberto Chang and Andrés Velasco relied on theory to evaluate the dollarization process. They claim that because there have been very little cases of dollarized countries, and all of them had been carried out fairly recently (especially when they wrote their paper), they decided to rely on a theoretical approach to evaluate the effects of the dollarization process (Chang & Velasco, 2001). Thus, in the absence of data and following their example, I also use a theoretical approach to explain the link between dollarization and the stability of the financial system.

The estimations in chapter 4 for the post-dollarization period are relevant because they show that the financial system has gained stability. It is easier to explain the effects of dollarization on the independent variables after having identified and estimated a stability model. Since each independent variable is more narrowly defined, it is possible to analyze how dollarization would affect each one, rather than the more aggregate and complex outcome of financial stability. In this regard I follow the contributions to the literature of Sebastian Edwards, Igal Magendzo, Roberto Chang and Andrés Velasco, Sofia Castillo, and rest of authors mentioned in chapter 1.

According to the literature, four main positive effects can be identified:

1. A statistically significant reduction of inflation from hyperinflation in the 1990's to one-digit inflation all throughout the 2000's;
2. Elimination of the Lender of Last Resort (LOLR) as the role of the Central Bank. With dollarization, the Central Bank's function is reduced to a regulatory institution. It does not have the power to rescue and bailout underperforming banks, thus reducing the moral hazard problem bankers face. This creates better management in banks and increases financial efficiency;
3. Dollarization builds credibility on the regulatory institutions. With a Central Bank and the "*Superintendencia de bancos*" that have the critical and basic role of regulating the system, it is easier for the institutions to build credibility both nationally and internationally. Dollarization also eliminates the time-inconsistency problem and the Central Bank has to adhere to a consistent monetary policy, further building credibility and reliability;
4. Dollarization eliminates currency risk. By adopting a larger and more powerful currency, investors will no longer fear that depreciation will diminish their assets.

Dollarization and its Effect on the Independent Variables

Economists agree that there are intrinsic benefits in dollarization, as it may enable the creation of financial stability. The literature has focused on dollarization for overall macroeconomic indicators such as inflation and economic growth, but few studies have analyzed specific sectors such as banking. Hence, my main contribution to the literature, is developing a banking model applicable to the post-dollarization era and analyzing how dollarization affected the independent variables in the model.

Dollarization has stabilized prices and increased international trade

Perhaps one of the most studied consequences of adopting a foreign currency as a legal tender is the effect on macroeconomic variables, predominantly GDP. The views on this subject are divided, and thus I cannot claim that GDP growth is generated directly by dollarization. What I can argue, however, is that dollar adoption (along with increase in oil price) has brought about a tremendous level of macroeconomic stability to Ecuador. Combined with the irrefutable decrease in inflation[4], business opportunities have grown and attracted foreign direct investment. Another positive effect engendered by dollarization is that, since 2000, the dollar has depreciated in terms of other international currencies. This means that Ecuadorean exports to other international actors (not the United States) have become cheaper, which induces greater international trade. In fact, one of the most debated topics in the country right now is the creation of a free trade agreement with the European Union that would alleviate the dominance of the United States on the Ecuadorean market for exports.

Dollarization eliminates currency risk, attracts foreign direct investment and increases the likelihood of granting loans both to Ecuadorean firms and to the Ecuadorean government. This reality, however, has not developed in Ecuador yet. The political risk associated with Rafael Correa's regime and the "socialism of the 21st Century" he promotes, has scared away potential investors. Furthermore, the rapid growths of Colombia, Peru, and Brazil, coupled with the small local economy size have reduced international interest in Ecuador and dollarization has not played a significant factor at

[4] Adoption of the dollar automatically stops hyperinflation and re-introduces stability to prices. With price stability the economy can go back to conducting business with stable expectations

the macroeconomic level. It is fair to say, however, that in recent years, Ecuador has created a different set of international allies signing free trade agreements with Iran and accepting a large amount of loans from the Chinese government.

