UNIVERSIDAD SAN FRANCISCO DE QUITO USFQ

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Is it Time to Dollarize the Andean Community?

.

Karen Mishell Díaz Álvarez

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Karen Mishell Díaz Álvarez

Nombre del profesor, Título académico **Mónica Rojas Garzón, MsC**

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Nombres y apellidos: Karen Mishell Díaz Álvarez

Código: 00143768

Cédula de identidad: 1725065021

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SUMMARY

This research work aims to determine the economic effects of the dollarization of the member countries of the Andean Community, in particular the effects of a possible official dollarization process on the assigned efficiency of resources and the key prices of the economy.

To this end, the study is based on the analysis of the accounts of the external and internal sector of the economy, also, the relative prices of an open economy are used.

On the other hand, a calibration model will be carried out to dynamically simulate the hypothetical situation of the implementation of an official dollarization scheme that quantifies the existence of exchange rate advance or delay.

Key words: Andean Community, dollarization, economic integration, inflation, national currency, foreign currency.

ABSTRACT

This research work aims to determine the economic effects of the dollarization of the member countries of the Andean Community, in particular the effects of a possible official dollarization process on the assigned efficiency of resources and the key prices of the economy.

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INTRODUCCIÓN

The American continent is the region of the world that has the largest number of regional integration systems, and it is necessary to admit that these processes have been carried out more by economic logic than by the political will of integration. In South America the most important integration processes that can be found are MERCOSUR and CAN. The Andean Community (CAN) was born in 1969, it is a community of four South American countries united by the common goal of achieving comprehensive, more balanced and autonomous development through Andean, South American and Latin American integration. The Andean integration process began with the signing of the Cartagena Agreement on May 26, 1969. The member countries of the community are Bolivia, Colombia, Ecuador and Peru. These countries occupy approximately a quarter of the South American subcontinent and are home to more than 100 million inhabitants. After formally establishing itself as a Free Trade Area, in which a free flow of goods and people were promoted, the CAN has done everything possible to dynamically promote intra-community trade. This regional bloc has remained stagnant and has not continued to advance its regional integration objectives.

Based on regional integration literature and in the stages of Balassa, 1961, the next step for CAN is total economic integration, which consists of “unification of monetary, fiscal, social and anti-cyclical policies. Supranational authority (binding)” (Balassa, 1961). "Regional economic integration offers a way to reactivate the economic growth necessary to reduce poverty and promote shared prosperity" (World Bank, 1999). For complete integration to take place, the CAN not only has to have a single market with free movement of goods, services, workers and capital; also, of a currency shared by its 4 members. Regional integration fundamentally needs to have an economic base. It must allow the exchange of goods, services, capital and workers, and it must serve to adopt common economic policies among the member

states, and this can be achieved by choosing a common currency such as the United States dollar.

During the last decade, a significant increase in the presence of foreign currency, mainly dollars, has been observed in the economy of the member countries of the Andean Community. This process known as dollarization occurs for various reasons; However, the main ones include the high and volatile levels of inflation, as well as the uncertainty that the presence of the different exogenous shocks that these countries face. In this sense, although dollarization depends on several factors, it is accentuated when assets in local currency lose the ability to maintain their real value constant over time. Additionally, the level of substitution is usually higher the lower the cost of changing assets from local currency to foreign currency and if the foreign currency is accepted, with some ease, as a means of payment in the national economy. One aspect to consider when interpreting dollarization relates to the distinction between monetary substitution and asset substitution. The monetary substitution is the process by which the foreign currency substitutes the local currency in its functions as medium of exchange and or unit of account; while asset substitution refers to the use of foreign currency as a store of value, that is, through investment in instruments denominated in foreign currency. However, it should be noted that these two types of dollarization are not exclusive since the existence of investment instruments in foreign currency previously requires the demand for currency as currency to make such investments, however, the growth rate and the level of deepening of the two may differ.

The importance of the dollarization issue becomes more relevant when analyzing the effectiveness in managing monetary and exchange rate policies, which are made more specific depending on the type of dollarization. For example, dollarization can reduce the margin of action of the monetary authorities because a significant fraction of liquidity is denominated in

a currency over which the Central Bank has little or no interference. Another relevant aspect when analyzing the level of dollarization in an economy is related to the level of exposure of the private banking system and its degree of exposure to exchange rate and credit risks, as its operations in foreign currency increase. This point becomes more relevant when the financial system lacks solidity and solvency.

This research will be divided into three chapters in order to adequately address the specific objectives that are intended to be analyzed, if the CAN should and is ready to dollarize, achieving full economic integration. The first chapter begins with a theoretical description of what dollarization is, the different exchange rate regimes and the implications of dollarization on the financial sector and the Government. The second chapter will address a brief summary of the dollarization situation of the CAN countries. Lastly, an econometric model will be carried out in which the determinants of dollarization in the CAN member countries will be identified, by estimating an equation in which the relative holdings of national and foreign currency in the hands of the public are expressed primarily as a function of their relative opportunity costs.

SECTION I

Dollarization

Dollarization is defined as "the legal use in a given country of a foreign currency in the different activities that its inhabitants carry out and that require the use of money" (Barajas, 2003). Initially, it can be thought that a dollarization implies that a country accepts dollars legally in the different activities that require money, but a dollarization does not refer to the use of affected dollars, it can be the use of any other currency, different from the national currency, within the territory of the given country (Cultural Deputy Manager of the Bank of the Republic, 2015). In this sense, the term dollarization is generalized to refer to the adoption of a foreign currency, whatever its denomination. What happens is that in most cases the foreign currency that countries host is the dollar. According to León and Reveiz (2008), dollarization is the adoption of a foreign currency to fulfill all or some of the functions of the local currency: serve as a means of payment, serve as a unit of account, and serve as a store of value.

Recently, the dollarization debate has aroused great interest and this process is increasingly considered as a feasible and probable option for many countries. In principle, dollarization arises from the weakness of the local currency to fulfill one of the three functions that are inherent to them: means of payment, since it adapts as payment for any good or service; unit of accounts, for the purpose of setting a price; and deposit of value, for its ability to retain that value over time. When a currency does not fulfill one of its functions? For example, when the inflation rate is very high, money loses its value quickly and prices vary constantly. This was the case of Peru in the years 1989 and 1990, when "inflation reached 3398.7% and 7482.7% respectively, prices varied so quickly that people, when receiving their salaries, spent them immediately, for fear that he himself lost value is his hands" (Paredes y Rossini, 1991). In this type of situation, economic agents prefer to keep their wealth in the form of assets such as real

estate. Likewise, money fails in its functions due to abrupt changes in the exchange rate, which is no more than the price of a foreign currency in terms of a domestic monetary unit. Thus, the Sucre in Ecuador suffered a "nominal devaluation of 350% between August 1998 and January 2000, so ecuadorians preferred to keep most of their assets and conduct their transactions in dollars" (Savastano, 1996). Dollarization then appears as a response to the number and severe inflation and exchange crises that some countries have suffered at different times in their history, that is, as a way to protect themselves or avoid such crises, clinging to a stronger currency. This is increasingly verified, as globalization narrows relations between nations and dependence on one another.

Among the factors that explain the emergence of the debate about dollarization, especially in Latin American countries, we can mention:

- Macroeconomic instability
- The poor development of financial markets
- Lack of credibility of stabilization programs
- The globalization of the economy
- The high inflation history of these economies
- Institutional factors

Dollarization: Some theoretical components

As already indicated, the dollarization process responds mainly to economic instability, high inflation levels and the desire of agents to diversify their portfolios with the intention of maintaining the real value of their assets. Thus, in hyperinflation conditions, dollarization it is a general trend. However, the dollarization process has been accentuated in some Latin American countries, despite their achievements in stabilization. This hints at the possibility that other factors contribute to explain the phenomenon, such as greater commercial depth (USA and European Union), in terms of CAN, greater economic integration.

Theoretically, as already mentioned, dollarization is defined as the process by which a foreign currency, generally the dollar, replaces the national currency in the performance of its functions. Therefore, the ideal way to measure should consider all foreign currency balances held by domestic residents. However, there are problems when measuring the degree of dollarization due to limitations in the available information. Typically, dollarization comes in the form of investments in financial assets denominated in foreign currency within the domestic economy, currency in foreign currency, and deposits of domestic agents in banks abroad.

In this sense, we can distinguish two substitution processes that are due to the reasons for demanding assets in foreign currency: currency substitution and asset substitution. The first occurs when "foreign currency is a means of payment, in this sense, agents stop using the national currency for their controls" (Paredes y Rossini, 1991). Asset substitution, meanwhile, occurs when "assets denominated in foreign currency are used as an integral part of an investment portfolio or as a means of value." This type of substitution is associated with capital mobility and can therefore be explained by the difference between the rates of return on assets in national and foreign currency.

But, due to trade openness, the globalization process and technological advances in bank transfers, every economy has a certain degree of dollarization. In this sense, “in countries with great commercial openness, resource transfer facilities and no restrictions to maintain deposits in foreign currency, the ratio of deposits in foreign currency to the liquidity of the banking system in national and foreign currency (M2) fluctuates between 15 and 20% "(Savastano, 1996). Historically it has been observed that in those countries with economic and political instability and with restrictions on deposits in foreign currency, once certain restrictions have been eliminated, this relationship has achieved up to 60%, for example Ecuador and Panama in the 90’s.

