# Real dollarization and monetary policy in Peru

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## Summary

*Despite the average inflation levels of 2.8 percent between 2002 and 2015, within the range of the price stability goal, partial dollarization remains as the main vulnerability of the Peruvian economy. Although financial dollarization has already been importantly reduced, in the case of lending, from 82 percent at the end of 1990's to 29 percent in June 2016; the dollarization of transactions persists at high levels such as 58 percent imposing important challenges to monetary policy, principally in events of higher volatility of the exchange rate which passes-through to domestic inflation. In this scenario, measuring the real dollarization at the sectorial level and at the level of the structure of costs of the non-financial firms becomes crucial to understand it and to contribute to the design of the monetary policy in the presence of dollarization.*

*JEL classification:*
C43, E52, E58, F31
*Keywords:*
Dollarization, financial dollarization, real dollarization
Monetary policy

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## 1. Introduction

Partial dollarization remains as the main vulnerability of the Peruvian economy.

During the 1970s, households were induced to store assets in the form of foreign currency due to prevailed persistent high inflation (27 percent of annual inflation on average). This phenomena was further enhanced by the hyperinflation of 1988-90 (3 850 percent of annual inflation on average). Since the third quarter of 1990 and in the following years, the reforms in the financial system and in the conduct of monetary and fiscal policies, brought a halt to the hyperinflation and stabilized the prices reaching 3.7 percent of annual inflation in 1999.

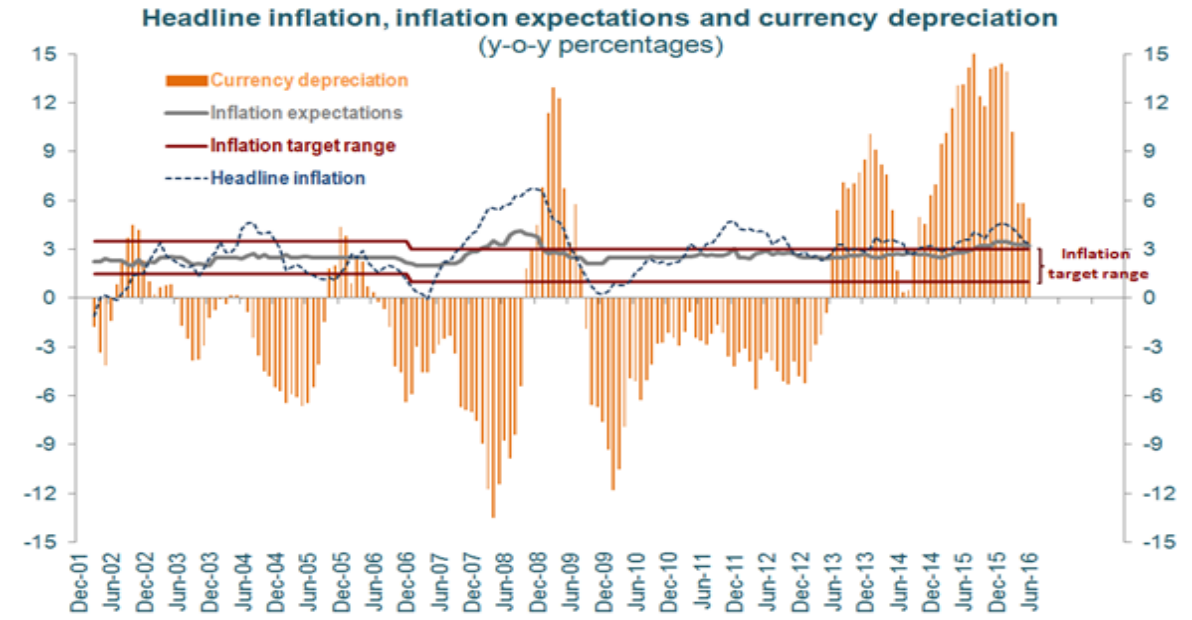
The inflation targeting regime implemented by the Central Bank since 2002 consolidated the stability of prices with an annual inflation of 2.8 percent on average between 2002 and 2015. The important reduction of inflation complemented with Central Bank de-dollarization policies reduced importantly the financial dollarization, particularly the credit, from 82 percent by the end of the 1990's to 29 percent in March 2016.

Peru was the first country in implementing a successful Inflation Targeting (IT) scheme for monetary policy in a context of partial dollarization of the economy. In 2002, when this monetary policy framework was adopted, the dollarization of deposits and loans was 67 and 77 percent, respectively. Although dollarization can create some frictions in the transmission mechanisms of the monetary policy, the evidence from Peru shows that it is possible to implement an IT regime with dollarization, complementing the regular design of monetary policy which uses the short term interest rate as its operational target, with an active use of macro-prudential tools such as reserve requirements and foreign exchange interventions, among other instruments.