The adoption of the US dollar means that prices in the United States affect domestic consumption in Ecuador in absence of an exchange rate regime. Ecuadorean tradables cannot compete with manufactures of the United States and agricultural products, so the market has been inundated with these products.

Dollarization Increases banking intermediation

Due to currency risk elimination and drastic inflation reduction, banks hold less cash and are able to meet their lending and investment operations. Before dollarization, banks used to make loans at really high interest rates, or make dollar loans in order to overcome the risk of the sucre depreciating or risk inflation. Also, banks would make predominantly short-term loans in order to avoid default.

In reality, we see a decrease in the amount of liquidity in the market from early 2000 (in April, the liquidity of the financial system was at 40 percent) to June 2011 when liquidity dropped to 29 percent of assets having passed through a low of 20 percent some years back. Short-term loans, on the other hand, have increased and still dominate the market for loans in the country.

Dollarization leads to greater concentration

In order for banks to be able to survive dollarization and for dollarization to be effective, the banking system has to write-off underperforming loans. In other words,

banks have to be strong and large to absorb losses. Banks that are not robust enough to deal with the crises fail and go bankrupt. This was clearly the case in Ecuador when about 70 percent of financial institutions collapsed by the end of the crisis that led to dollarization. Banks that survived-the four largest banks in particular- are strong enough to withstand the harshest of environments.

One of the main effects of dollarization on the banking system has been to diminish, if not totally remove, the capacity of any one institution within the country -- including the government -- to act as LOLR. Whether this is good or bad is often disputed, but in the case of Ecuador it was probably a good thing. Most economists agree that with the disappearance of an institution to act as LOLR, the presence of oversight and strong management becomes critical. Banks know that if they decide to accept very risky projects and they fail, there is no institution to bail them out and would go under if their losses are too large.

The sword is a double-edged weapon because a banking crisis can be very costly, and the last crisis cost Ecuador 22 percent of its GDP. The inability of the Central Bank to bailout a bank reduces the moral hazard problem of time-inconsistency, thus forcing the banking system to be more credible and responsible. This condition helps explain the increasing trend towards the greater concentration of banks throughout the last decade. Thus, dollarization has meant that only the best banks in the system have survived and now operate more efficiently.

Dollarization increases banking productivity and efficiency

The most important dollarization effect is the reduction of moral hazard caused by the LOLR practice. With the elimination of the LOLR practice, banks have to scrutinize their assets more rigorously and can no longer lend money expecting that if something goes wrong, the Central Bank will bail them out to avoid a financial crisis. Furthermore, banks have to get better managers and plan ahead in order to survive in the new system.

With better management and greater oversight, the proportions of productive bank assets and of past-due loans have improved. In the past decade, the ratio of productive assets went from about 60 percent in mid-2000 to just below 90 percent in mid-2011. Moreover, the ratio of past-due loans went from around 20 percent in the crises years until the end of 2000 to below five percent in 2011.

Most economists agree that dollarization improves financial efficiency through the loss of LOLR as it directly engenders a vast increase in financial efficiency. Furthermore, as mentioned before, the dollarization process in Ecuador triggered the failure of those banks that were not efficient enough to survive.

It is clear from the data that the financial efficiency of banks in Ecuador has vastly increased in the last ten years. The measure for financial efficiency has gone up from between zero and ten percent in the first months of the year 2000 to right above seventy percent in the later months of 2011. Furthermore, the recent proliferation of smaller financial institutions shows that a larger percentage of the market has some sort of access to the banking system through both microfinance and credit agencies that focus on micro loans as well.

Dollarization improves the balance sheets of banks

The drastic inflation drop created by dollarization improves the balance sheets of banks. A decrease in inflation promotes saving rather than immediately spending money. Depositors are no longer afraid of putting their money in banks and having the value of their savings drastically diminished the next month. Banks are able to reduce significantly the passive interest they pay depositors, thus making it less expensive for them to leverage capital. As a result, banks can lower the active interest rates they charge to lenders making it easier for them to find clients willing to take out a loan.