In Latin America, the 1990s was marked by high levels of inflation, which would explain the growing trend in the ratio of deposits in foreign currency to M2, however, despite a reduction in inflation rates at the end of During the decade and during the 2000s, the trend continued to increase. This phenomenon called by the literature as "hysteresis" explains this persistence of dollarization. The hysteresis "constitutes a fraction of the non-reversible dollarization process that is due to structural changes that are difficult to modify in the short term, or simply because agents do not perceive any benefit from changing their holdings in foreign currency to savings in domestic currency" (Barajas, 2003)

Another reason that would explain the increase in the levels of dollarization, despite the relative stabilization achieved, is the liberalization or greater financial integration and the return of capital in foreign currency that were abroad. This is evidenced by the "increase in international deposits of national residents in foreign currency in the national banking system" (Barajas, 2003). In this case, an increase in the confidence of agents in the domestic economy, but not in the local currency, could be considered. However, for this process to translate into a greater presence of foreign currency balances in the financial system, it is necessary, for example, to be able to save in foreign currency or off-shore banking, which becomes the facilitator of the process.

An example of this situation is Peru, when the restrictions on foreign currency deposits were lifted, the relationship between dollar deposits and the Peruvian sol increased as agents took benefit of the new advantages of diversification to repatriate their funds from other countries, but an increase in the degree of dollarization in the economy can lead to difficulties in managing monetary, exchange and financial policy. In this sense, “a rapid increase in the level of financial operations in foreign currency increases the risk of a crisis in the financial system due to currency and credit risk” (BID, 2004). The inflow of capital intermediated by the

financial system may increase international reserves, which could be in disagreement with the provisions of the monetary authorities. In other words, unless the authorities maintain these resources as reserves, there will be pressure on the exchange rate. In this way, changes in the exchange rate of the currency would positively or negatively affect agents who hold long or short positions in foreign currency, thus increasing exchange rate risk.

On the other hand, for the treasury, dollarization reduces the possibility of generating income from seigniorage. Indeed, in the case of monetary substitution, the use of a foreign currency reduces the demand for the domestic currency and implies a lower margin of seigniorage for the government. In other words, agents reduce their demand and possession of local currency. In this sense, dollarization limits the government's ability to collect the inflation tax through the use of foreign currency in transactions in which its use is more convenient than that of the national currency. In this context, the government would have to find alternative ways to finance its deficit, which is both an advantage and a disadvantage.

Exchange Regimes

Dollarization implies a transformation in the exchange system of a country. Hence, the importance of knowing that it is a foreign exchange system, its modalities and the advantages and disadvantages of each modality, in order to have the theoretical framework necessary to critically analyze dollarization. An exchange system is "the set of rules and institutions that govern the way in which the exchange rate is determined, and with it, the management of international monetary reserves" (BID, 2004). The exchange rate, meanwhile, is the number of units of the national currency that we can obtain for a unit of the foreign currency or, in other words, the price of the foreign currency expressed in the national currency. For example, the nominal exchange rate currently in Colombia is 3,771 Colombian pesos to the dollar. The exchange rate is a very important indicator for an economy, so much so that the problems that

have arisen in the exchange systems have expanded in the rest of the economy. In this sense, the dollarization of an economy is by far considered, as a way to allow developing economies to overcome monetary and exchange rate instability. To understand the origin of these currency crises, it is important to first know the characteristics of the different exchange rate regimes that have been implemented over time.

According to (Hidalgo, 2003) there are in principle two major classifications of exchange rate systems:

1. Fixed: the exchange rate is rigid and the currency is fully convertible in the reference currency, the main characteristic of a fixed exchange system is that the monetary authorities do not carry out sterilized interventions (that is, in the interventions they carry out, it will be allowed to influence the level of money supply of the economy, instead of implementing policies that counteract this effect) and the balance of payment determines the money supply. Among countries that have an exchange rate fixed, there are the dollarized countries or those that have the conversion system. For example, in Argentina, the currency is fully convertible into dollars, due to the conversion system implemented in 1991. A conversion system combines three elements: a fixed exchange rate against an "anchor" currency, automatic convertibility and a long-term.
2. Clean Flotation (Pure): the exchange rate is flexible and results from an interaction between supply and demand of currencies; the currency is fully convertible some countries with this type of system are Colombia, the Philippines, Peru, Brazil and Canada.

There are other exchange rate regimes that are, rather, intermediate points between the two extremes mentioned above:

- Anchored where the exchange rate is rigid, and the currency is fully convertible into the anchor currency. The monetary authorities, unlike the fixed exchange system,

perform sterilized interventions, and together with the balance of payments, determine the monetary base. The central bank uses its international reserves to intervene in the market until such reserves allow it. Some countries that have this system are Qatar, Iran and Aruba.

- Band, the exchange rate is flexible within limits and the currency is fully convertible, the central bank undertakes to keep the exchange rate within a range. Some countries that have this system are Denmark, Greece, Iceland and Vietnam.
- Controlled slip (crawling peg) the anchor varies on a predetermined scale. Some countries that have this system are Costa Rica, Nicaragua, Turkey and Bolivia.
- Sliding band (crawling band), the band moves over time. This system is also known as successive mini-devaluations. Some countries that have this system are Israel, Honduras, Uruguay Venezuela and Poland.

Recommendations on which is the best exchange rate regime for a nation has been changing, because the world economy is presenting different problems to policy makers. In this sense, many economists now consider that countries that present exchange problems should not have any exchange rate system, this means, that countries should abandon their national currency and legally adopt a more stable foreign currency.

Fixed and Flexible Exchange Rate Systems: Advantages and Disadvantages

The following are the arguments that favor each exchange system, the strengths that each represents and the weaknesses of the other.

Fixed Exchange Rate	Flexible Exchange Rate
Maintains discipline	Absorb external shocks
Reduce transaction costs	Independent monetary policy

Arguments in favor of a fixed exchange rate

- A fixed exchange rate system exerts pressure to maintain discipline.

Many times, especially in developing countries, central banks issue money without backing, in order to cover or finance large fiscal deficits or provide soft loans to the banking system. Although these measures may be popular in the short term, in the long term, under a fixed exchange rate, this measure would result in inflation and currency devaluation. In this sense, under a fixed exchange rate system, central banks will be discouraged to issue currency without their corresponding support. It is important to highlight that in a conversion box, as in the case of Argentina, the discipline imposed by the fixed exchange rate is even greater, since the Central Bank is not allowed to give credits to the government or the private sector.

- A fixed exchange rate system reduces transaction costs.

When the exchange rate is stable, the risk decreases at the time of exchanging the currencies and, in addition, the transaction costs (measured as the difference between the purchase and sale price in the currency market) decrease markedly. Therefore, entrepreneurs generally appreciate the stability of the exchange rate associated with the fixed system.

Arguments in favor of the flexible exchange rate

- A flexible exchange rate allows depreciations and appreciations of currencies to serve as a method of absorbing external shocks.

For example, consider a coffee exporter in Colombia, if international coffee prices start to fall, income from coffee exports decreases, the economy slows and unemployment increases. Under a fixed exchange rate system, one of the solutions would be to reduce nominal wages, so other industries can lower their prices and increase their sales, however, this measure is not viable, due to the high cost of renegotiation of thousands of contracts and the social tension that this process implies. On the contrary, if there is a flexible exchange rate system, the solution would be simpler, because the currency could depreciate, making colombian export products relatively cheaper and therefore attract a greater number of foreign buyers. Thus, the increase

in demand for colombian export products other than coffee, would compensate for the fall in coffee income and, therefore, absorb external shock.

- What is good for the United States is not necessarily good for another country.

It is important to highlight that a fixed exchange rate implies that the monetary policy of a country is tied to the US monetary policy, which would only make sense if the monetary policy of the United States is completely appropriate for the economy of the country in question. Thus, if for example, Colombia has fixed its exchange rate and needs to any reason, whether to cover a fiscal deficit or stimulate the economy, a monetary expansion, this measure would lead to a loss of reserves and eventually a contraction of the money supply.

As we see, the evidence seems to indicate that each exchange rate system is appropriate for certain circumstances. Thus, when a country is frequently affected by shocks to its exports, by fluctuations in the international prices of its products destined abroad, it is convenient to implement a flexible exchange rate system; however, it is very likely that a fixed exchange rate is more convenient for a country that does not suffer from many external shocks or they are small, or for those countries where central banks implement irresponsible economic policies or do not have institutional controls. Many economists agree that a flexible exchange rate system is beneficial for those economies that enjoy internal stability and a deep internal financial system that allows them to adequately manage monetary policy.

On the other hand, smaller economies, which have a shallow internal financial market and whose foreign trade represents a significant proportion of their Gross Domestic Product (GDP), should be inclined, rather by a fixed or sliding system, where the rate change remains the main variable that you want to control.

- If wages and benefits do not depend on a price index that contains a large component of imported goods

Those who defend dollarization point out that neither of the two previous systems (fixed or flexible) is optimal. On the one hand, they consider that a floating exchange rate is not viable for many countries because it is very volatile and also, if the authorities resist the movements of the rate, it could cause overvaluations or undervaluation. Experience has shown that even the currency boards are susceptible to speculative attacks, as were the cases of Argentina and Hong Kong when in recent years, they suffered serious episodes of financial contagion: these crises produced large increases in the rates of interest and recession.

In this sense, one of the benefits that is generally attributed to dollarization is that it allows countries to avoid or reduce the effects of monetary and balance of payments crises. The complete dollarization of an economy eliminates the possibility of great depreciation and, therefore, the sudden capital leaks that occur in the face of fear or imminence of a devaluation.