However, despite the important reduction of financial dollarization (which is still high at the international standards), events in the foreign exchange market poses challenges to monetary policy through the pass-through of exchange rate to domestic prices, implying the persistence of real dollarization (dollarization of transactions: using the dollar as unit of account and medium of exchange); and may affect the formation of inflation expectations. Figure 1 shows that although the fluctuations of the inflation and inflation expectations are much more lower than those of the currency depreciation, however these dynamics signal a special character of the exchange rate pass-through.

Consequently, to better understand the implications and challenges for monetary policy, in this paper, after a brief revision of the stylized facts of financial dollarization, we address measurement issues of real dollarization: first we will identify the dollarization of transactions at a sectorial level; second we will look for the level of dollarization in the structure of costs (labor costs, financial costs, operational costs and prices of inputs), distinguishing the traded or non-traded character of the final output of the surveyed firms which will also provide us an indirect measurement of the possible balance sheet effects of changes in the exchange rate due to currency mismatches. Finally, we will discuss the challenges for monetary policy posed by real dollarization.

**Headline inflation, inflation expectations and currency depreciation (Y-o-y percentages)** **Figure 1**

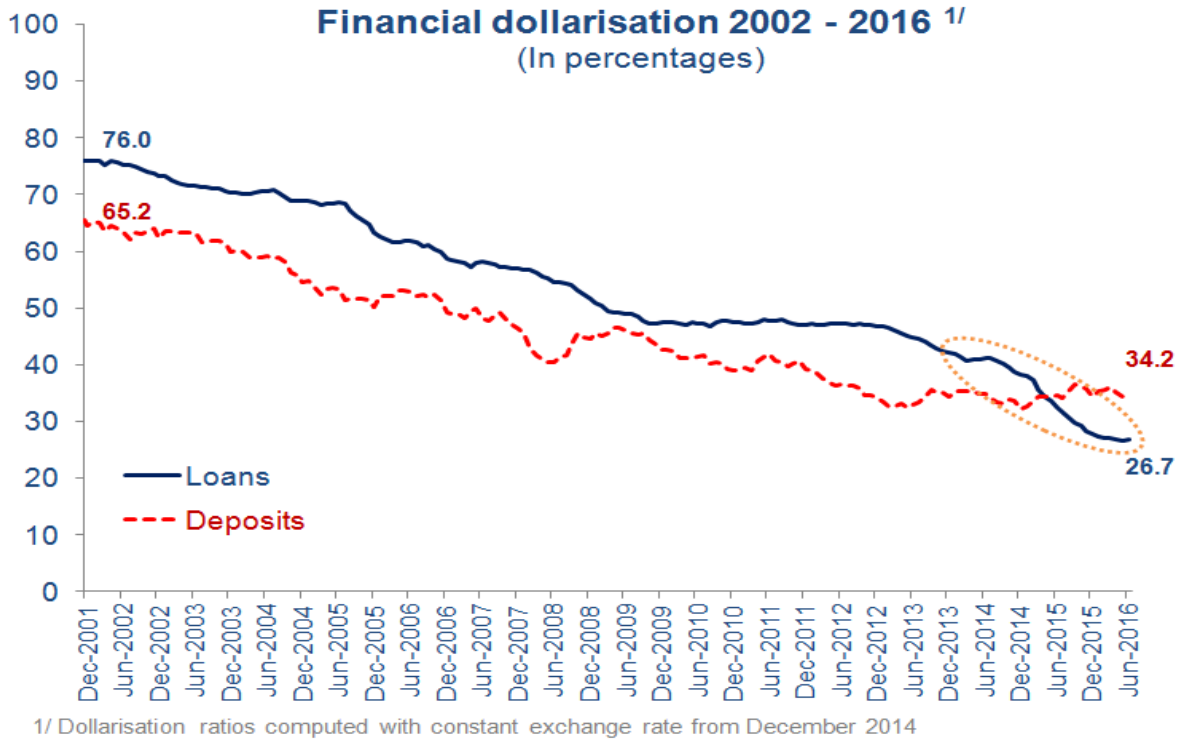



## 2. Stylized facts of financial dollarization

Since the implementation of the IT monetary policy framework in Peru, the financial dollarization of the economy has been importantly reduced, both in the assets and the liability sides of the balance sheet of the financial system. The loans dollarization decreased from 76.0 percent in January 2002 to 26.7 percent in June 2016, and the deposit dollarization has been reduced from 65.2 to 34.2 percent during the same period. (See figure 2).