Impact of Oil Prices on Banking Stability

There are other variables worth examining. The price of oil has increased considerably since the mid-2000s and has brought a lot of money into Ecuador that could be promoting stability in all sectors. Similarly, a seemingly politically stable period since the election of President Rafael Correa could be considered another important context variable. Correa is the only president since the election of Sixto Durán Ballén in 1992 to finish his mandate in office. Due to popular upheaval, previous presidents failed to complete their constitutional mandates. This was true for Abdalá Bucarám, Jamil Mahuad, and Lucio Gutiérrez, who were elected and later ousted from office. The first argument is further explored in this section, but the second one I do not discuss because arguments are vastly speculative.

It has been suggested, therefore, that the sharp increase in oil prices throughout the last decade has helped promote growth and financial stability throughout Ecuador, as seen in the graph below:

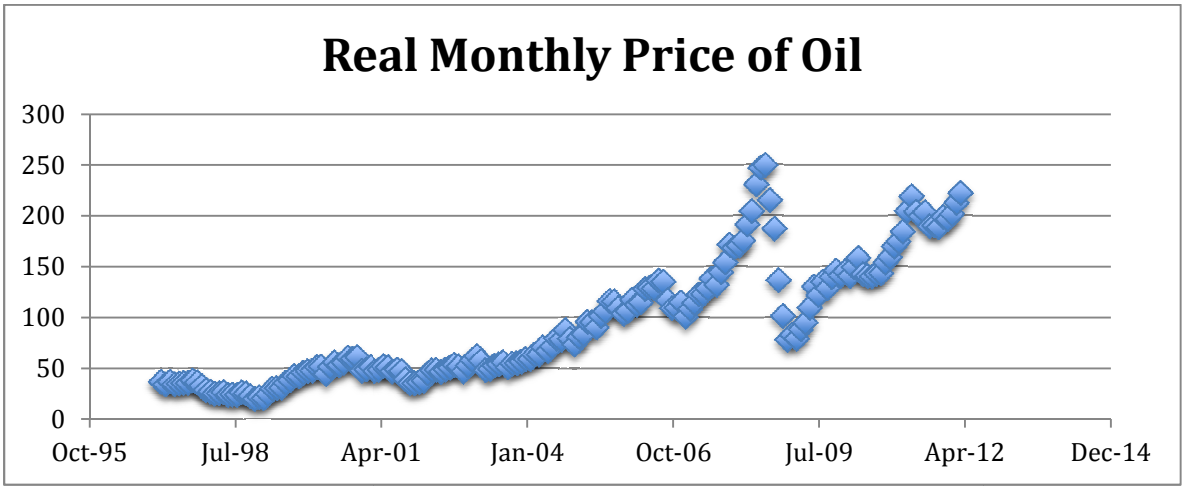

Figure 9 Price of Oil with 2005=100

Though the price of has risen, large swings are evident. If the financial stability of the country were solely dependent on the price of oil, the swings would transfer into the banking system. Furthermore, the oil factor has been present in the country for the past forty years and the country has never experienced the growth in financial stability that characterizes this past decade. Not even when oil was discovered and the economy grew rapidly, was there a similar development and deepening of the banking system. If anything, the economy's dependence on oil prices has generated more economic instability than economic stability.

In the estimations presented in chapter 4, GDP was removed from the equation and the results improved. It was removed because it became evident that the correlation between the banking stability and the growth in the GDP was not strong. However, because GDP is one of those variables that affect all the economy's sectors, a more in-depth analysis of its effects is warranted.

Conclusion

The transitive property in mathematics states that if A is equal to B and B is equal to C, then A is equal to C. The analysis conducted in this chapter carries the same logic. If dollarization affects the independent variables, and the independent variables explain the dependent variables, then it can be said that the dependent variables are affected or explained by dollarization.