Theory of Optimal Monetary Areas

Dollarization, in order to be carried out successfully, implies the fulfillment of some conditions. According to economist Robert Mundell, one of those conditions is to satisfy the requirements of the Theory of Optimal Monetary Areas. This theory determines "when it is beneficial to implement flexible exchange rates and when fixed exchange rates are preferable, given the balance of payments crises that have been characteristic of the global economic system (the balance of payments records the transactions of a country with the rest of the world)" (Mundell, 1961). This analysis, although deep and complex, has been the basis for the discussion of dollarization, a monetary area could be defined as a 'domain within which exchange rates are fixed'.

The existence of a single currency means the presence of a Central Bank with the power to issue money and, therefore, an elastic offer thereof. As an example, the case of the European Economic Union, which has only one currency and a Central Bank capable of issuing euros,

could be cited; thus, in these countries, there is a money supply that can be adapted to demand without major difficulties, i.e. elastic offer. Nevertheless, within a monetary area with more than one currency, the money supply is more inelastic, since it is conditioned by the cooperation between the different Central Banks. In these cases, no Central Bank will be able to increase its money supply faster than the others, without this meaning losing reserves and, therefore, unbalancing convertibility. As we can see, there is a big difference between the adjustment process that occurs in a monetary area where there is only one currency and that in which there are different currencies. In other words, it could be said that there are differences between the adjustments in a regional economy (single currency) and an international economy (different currencies).

What is the optimal monetary area?

When there is more than one monetary area, there will inevitably also be exchange rates, which, if they are flexible, will help balance the balance of payments in case of imbalance. However, it is important to note that the exchange rate adjustments will not always solve the imbalances. Imagine an example between Bolivia and Peru, where one has its own currency. Let us also assume that the Island of the Sun is divided into two parts, which do not correspond to the border: on the one hand, the North, which produces soft drinks and, on the other, the South, which produces glass bottles. To test the flexible exchange rate argument in this example, we can assume that an increase in productivity in the soft drink industry will result in an increase in the demand for the bottle and an excess in the supply of soft drinks. Thus, excess demand in the south and excess supply in the north, produce unemployment in the latter zone, inflation in the former and a flow of reserves from the north to the south, due to the balance of payments deficit that would arise in the north. Thus, in order for both countries to control the inflation caused by excess demand for bottles, they would need to contract their money supply, while,

in order to reduce unemployment caused by the over-supply of soda, the central banks of both countries should expand their money supply.

Throughout this process, the exchange rate between Bolivia and Peru will adjust to these movements. As we can see, inflation can be controlled in both countries, but only at the expense of employment, unemployment can be controlled in both countries, but only at the expense of inflation; likewise, a situation with some unemployment in the north and some inflation in the south could be achieved. The important thing is that, it is not possible to avoid both inflation and unemployment in both countries; the flexible exchange rate fails to correct the balance of payments situation between the two regions, although it does succeed between the two countries. Therefore, the flexible exchange rate is not necessarily a better system than the fixed exchange rate or the single currency system.

Based on these ideas, Mundell designed his theory of optimal monetary areas. For this author, "the important thing is not the type of monetary area that exists, but the domain of said area, that is, the countries it covers" (Mundell, 1961). According to this theory, the optimal area is not the whole world, but a region. Using the same example above, but now assuming that there is one currency for the north region and one for the south, instead of one for each country, we would realize that the flexible exchange rate if we solve the balance of payments problem between both areas; therefore, the optimal area is not the whole world but a region.

In summary, for the defenders of this theory, a flexible exchange rate system based on national currencies could be effective in an economy where there is great mobility of factors internally, although not externally. However, if there are regions that cross the borders of different countries, as in the example cited, or if the countries are made up of multiple regions, the flexible exchange rate argument is only valid if the currencies are reorganized under a regional scheme.

In carrying out this analysis, it is clear that in order for the "monetary reorganization" to take place in reality, a profound political change is required, largely due to the role assigned to the national currency as an expression of the sovereignty of such a country, you might think that the concept of optimal monetary area has a practical application only in areas where the political organization is flexible, such as in the areas of ex-colonies and in Western Europe. If you only consider the object of internal stability, then it would be convenient to have many monetary areas; however, for a complete analysis it is necessary to take into account the costs associated with maintaining these monetary areas. Among these costs, it can be specified that money does not fulfill its function of unit of quantum so adequately when the prices of foreign goods are expressed in terms of a foreign currency and must be translated in terms of a local currency. In addition, money as a means of payment is less effective if there are many currencies. In fact, if we think of a hypothetical world, where there are as many currencies as goods, then the existence of money as a unit of account and means of payment is meaningless, and the exchange would take a change in the form of barter. As we see, if we consider only this argument, we conclude that only the size of the optimal area is the whole world, although we have already seen that this is not the case.

Similarly, there are two other factors that impose an upper limit on the number of optimal areas that must exist. First, there is the argument of speculation “currency markets should not be so small that a single speculative entity can affect the market price” (Mundell, 1961). The other factor is related to the psychology of economic agents, in the sense that “individuals prefer to see their purchasing power variable due to fluctuations in the exchange rate rather than changes in nominal wages or prices” (Mundell, 1961). The latter is so, because unions negotiate nominal wages, not real wages, and if their wage demands are adapted to the cost of living, they do so only in relation to the prices of those products that are not imported. Thus, as the monetary areas become smaller and the proportion of imported goods in the family basket

increases, the agents, more and more, are going to pay attention to the fluctuations in the exchange rate.

In summary, the theory of optimal monetary areas establishes that the argument of stabilization of the flexible exchange rate (in terms of stabilization of prices and employment) is valid if it is based on regional monetary areas. Each of these regions must have a different currency that fluctuates freely relative to the other currencies. In this context, Robert Mundell has recommended since 1961 the formation of an optimal monetary area that we have the United States as the center, in addition to insisting that all countries carry out their transactions in yen, euro and dollar, with the aim that in the long term only circulates the latter.

Dollarization Modalities

Unofficial or informal dollarization

Unofficial or informal dollarization normally appears spontaneously, that is, economic agents prefer to keep part of their financial assets in foreign currency, whether in deposits, foreign banknotes, bonds, among others. Already in another stage, called by some authors "monetary substitution", the prices of certain goods and services are denominated in dollars. Agents mostly take the foreign currency as a reference, relating the local currency to the exchange rate only for payment purposes. Unofficial or informal dollarization exists even outside the country's legal framework. This is evident in Latin American countries where, given the strong commercial relationship they have with the United States of America and the enormous influence that this country has on their economies, its citizens prefer to use the dollar.

Semi-official dollarization

This second type of dollarization implies that the foreign currency is legal tender, however, the local currency continues to play a fundamental role in the economy. In semi-officially dollarized countries, the Central Bank maintains the ability to influence monetary policy.

Table No. 1 contains a sample of some countries that represent unofficial or informal and semi-official dollarization:

Table No.1

OFFICIAL OR FORMAL DOLLARIZATION		
Country	***Since***	***Foreign Currency Used***
Guam	1898	U.S. dollar
Panama	1904	
Puerto Rico	1899	
Micronesia	1944	
Marshall Islands	1944	
British Virgin Islands	1973	
Ecuador	2000	
The Savior	2001	
San Marino	1897	Italian Lira / Euro
Monaco	1865	French franc / Euro
Vatican City	1929	Italian Lira / Euro

Source: IMF

Money demand version

In developing countries, the demand for national currency is very important for an economy since a part (large in the case of underdeveloped countries as well as their capital markets) of investment financing is carried out through the credit market. In other words, a high credit volume (nominal) in national currency only allows a high volume of investments so only asset holders are willing to accept in their portfolio a sufficient amount of assets in national currency. As investments destined for the national market must be financed in national currency (this to exclude exchange rate risk), the demand for monetary assets in national currency emits the volume of investments and, consequently, the development of the country's national market.

Consequently, “the demand for monetary assets in a currency depends, apart from the interest rate arguments and the expectations of a change in the exchange rate, the probability of the surplus payments to be made in this currency and the amount of expected illiquidity costs in a case of surplus payments” (Castellano, 2018). This allows us to deduce that, on average, the surplus payments in foreign currency will be higher in a debtor country than in a creditor country and, therefore, the foreign currency is more attractive in that country. The most rational

decision of an economic agent is to choose the way in which he carries out his transactions. If there is an excessive demand for foreign currency, a seller, for example, delivers his merchandise receiving foreign currency for payment and even discounts if he receives in foreign currency. This phenomenon is especially perceived in foreign trade where in this way the volume of foreign currency increases in volume of transactions and creates another incentive to have foreign currency.

In the case of dollarization, this process reaches such dimensions that even at the national level there is a high willingness to make sales against payment in foreign currency. The non-pecuniary rate of return is not, therefore, only the starting point of the dollarization process, but even increases during it. Since the national currency is overvalued and one of the requirements for development is to eliminate this overvaluation, it can be applied through a stable nominal exchange rate given by an increase in the price level below the average increase in prices in other areas. monetary. The successive real devaluation also ends up improving competitiveness. The disadvantage is in the fact that there is a strong import that generates a demand for foreign currency and that can only be reduced by increasing the interest rate, that is, a restrictive policy.

SECTION II

The macroeconomic characteristics of the countries with the highest levels of dollarization are very similar, basically high levels of inflation that have deteriorated confidence in the local currency. Additionally, they are countries in which stabilization programs have begin with a depreciation of the local currency. Another element present in dollarized economies is the loss of confidence in the management of the economic policy. Based on a study carried out by the IMF (1997), a highly dollarized economy is one that registers a ratio of deposits in foreign currency to M2 greater than 30%. Under this definition, in Latin America, the countries with high levels of dollarization are Argentina, Peru, Uruguay, Colombia, and Bolivia.