Conclusions

The purpose of my thesis is to study the factors that affect the stability of the banking system in Ecuador and to assess the role of dollarization. Taking as the starting point the two models presented by Luisa Erika Pérez Hernández (2009), I conducted a time-series econometric analysis to identify the relationships between the banking stability of the country and the selected independent variables. The two dependent variables were Z and NPL. Z explains the level of financial stability within the system, and NPL gauges the credit risk of the banking system. The original independent variables were GDP, liquidity, financial efficiency, the proportion of productive assets, the percentage of past-due loans, the ratio between total assets and total liabilities, and the degree of concentration of the banking sector. The final estimated models are presented below:

1. $Z_t = \beta_0 + \beta_1 CA_t - \beta_2 L_t - \beta_3 CIR_t - \beta_4 CVC_t + \beta_5 EO_t + \varepsilon_t$
    a. $z_t = .81624 + .1249ca_t - .291l_t - .143cir_t - 1.7820cvc_t + .108eo_t$
2. $NPL_t = \beta_0 - \beta_1 H_t - \beta_2 CA_t + \beta_3 CIR_t + \beta_4 CVC_t + \varepsilon_t$
    a. $npl_t = .047 - .095h_t - .0458ca_t + .0592cir_t + 1.56cvc_t$

My study shows that the stability of Ecuador's banking system is highly correlated with the independent variables specified above. Furthermore, because of the improvements in all of the variables shown in chapter 3, it is clear that the financial system has become vastly more stable.

Chapter 5 contributes a theoretical discussion on the effects of dollarization on the independent variables. I show that through the four main benefits of dollarization on a small, open, and developing economy, the values of the independent variables have improved. The four main effects of dollarization on an economy are: i) the statistically

significant decrease in inflation, ii) the removal of the figure of the Lender of Last Resort, iii) the removal of currency risk, and iv) the increased credibility of regulatory institutions. These positive effects are proven to have a direct connection to the independent variables, and thus to the dependent variables portraying financial stability.

During the analysis of dollarization and banking stability in Ecuador, I faced several problems. First, there is no data to conduct an econometric study on dollarization and the banking system. Hence, my first recommendation to improve and strengthen the econometric model is to find data for the 1990s and analyze how the banking sector was doing before the dollarization and how it is doing now. The problem with this recommendation is that the data prior to the dollarization cannot be compared to that of post-dollarization without omitting important factors like inflation.

The second major improvement that would greatly benefit this analysis, but at the same time make it more complex, would be to use cross-section data for all the banks, or for a representative sample of banks throughout the period of analysis. This comparison would provide an accurate and demonstrative picture of the reality of the country. I could not do this because of my limited understanding of econometrics and the techniques used.

Lastly, it would help to go over the variable specification in order to be able to link dollarization to each independent variable. Furthermore, if it were possible to establish the econometric significance of dollarization on each of the dependent variables, it would demonstrate the effects the dollarizing an economy would have in the well-being of its banking system and its society.

With the above suggestions in mind, it is important to emphasize the contribution of my analysis. It represents a first step to understanding the effects of dollarization both

in the Ecuadorean banking system and on that of any country that either is dollarized or is thinking of dollarizing. Very few analyses have been conducted on the effects of dollarization on specific sectors, such as banking. The intrinsic understanding of such effects allows governments and citizens to make better-informed decisions. There are trade-offs when adopting a drastic measure for an economy, and it is important to recognize that what may be good for some sectors may not be good for others. It is therefore necessary to understand all the policy implications in order to reduce the likelihood of negative unexpected consequences.

More specific to this analysis, it is clear that dollarization has substantial potential benefits for the banking sector of an economy. Hence, a deep understanding of the exact repercussions of dollarization is required. My analysis is case-specific and it focuses on the economy of Ecuador only, showing that, for this country, dollarization did indeed help the banking sector. Economists suggest this type of analysis as necessary to discuss the particular effects of policy implementation. Also, this analysis shows that if nothing else, dollarization has allowed the development of a banking system that is now more stable and better prepared to face the challenges that will come in the future.

Some economists, including President Rafael Correa, argue that dollarization of the Ecuadorean economy was not a good thing; that the loss of sovereignty and monetary policy were detrimental to the country. Bu at least from the banks' point of view, dollarization has been nothing but beneficial to the country. Reversing it would only increase instability and risk in an economy that already has enough of both.

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