In Latin America dollarization has gained strength since the mid-1980s and especially in the 1990s. Despite the reduction in inflation, this phenomenon has persisted in the medium term, which shows the lack of credibility in macroeconomic leadership, management and administration. This section presents a series of qualitative and quantitative indicators that characterize the degree of dollarization of the CAN member countries that allow evaluating the evolution of dollarization at the microeconomic level. All the information in this section is the result of questions specially formulated in the Macroeconomic Expectations Survey (EEM) of the Central Reserve Bank of Peru and the databases of the Central Bank of each country.

Financial Dollarization

The dollarization of payments or monetary substitution, in which residents use the dollar as a means of payment, responds to the public's mistrust of their currency to carry out daily transactions, which can lead to replacing it with another currency or means of payment than the public deems more convenient. Mistrust may be due, for example, to a high level of inflation that penalizes the possession of local currency (Ize and Parrado, 2002); This was the case of the Ecuadorian economy before total dollarization when economic agents substituted

sucre for the dollar in their transactions (Sierra and Padilla, 2000). The CAN member countries are classified as economies with high financial dollarization, where wages and other prices are still denominated in local currency.

Financial dollarization (FD), also known as substitution of assets and liabilities, consists of using the dollar to denominate deposits, loans, and other financial contracts, to preserve its value. Practically, FD is the first step to reach official dollarization. This type of dollarization, very common in Latin America, is usually measured with the coefficient of deposits in foreign currency as a proportion of total deposits (Heysen, 2005). It can be seen in table No. 2 that the financial dollarization increased significantly between 1990 and 2001 for the CAN member countries. The ratio of deposits in foreign currency (DFC) to total deposits increased greatly in countries that were already highly dollarized, such as Bolivia and Peru. Dollarization also increased in Colombia between 2001 and 2010, the country with the lowest level of dollarization. These countries preserved demand for their currencies through a combination of sound economic policies, indexed financial instruments, and legal restrictions on dollar transactions.

In some countries, residents progressively increased the use of the dollar to carry out their conventional transactions or the purchase of goods and services (means-dollarization), and in others, progress was even made towards real dollarization, where contracts, wages and prices of goods and services were indexed to exchange rate variations. However, since the early 2000s, many of these countries have undertaken economic policy measures to de-dollarize their economies, highlighting the cases of Bolivia, Uruguay, and Peru, among others.

Since 2005, financial dollarization has decreased in some Latin American countries. Bolivia and Peru have experienced moderate declines in DFC as a percentage of total deposits.

However, its magnitude is still high in the CAN member countries. Although financial dollarization has been reduced considerably (in the case of credits, from more than 80 in 1990 to less than 30 in 2018), the dollarization of transactions persists at high levels (around 60 percent). This imposes important challenges to monetary policy, mainly in scenarios of greater volatility in the exchange rate, which affect domestic inflation through the transfer to prices.

Table No. 2: Dollarization in deposits and credits in selected countries
(In percentage)

Country	Deposit dollarization				Credit deposits			
	1990	2001	2010	2018	1990	2001	2010	2018
Bolivia	87,5	92.9	43,8	14,2	96,1	97,0	43,6	2,2
Peru	62,5	78,4	46,2	39,5	72,1	78,2	43,3	28,8
Colombia	0,3	0,5	2,0			6,3	5,8	4,6
Ecuador	13,3	100,0	100,0	100,0	ND	100,0	100,0	100,0

Source: Bancos Centrales de cada país, De Nicoló, Honohan e Ize (2005), Rennhack y Nozaki (2006) y FMI
Note: (ND): No Disponible

Financial dollarization, in which the dollar is used to denominate deposits, loans, and other financial contracts, responds to the need for a currency that preserves the value of assets. This fairly common type of dollarization is due, among other reasons, to the fact that agents seek to reduce the volatility of the real value of their portfolio of assets using foreign currency. Peru, Bolivia, Costa Rica, Uruguay, and Colombia show high degrees of financial dollarization. According to the theoretical review, three factors determine the greater or lesser degree of financial dollarization of an economy: i) credibility of the monetary authority and confidence in the local currency, ii) the relative volatility of the local currency and risk coverage, and iii) commercial integration and size of the economy.

Additionally, financial liberalization has had a positive impact on the dollarization process. In many analyzed economies, limitations on foreign currency operations such as deposits, credits, and even transactions, were eliminated between 1980 and 1990. This, together with the macroeconomic environment noted above, caused agents to consider it safer to keep their

foreign currency assets. For its part, borrowing in foreign currency also generated certainty, especially if the government announced a target for depreciation of the local currency and greater stability in the contracted interest rate.

Table No.3

Legal regulation for operations in foreign currency				
Country	***Currency***	***Deposits in ME***	***Credits in ME***	***Deposits off-shore***
Bolivia	Boliviano and legal contracts in US $	Possible in every way since 1987	Unlimited	No restrictions
Peru	Nuevo Sol and legal contracts in US$	Possible since 1988, full convertibility since 1990	Unlimited	No restrictions
Colombia	Colombian peso and legal contracts in US$	Possible in every way since 1986	Unlimited	No restrictions
Ecuador	American dollar	Possible in every way since 1986	Unlimited	No restrictions

Source: IMF

Regarding the reserve policy for foreign currency deposits, the countries analyzed recorded a high percentage, mainly due to the uncertainty and volatility of these deposits. In this sense, "the legal reserve required for foreign currency deposits in developing countries reaches up to 50%, while the reserve requirement in transition countries is, on average, 12% and in developed countries, the reserve requirement over this type of fundraising is equal to the reserve requirement for local currency, on average 5% (IMF, 2016). Likewise, the currency in which this reserve requirement must be made in developing countries is foreign currency and the local currency in other countries. This difference is due to the instability and uncertainty in these countries and policy that seeks to protect savers, as well as to avoid further weaknesses in the financial system.

Table No.4

Requerimiento de Encaje (en porcentaje diciembre 2019)		
Country	***Local Currency***	***Foreign Currency***
Bolivia	12	66.5
Peru	5,2	35.5
Colombia	4,9	---

Source: IMF

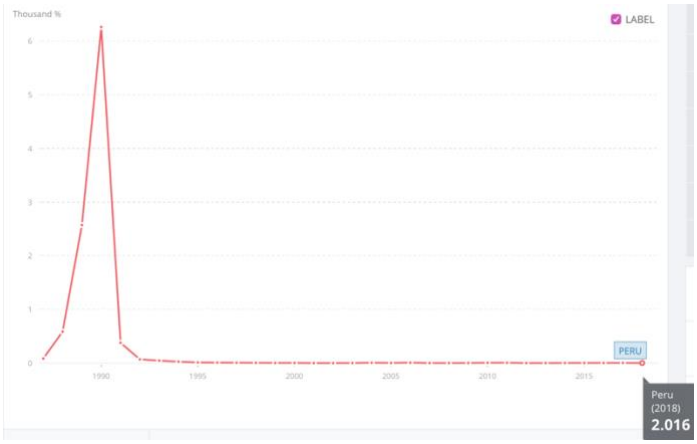
Dollarization in the CAN

Dollarization in Peru

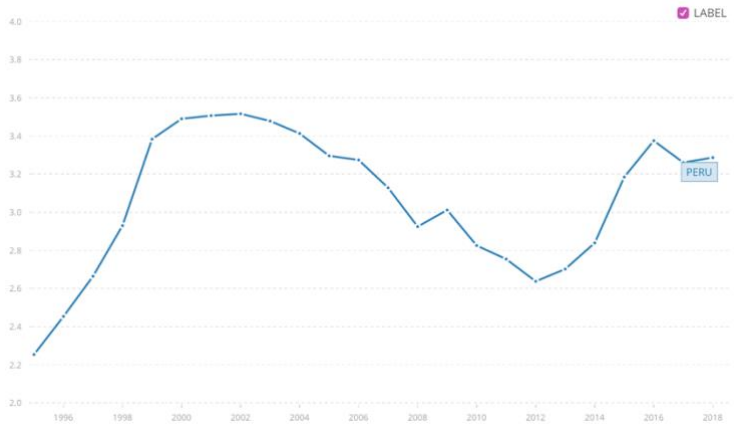
In the early 1990s, Peru experienced periods of economic instability, characterized by high inflation rates, high fiscal deficits, and unsustainable debt levels. The loss of purchasing power of the local currency due to the rapid growth in prices, prompted people to use the dollar as a store of value, considerably increasing their deposits in foreign currency in the banking system, for which credits were also granted under this denomination. This perception of risks of devaluation of the national currency was maintained for several years until the beginning of 2000, even though the economy had price stability.

Graphic 1: Evolution of inflation in Peru
(In percentage)

a) Inflation



b) Nominal exchange rate
(Soles per US dollar)



Source: World Bank

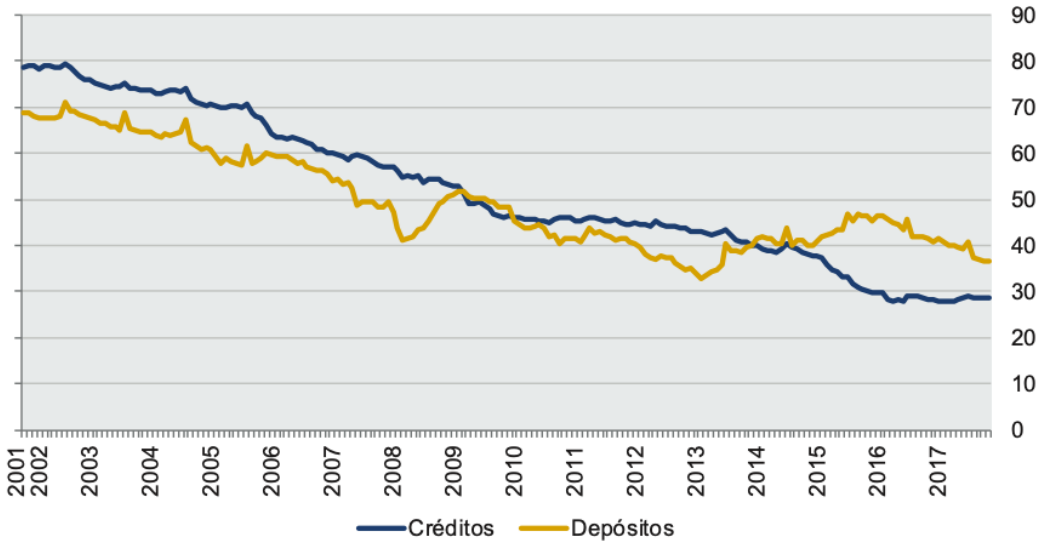
"Since the late 1990s and the following years, reforms in the financial system and the conduct of monetary and fiscal policies have stabilized hyperinflation and prices, reaching levels of 3.7 percent annual inflation in 1999" (Armas, 2016). The explicit inflation targeting regime (MEI) implemented by the Central Bank since 2003 consolidated price stability with an annual

inflation rate of 2.8 percent on average between 2003 and 2016. The significant reduction in inflation, complemented by the Central Bank "de-dollarization policies dramatically reduced financial dollarization, from 82 percent in the late 1990s to 29 percent in June 2018" (Central Bank of Peru, 2016).

Peru was the first country to implement a successful MEI scheme for monetary policy in a context of partial dollarization of the economy. In 2003, when this monetary policy framework was adopted, the dollarization of deposits and loans amounted to 67 and 77 percent, respectively. Dollarization could create friction in the transmission mechanisms of monetary policy. To reduce the vulnerability of the Peruvian economy to the credit and liquidity crisis that characterized economies with high partial dollarization, "the Central Reserve Bank of Peru (BCRP) decided to promote financial de-dollarization through various policy mechanisms" (Armas, 2016). The measures implemented in early 2000 aimed at the internalization of risks of foreign exchange operations by economic agents, the progressive increase in the reserve requirement for deposits in foreign currency and the application of remuneration differentials for favorable bank reserves for the National currency.

The Peruvian economy managed to relatively de-dollarize its financial system, reducing the proportion of deposits and credits in foreign currency. Deposits in dollars peaked at 71.2% at the end of August 2002, after progressive declines, currently at around 36%. Regarding loans in foreign currency, these reached maximum participation in the total of 79.3% in the same period, falling until the end of 2017 to around 29% (Graph 2)

Graphic 2: Dollarization of deposits and credits of Peru
(In percentage)



Source: Superintendency of Banking, Insurance and AFP of Peru

However, despite the significant reduction in financial dollarization (which is still high by international standards), events in the foreign exchange market pose challenges to monetary policy through the effect of passing the exchange rate on domestic prices, induced due to the persistence of real dollarization, which, in turn, may affect the formation of inflation expectations. Graph 1 shows that fluctuations in inflation and inflation expectations are less than those of currency depreciation. The nature of exchange rate fluctuations, as well as the medium degree of real dollarization, may influence the transfer effect. The persistence of partial dollarization led the Peruvian economy to adapt its transactional technologies and market practices to the coexistence of two currencies. Currently in Peru holdings of any form of deposits in the financial system are allowed without restrictions on foreign currencies such as the US dollar. Bank, ATMs are adapted to withdraw money in soles currency and dollars. Furthermore, the public can easily access the foreign exchange market in both the formal financial system and the informal market. Most durable goods (such as real estate, cars, machinery, among others) are traded in US dollars. Likewise, the trade opening of the economy together with the greater growth of trade are factors that can induce dollarization.

Dollarization in Bolivia

Dollarization in Bolivia is a process that was already observed in the 1970s, although in this period the national currency dominated as a medium of exchange, the unit of account, and store of value (Lora, 1999). Since 1973 deposits in foreign currency were officially admitted to the financial system, increasing dollarization in the economy. In July 1981, the window of the Central Bank of Bolivia for the free sale of foreign currency was closed, because the country's reserves were depleted. Commercial banks, unable to access the dollars from this window, refused to receive bolivian pesos to cover their dollarized claims, thus forcing debtors to pay in dollars. Borrowers turned to the black market for the currency and the price of the dollar in this market rose significantly. With an increasing parallel market exchange rate, many of the borrowers became delinquent and some industries failed.

On the other hand, a policy of de-dollarization was adopted in November 1982, the basic objective of which was to settle the default of the industrial sector of the economy. The government ruled that all debts due in foreign currency, contracted by individuals and legal entities, be converted into national currency at the official exchange rate in effect at the time of payment, which was well below the parallel exchange rate. Likewise, deposits in foreign currency were converted into bolivian pesos. The big losers of de-dollarization were savers and workers' social funds.

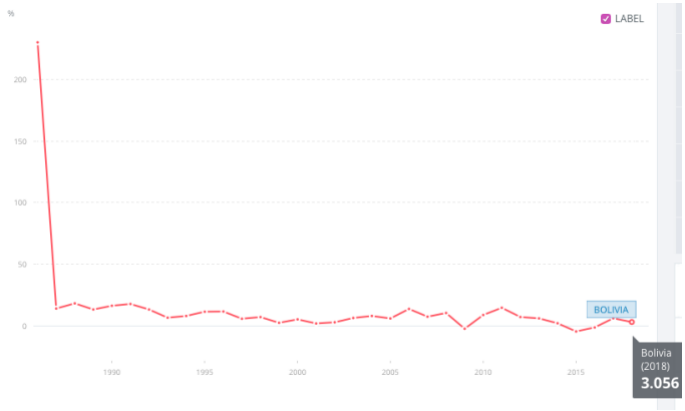
This set of measures did not manage to stop the economic crisis, and ended up deteriorating public finances, confidence in the banking system, and boosted the expansion of the parallel dollar market disconnected from the official exchange rate; triggering the largest hyperinflation in the history of the country, where the price increase came to exceed 8,170% in 1985 (Graph 13). Given the seriousness of the situation, the new government implemented an effective stabilization program that included, among other measures, the restitution of the possibility of

carrying out operations in dollars within the national financial system. With the reestablishment of foreign currency deposits, the formal financial system was rebuilt based on the US dollar.

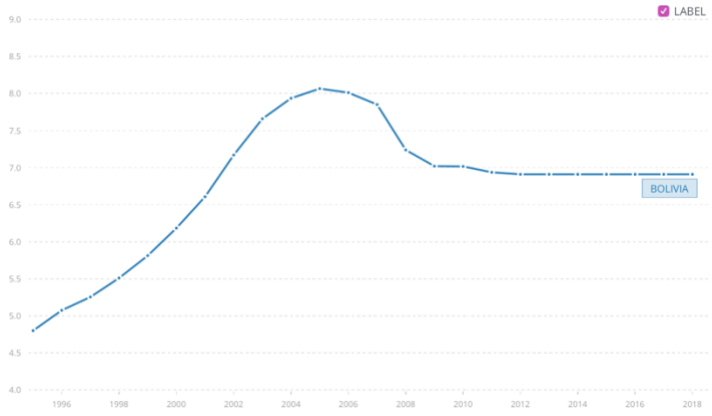
Despite the success of the NPE to emerge from the economic crisis and restore the stability of the financial system, mistrust in the national currency lasted for several periods, persisting until the mid-2000s. During these years, the dollarization of deposits and loans came to represent

Graphic 3: Evolution of inflation in Bolivia
(In percentage)

a) Inflation



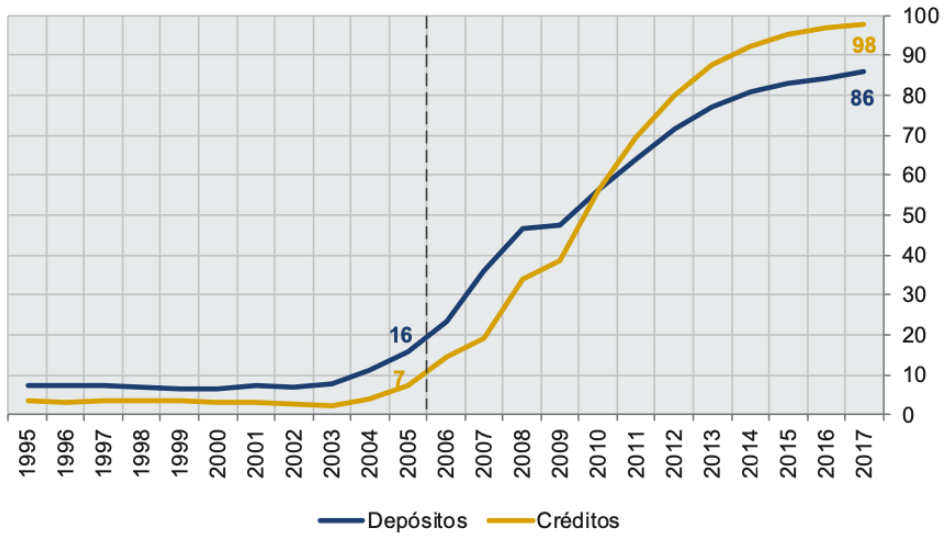
b) Nominal exchange rate
(Boliviano per US dollar)



Source: World Bank

more than 90% of the total (Figures 14a and 14b) and the Open Market Operations (OMO) 36 of the BCB were preferably carried out in dollars. This had an impact on the reduction of the spaces of action (less effectiveness) of the monetary policy to regulate the liquidity of the economy, a less slack for the fiscal policy, a decrease in the seigniorage, and a high vulnerability to external shocks.

Graphic 4: Dollarization of deposits and credits of Bolivia
(In percentage)



Source: Financial System Supervisory Authority - Central Bank of Bolivia

Until 2005, the country's financial dollarization levels (greater than 80% and 90% for deposits and loans) far exceeded that registered in other countries in the region. Given the persistence of exchange rate and balance sheet risks in the financial system, in addition to the imminent loss of monetary sovereignty, the issuing entity and the executive body decided to give a change of helm to the economic policy, particularly in monetary policy and exchange. Therefore, “a period of policies aimed at creating mechanisms that systematically promote greater use of the national currency would start from 2006” (Castellano, 2018). Among the most important measures are the reorientation of exchange rate policy towards mini-prices initially and greater stability of the nominal exchange rate later. Also important were the widening of the exchange rate differential (for buying and selling), the differentiation of the reserve requirement by currencies with higher reserve requirements for deposits in foreign currency, a period of greater use of the UFV when inflation increased, the bolivianization of monetary operations (of OMO and other instruments), the Financial Transaction Tax (FTT), changes in the exchange position and other monetary measures and macroprudential regulation

that promoted a differential in returns in favor of operations in national currency concerning foreign currency.

In this way, financial nacional currency experienced important advances in the last twelve years. In 2005, the proportion of deposits and loans in national currency reached just 16% and 7% in each case, for 2017 these ratios increased impressively to 86% and 98%, respectively (Graph 4). Despite the general trend towards the bolivianization of deposits and portfolio, there were specific aspects that determined that the process proceeded at a differentiated rate depending on the financial market segment, the type of entities and the regions, among other variables.

Dollarization in Colombia

Colombia has a financially little dollarized economy less than 15% in 2018, this being the only type of dollarization it has and being only above Venezuela, which has zero dollarization. Colombians currently have the possibility of acquiring and maintaining assets and liabilities in foreign currency, however, Colombia, along with Chile and Venezuela, has not given any sign of interest in dollarizing their economy.

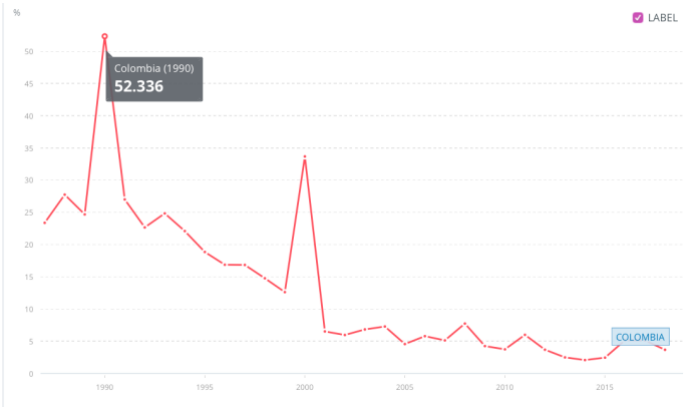
The Colombian economy is characterized by having high credibility in monetary policy and in the central bank, being a medium-sized economy, with a medium level of integration, which, measured as "the sum coefficient of exports and imports as a proportion of GDP, it is less than 29.5% on average for the 1994-2005 period and where exports as a percentage of GDP are less than 13.9% for the same period" (Singh, 2006) and have a history of moderate and mild traumatic inflation and devaluation. Therefore, the causes that justify financial, real, means of payment or total dollarization are not met for the Colombian case.

The most important episode of dollarization occurred in the 1999 when dismantling the exchange rate band, where in a context of high inflation and depreciation of the exchange rate

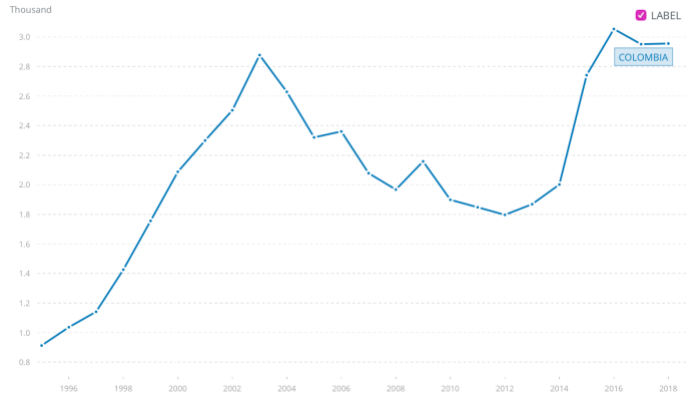
(Graph 5), the use of the US dollar in the financial system and as a medium increased

Graphic 5: Evolution of inflation in Colombia
(In percentage)

b) Inflation



b) Nominal exchange rate
(Peso per US dollar)



Source: World Bank

significantly payment for real estate transactions. The Banco of the Republic (BR) privileged monetary autonomy and capital mobility over an exchange rate commitment. If financial dollarization is allowed, due to the balance sheet effect and the (fear of floating), the BR pressured to maintain a level and volatility of the exchange rate that guarantees the stability and solvency of the financial and real sector, as well as the wealth of savers and debtors.

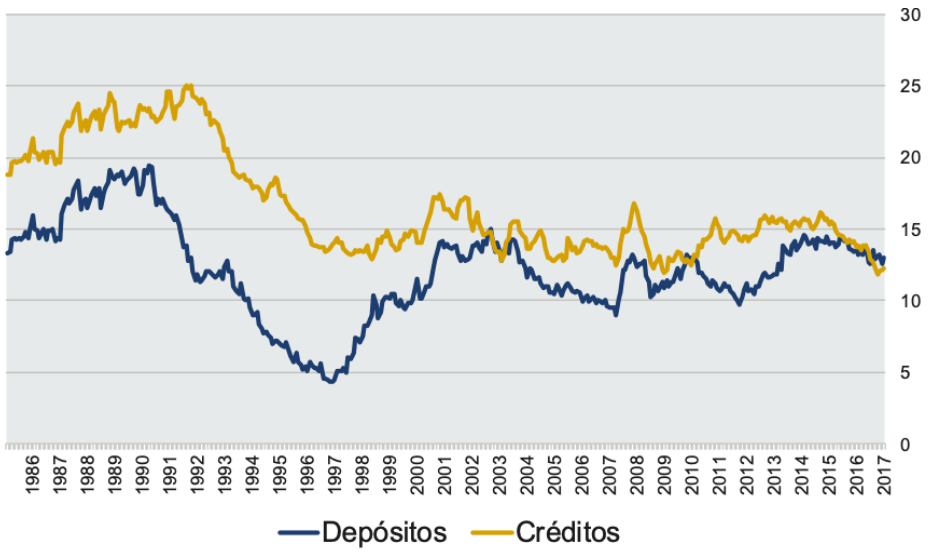
However, dollarization was not an alternative consistent with the objectives of colombian economic policy, for which the BR took measures to "increase operations in Development Units (DU), in addition to stabilizing its growth rate. interest, using it as a reference for financial operations" (Calvo, 2002). The DU is an inflation indexed unit of account that covers the means of payment in national currency. Such measures helped to avoid pressures to increase dollarization until the 1990s.

Subsequently, since August 2001, the BR changed its Monetary Policy Rates (MPR) to be expressed in nominal terms (leaving the DU), however the coverage of some indexed instruments continued and new hedging instruments for the exchange market were perfected.

Given that confidence in the colombian peso was already consolidated, this momentous change did not significantly affect the levels of dollarization of deposits and loans in the financial sector (Graph 6). For this reason, the colombian peso is a currency that has the confidence of the agents of the economy, supported by the credibility of the authority and monetary policy.

The interest rate on dollar deposits is generally lower than that of local currency deposits. This low profitability against peso deposits suggests that there is no financial incentive for the public to wish to transfer their deposits to dollars. The existence of expectations of appreciation or low depreciation of the peso, as well as the low remuneration of dollar deposits, results in the absence of a financial incentive for the public to wish to transfer their deposits to dollars.

Graphic 6: Dollarization of deposits and credits of Colombia
(In percentage)



Source: Bank of the Republic

SECTION III

Determinants of dollarization

Model especification

From the review of the existing empirical literature on dollarization in Latin America, two types of standard tests can be established to identify the determinants of dollarization: The first of these is to estimate an equation in which the relative holdings of domestic and foreign currency in the hands of the public are expressed primarily as a function of their relative opportunity costs.

The common general form can be represented as follows:

$$(1) \quad \frac{M}{eF} = \lambda\left(\left(i - i^*\right), \Omega\right) \quad \lambda\left(i - i^*\right) \quad \langle o$$

Where:

- M and F are national and foreign money balances,
- e is the nominal exchange rate,
- i (i*) is the domestic (external) nominal interest rate,
- λ is a multiplier, and
- Ω is a vector of other determinants,which may include proxies that capture political and institutional changes, political risk factors, balance adjustment mechanisms represented by the lagged dependent variable, a deterministic trend to capture inertia in the process of monetary substitution, among others (Suarez, 1992).

Frequently and due to information limitations, the inflation rate differential or the expected rate of devaluation is often used instead of the interest rate differential.

The second test to demonstrate the presence of dollarization consists of estimating an equation of demand for balances in national currency in which it is included as an additional regressor

to the expected rate of devaluation. In this case, the estimated equation takes the following general form:

$$(2) \quad \frac{M}{P} = \Phi(\pi, \delta, R, Y);\ \Phi_{\pi}\ \langle o \quad \Phi_{\delta} \langle o$$

Where:

- M denotes nominal balances in national currency,
- P is the domestic price level,
- ϕ corresponds to a multiplier,
- π is the rate of domestic inflation,
- δ is the expected rate of devaluation,
- R is a vector of other rates of return,
- Y is a scale variable.

Although these tests have disadvantages that have been widely discussed, they verify whether or not there is evidence of dollarization and whether the data supports the hypothesis that rates of return and opportunity cost variables are statistically significant determinants of public holdings. in national and foreign currency. As indicated above, the degree of dollarization in an economy has many implications and generates pressures or tensions on the exchange rate, interest rates, among others. Additionally, the increasing level of deposits in foreign currency generates greater tensions on the financial system due to the currency risk. However, dollarization has some advantages, for example, from the agents' point of view, the diversification of its portfolio is a positive element, as are the greater opportunities for reintermediation and financial deepening. Financial institutions manage to expand their operations through new products in foreign currency, although this diversification can increase the systemic risk of the financial system if it is not very solid.

Metodology

Econometrics provides numerous empirical tools in testing the relationsip among economic variables. Each tool has its merits and demerits. The early literature and elementary econometric have adjusted Ordinary Least Square (OLS) as the best estimator based on its "BLUE" properties.

For the analysis in this study, the dollarization indicator is condesired as a function of spreads in interest rates, internal risk and a partial adjustment mechanism represented by the lagged dependent variable. The general functional form of the model used can be expressed as:

$$(3) M_t = M_t(dr_t, R, M_{t-1}, \phi, T, \varepsilon_t^*)$$

where:

- dr_t: interest rate differential in period t,
- R: internal risk,
- ε_{t^*}: expectations of devaluation in period t
- ∅: dummy variables for critical months,
- T: deterministic trend,
- M_t: some measure of the degree of monetary substitution in period t,
- M_{t-1}: lagged dependent variable used to capture partial adjustment.

The dependent variable is measured as the ratio of deposits in foreign currency (DFC) with respect to the monetary aggregate M2 (ISM) expressed in logarithms. The interest rate differential (RATES) is approximated through the difference between the reference dollar passive rate and the LIBOR rate for 90-day deposits less the expectation of devaluation. In this case, the devaluation expectations of the 3 countries have been subtracted to reflect a possibility of interest rate arbitrage.

As for the risk variable, the differential of the internal and external inflation of each country (Peru / Bolivia / Colombia and USA) (INFL), the ratio of international monetary reserves on the monetary aggregate M2 (RMIM2) and the real exchange rate index (TCR). Regarding the promises of these proxies, due to the inflation variable, economic agents tend to demand a risk premium for maintaining financial assets in national currency. Given an increase in expectations of internal inflation, individuals would move to the foreign currency, positively affecting the indicator of monetary substitution. The second variable could be considered as an internal risk for each country, since it represents the portion of international monetary reserves that would be absorbed by the private sector in adverse situations, so this variable would be expected to have a negative effect on the indicator of monetary substitution. Finally, when it comes to the real exchange rate index, this variable is relatively correlated with the dollarization coefficient. These variables were identified with the initials of each country: PER, BOL and COL.

The behavior of the variables analyzed accounts for a dollarization process. When performing the corresponding empirical analysis on the causes of this process, the results of the cointegration estimate by the ordinary least squares (OLS) method between the ISM dollarization coefficient and the variables of interest rate differentials and inflation, the relationship RMIM2 and currency risk, (ER) rejects the null hypothesis that there is no cointegration, therefore these variables cointegrate and an error correction representation could be made.

Data

The central focus of this study is limited to the member countries of CAN. La informacion que se utiliza es mensual y comprende el periodo de diciembre de 2015 a diciembre de 2018, the choice of this time is limited to data available for 2019 for every country. The mail data source

are Unternatuinal Financial Satatistics of the International Monetary Fund, Central Bank of each country and World Governance Indicators (WGI).

Empirical Results

Cointegration Model

Three models were carried out, one for Peru, another for Bolivia and the last for Colombia, the three regressions present a good level of adjustment (adjusted R^2 of 0.89, 0.99 and 0.68 respectively) and a Durbin Watson greater than 1 that determines the existence of cointegration between the variables. Regarding the significance of the variables incorporated in the three models, the interest rate and inflation differentials of the three countries show a high statistical significance, while the proxy variables used for internal risk and exchange rate risk (RM1M2 and ER) it would appear not to be statistically significant in the three models. Examining the results firstly, it should be noted that the signs obtained for the variables coincide with what was expected in theory, and secondly, the influence of the variables that reflect the interest rate and inflation differentials should be highlighted. In the case of the interest rate differential, there is a negative correlation with the dollarization indicator, that is, when a reduction in the rate differential occurs, economic agents will reduce their assets in foreign currency and and increase their holdings in national currency.

However, the impact of a reduction in this differential would not have a major impact on the reduction of dollarization in Peru and Bolivia (0. 04 and 0.01 percentage points respectively). Nevertheless, in Colombia the impact is greater in the reduction of dollarization (0.3 percentage points), this is justified because Colombians have more confidence in their national currency. On the other hand, the internal and external inflation differential would be positively related to the dollarization index, this result would suggest that the decrease in inflation would

significantly reduce the degree of dollarization of the economy in both Peru and Bolivia (1.79 and 2.5 percentage points) and on a smaller scale in Colombia (0.71 percentage points).

Table 5: Cointegration Model

PERU				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-3.7793	0.6100	-6.1954	0.0000
TASAS	-0.0443	0.0082	-5.3981	0.0000
ER	0.0283	0.0174	1.6253	0.1142
INFL	1.7877	0.2069	8.6401	0.0000
RMIM2	-0.9249	0.8273	-1.1180	0.2722
Observations	48			
R^2	0.9102			
Adjusted R^2	0.8986			
Residual Std. Error	0.5004 (df = 46)			
F Statistic	78.5714*** (df = 2; 46)			
Durbin-Watson stat	1.1779			

Table 6: Cointegration Model

BOLIVIA				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-5.29102	0.3666	-8.6735	0.0000
TASAS	-0.01772	0.0049	-7.5573	0.0000
ER	0.04567	0.0104	2.2754	0.0000
INFL	2.4521	0.1241	12.0961	0.0000
RMIM2	-0.8976	0.4963	-1.5652	0.0000
Observations	48			
R^2	0.992			
Adjusted R^2	0.992			
Residual Std. Error	0.291 (df = 47)			
F Statistic	19,730.000*** (df = 1; 47)			
Durbin-Watson stat	1.1875			

Table 7: Cointegration Model

COLOMBIA				
	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	-1.5117	0.4100	-4.9782	0.0000
TASAS	-0.2811	0.0654	-0.88	0.3800
ER	0.0113	0.1557	5.76	0.0000
INFL	0.7151	0.0663	16.92	0.0000
RMIM2	-0.3699	0.2073	-1.20	0.2327
Observations	48			
R^2	0.564			
Adjusted R^2	0.68			
Residual Std. Error	0.625 (df = 44)			
F Statistic	1.278* (df = 2; 44)			
Durbin-Watson stat	1.1678			

Error-Correction Model

The second regressions that were run were long-term equations in which the first difference of the dependent variable is examined, the same that is explained by its lagged values, by present and lagged values of the explanatory variables included in the first models and by the lagged value of the remainder of the cointegration equations. Based on the discipline marked by the dynamic economy, the model that most closely approximates the process it is trying to explain, passed the tests on both the residuals and the parameters, the results of which are the following for each country

Table 8: Error-Correction Model for Peru

	Dependent variable:
	DISMPERU
DISM(-6)	0.2717***
	(0.0723)
DISM(-9)	−0.2858
	(0.0703)
TASAS(-1)	0.0130
	(0.0007)
DINFL	0.2008
	(0.0007)
DINFL(-9)	−0.2693
	(0.0007)
DRMIM2	−1.3204**
	(0.0007)
DER	0.0153
	(0.0007)
DER(-1)	0.0195
	(0.0007)
RES(-1)	0.2347
	(0.0007)
Constant	0.4341***
	(0.0706)
Observations	48
R^2	0.7562
Adjusted R^2	0.6271
Residual Std. Error	0.0309 (df = 46)
F Statistic	5.8588*** (df = 2; 46)
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 9: Error-Correction Model for Bolivia

	Dependent variable:
	DISMBOL
DISM(-6)	−0.1678***
	(0.0979)
DISM(-9)	−0.1897
	(0.0789)
TASAS(-1)	0.0100
	(0.0009)
DINFL	0.3108
	(0.0010)
DINFL(-9)	−0.2193
	(0.0009)
DRMIM2	−1.8865***
	(0.0060)
DER	0.0165
	(0.0008)
DER(-1)	0.0212
	(0.0007)
RES(-1)	0.2456
	(0.0012)
Constant	0.5467***
	(0.0823)
Observations	48
R^2	0.8678
Adjusted R^2	0.7768
Residual Std. Error	0.02139 (df = 46)
F Statistic	7.81237*** (df = 2; 46)
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 10: Error-Correction Model for Colombia

	Dependent variable:
	DISMCOL
DISM(-6)	−0.3565***
	(0.0672)
DISM(-9)	−0.3658
	(0.05672)
TASAS(-1)	0.100
	(0.0002)
DINFL	0.02101
	(0.0005)
DINFL(-9)	−0.5293
	(0.0005)
DRMIM2	−0.7862*
	(0.0010)
DER	0.0213
	(0.0009)
DER(-1)	0.0112
	(0.0001)
RES(-1)	0.1189
	(0.0002)
Constant	0.3246**
	(0.0103)
Observations	48
R^2	0.6271
Adjusted R^2	0.5160
Residual Std. Error	0.0987 (df = 46)
F Statistic	5.3489** (df = 2; 46)
Note:	*p<0.1; **p<0.05; ***p<0.01

From the analysis of the results, the following aspects can be highlighted. In the first place, the good level of adjustment of the first two models Peru and Bolivia, with an adjusted R_2 of 0.62 and 0.77, taking into account that the dependent variable is in differences, which assures us that the model is collecting the dynamics presented by dollarization. In the case of Colombia, they have an adjusted R_2 of 0.51, which is also good, although less significant, unlike other countries.

Second, the level of significance of most of the explanatory variables can be observed, with the exception of the differences in inflation rates between the domestic and the United States for the three countries. Particularly noteworthy is the greater significance of interest rates with a lag (TASAS-1), the first difference of the RMI / M2 variable (DRMIM2) and the first difference of the variable that measures the foreign exchange risk DER (-1). In the estimated equation in tables No. 8, 9 and 10, the elasticity coefficient of 0.0130- Peru, 0.0100 - Bolivia and 0.100 - Colombia for the interest rate differential variable implies that, in the short term, a reduction In this component, in one unit the ratio of foreign currency deposits over M2 could decrease by 0.0130, 0.0100 and 0.100 percent respectively for each country. In the case of Colombia, again we see that it is not affected by exogenous changes regarding dollarization.

Regarding the positive sign that accompanies this coefficient in the three models, in principle it would not be consistent given that if there is a decrease in the interest rate differential, economic agents would reduce their assets in foreign currency and increase their currency holdings. national. However, a positive relationship may reflect the fact that economic agents perceive the possibility that a realignment of the exchange rate is taking place, or failing this, the abandonment of the exchange system; but also political factors can influence the decisions of individuals when perceiving certain economic instability, which could be associated as a factor of internal risk or country risk.

Regarding the inflation expectations differential, although the contemporary variable is not statistically significant in any of the models, its influence in the short term is 0.20 for Peru, 0.31 for Bolivia and 0.02 (almost nil) for Colombia percentage points. Additionally, it is appreciated that the nine-month lag negatively affects the three equations, with which a decrease in the spread between the expected rates of internal and external inflation in one unit could, in the short term, decrease the participation of the foreign currency at 0.27 for Peru, 0.21

for Bolivia and 0.52 for Colombia percentage points. In the case of Colombia, as previously seen, it is a country with a strong monetary policy that despite its inflation, the national currency is stronger than the foreign one. On the other hand, without considering policy actions, the estimated equation suggests that reducing inflation, at least in the short term, could reduce the degree of dollarization of the economy for both Peru and Bolivia.

The coefficients for the balance adjustment variables, taking into account that it corresponds to lags of 6 and 9 months, imply that economic agents would not immediately or totally adjust their holdings to variations in the relative returns of current balances in foreign currency. . The coefficient of -0.56 for Peru, 0.36 for Bolivia and 0.72 for Colombia in the balance adjustment variable implies that only 44, 64 and 28 percent of the adjustment between current and desired balances occur instantaneously, that is, in the month December 2018. Consequently, current holdings in any given month have a strong effect on behavior during the following month. The relative explanatory power of the lagged endogenous variable suggests an inertia in the dollarization process in the three countries and the difficulty of reversing this trend.

Regarding the RMI / M2 variable, used as a proxy for internal risk, it turned out to be statistically significant in the three models. The negative coefficient of 1.3204 for Peru, 1.8865 for Bolivia and 0.7862 for Colombia indicates that a decrease of one percentage point in this relationship would have a positive impact on the monetary substitution index at 1.3204, 1.8865 and 0.7862 percentage points respectively, reflecting an attack on reserves international monetary. Analyzing the variable that measures the exchange rate risk, approximated by the deviations of the real exchange rate with respect to its trend, it can be seen that both the

contemporary variable and the lag of the first month are statistically significant and of the expected sign.

Although the empirical analysis carried out considers deposits in foreign currency on M2 as the "representative index" of dollarization and on which the majority of econometric work has been carried out, there are other relationships that account for the level of dollarization in the economy. One of these is the proportion of monetary deposits in foreign currency over the total monetary species in circulation plus monetary deposits in current account. Using this dollarization measure, it can be seen that the trend is increasing despite a high degree of volatility due to the greater liquidity of these assets as they are deposited in current accounts. In addition, these resources show a greater movement due to the payments or disbursements that agents must make in foreign currency, as well as payments made mainly by the export sector of the economy of the three countries.

CONCLUSION

Once it has been verified that dollarization is present in the three economies, to a lesser extent in Colombia, and that it is a process that has been accentuated and increased in recent years, it is up to the monetary authorities to delve into the implications of this phenomenon on the design and implementation of economic policies. The presence of dollarization in the national economy does not necessarily constitute a negative phenomenon, on the contrary, rather, it generates the need to rethink monetary, exchange and financial policy to consider the level of foreign currency present in the domestic economy. For this, the authorities of the three countries must take into account two fundamental aspects: which type of monetary policy is the most appropriate, that is, one that controls the exchange rate, interest rates or some monetary aggregate; and how to determine the intermediate objective.

In this sense, although dollarization by currency substitution does not exclude dollarization by asset substitution, when setting a monetary and exchange rate policy, it is convenient to determine the degree of each one. In the case of currency substitution, the main implication is the volatility of the exchange rate, which would tend to be greater due to the increase in demand for foreign currency. Furthermore, the demand for local currency will be more sensitive to changes in its expected opportunity cost. Moreover, the effect of interest rates on the demand for total money will be another component that will be affected. The interest-demand elasticity of the domestic currency will be greater when the currency substitution is significant. This greater sensitivity of demand will in turn have direct pressure on the exchange rate. Therefore, when the elasticity of demand for the local currency is greater and a floating exchange rate is maintained, it will be more volatile. It is for this reason that when dollarization focuses on currency substitution, to avoid high volatility in the exchange rate, the literature recommends a controlled rate.

On the other hand, if dollarization results from an asset substitution process, the narrower definition of money would not be affected, but the possibility of having deposits in foreign currency has implications for the exchange rate regime decision because by having foreign currency deposits in the national banking system, it increases capital mobility, while the public can move from foreign currency deposits to national currency in the domestic financial system. These investment alternatives strengthen the relationships between domestic interest rates in foreign currency, international interest rates as well as equivalent rates in local currency. Therefore, in this case, a flexible exchange rate that increases the autonomy of the Central Bank is better considered, contrary to the recommendation established in the case of a monetary substitution.

In addition to determining the appropriate exchange rate regime, it is necessary to determine the appropriate monetary aggregate to achieve the inflationary objective as well as its growth goal. Taking into account that the quantity of money is used as an intermediate objective of monetary policy, and therefore it determines the level of prices through the demand for money for transactional purposes, currency substitution implies that assets in currency foreign are an important part of the concept of money, while an asset substitution is not.

In dollarized economies, the selection of a monetary aggregate as an intermediate objective of monetary policy implies a purely empirical problem, since it is not possible to deduce a priori the composition of the demand for money. In the design of monetary programming, it is required to determine whether the monetary aggregate that is closely related to the final objective (such as inflation) should include assets in foreign currency, since in that case a goal would be setting for an aggregate that has an unstable relationship with the final goal. In short, the presence of dollarization has consequences for the management of monetary policy, insofar

as the relationship between the components of the monetary aggregate and the level of activity is related to the liquidity level of each component.

If the CAN member countries dollarize, they would obtain the advantage of maintaining a balance and offering healthy competition between the different countries of the organization, forcing the productive sector to be competitive through improving production techniques or not based on devaluations that in the end, they end up taking its toll on the national industry and development. In the preview econometric exercise, we see that both Peru and Bolivia have already taken the first step towards official dollarization. In these two countries there is already a de facto dollarization of stocks, what is missing is to dollarize flows, which is only possible if the national currency is renounced as a means of payment.

Indeed, the unilateral decision of these two developing countries to adopt the dollar as a monetary unit shows good signals to the market. Investors will need less information to make their decisions and will not require econometric experts to model and project the national exchange rate against the dollar and other strong currencies. The exchange rate risk disappears and the credibility of the economic policy increases, as the government will have than assuming greater fiscal discipline and better debt management, which will revert to a reduction in sovereign risk, the cost of credit, and therefore greater investment and growth.

On the other hand, Colombia does not have high financial dollarization and it exists strong credibility and confidence in its currency, however, Colombia is part of the CAN beside Ecuador, Bolivia, and Peru. The latter two have medium-sized developing economies, which are close to official dollarization while Ecuador is fully dollarized. Their economic cycles are similar among them and the impact on international markets is significant, so a change from Colombia to the dollar would bring the idea of economic integration closer.

As previously stated, upon losing competitiveness, this alliance would lose its strength as well, and the economic aspects it encompasses would be affected, especially affecting the Colombian economy, what would have to do with a reduction in the circulation of goods, services, capitals and people (CAN, 2015).

After establishing a free trade zone, the CAN countries have taken actions to determine among themselves the free flow of people and goods intra-community trade has been boosted. In terms of the regional integration process, "the CAN is in a stage in which it seeks to move from a free zone to a regional common market, eliminating restrictions on the movement of production factors" (CAN, 2015) and thus being able to reach an economic union, which can be achieved through dollarization.

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