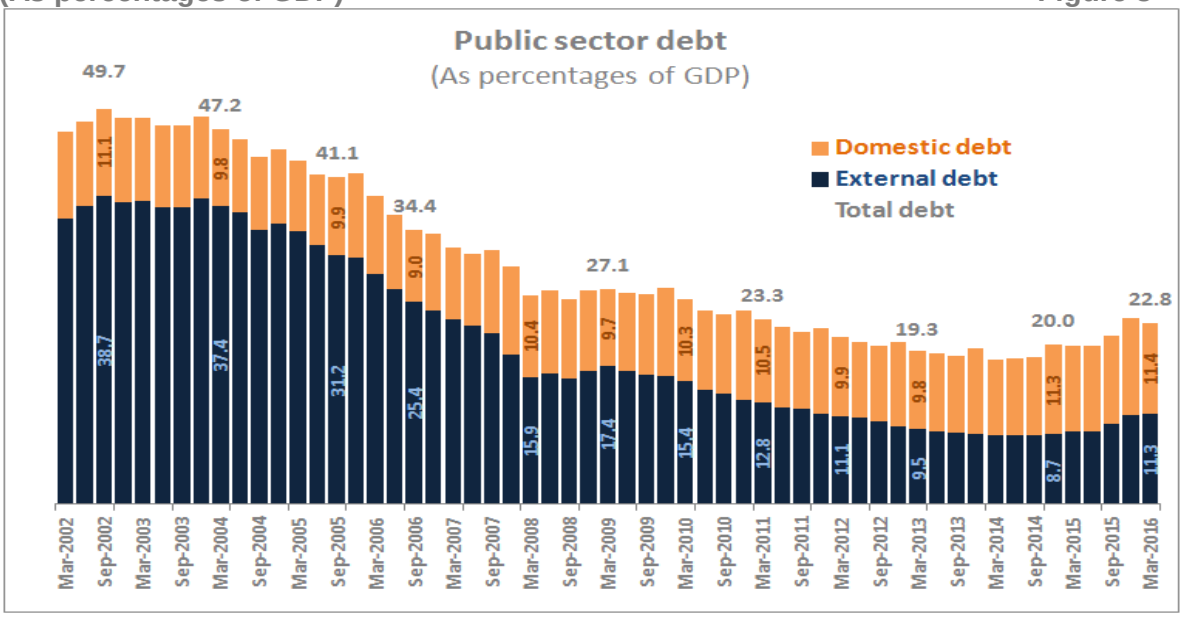
The main drivers that contributed to the de-dollarization process include the sustained macroeconomic stability of the Peruvian economy reflected in inflation levels at the price stability range, 2.8 percent during the last 15 years (Figure 1), and a disciplined management of the fiscal accounts reflected in an important reduction of the public sector debt which averaged 29.6 percent of GDP during the same period (Figure 3). The de-dollarization process has been further enhanced by macro-prudential policies aimed to strengthen the stability of the financial system, which allowed financial institutions to internalize the currency risks. The progressive development of the capital markets with trading of assets in domestic currency also played an important role. (García Escribano, 2010).

**Lending and deposit dollarization[1/]**
**(Percentages)** **Figure 2**



1/ Dollarisation ratios computed with constant exchange rate from December 2014

**Public debt**
**(As percentages of GDP)** **Figure 3**

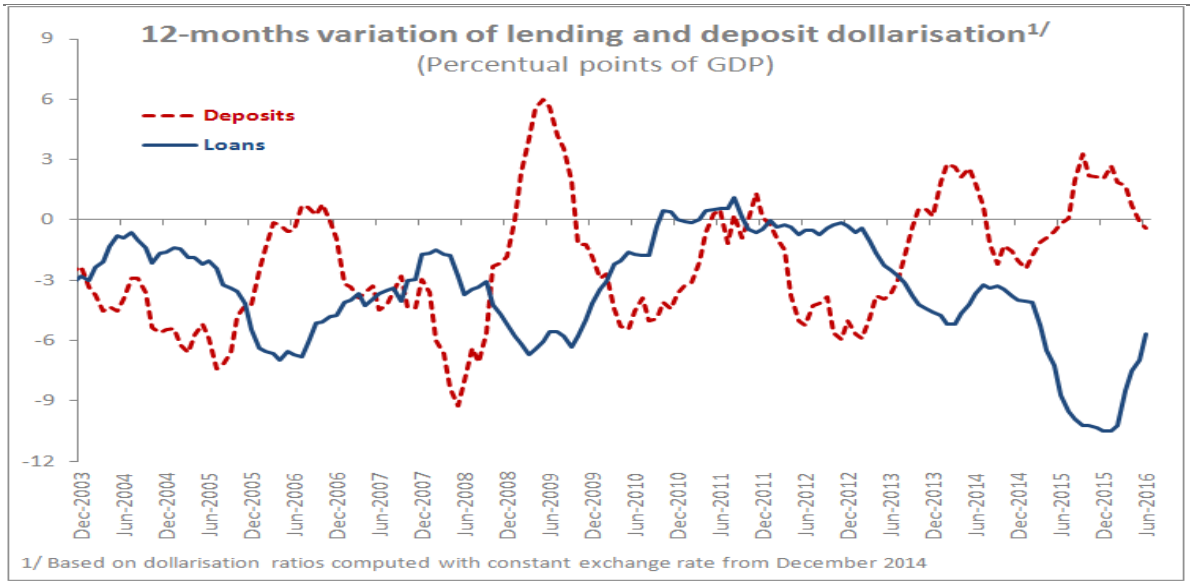


Although the financial de-dollarization process of the economy shows a clear long term downward trend of the lending and deposit dollarization ratios, reflecting the increasing confidence of economic agents in the domestic currency; however, this process has shown periods of rigidity, or upward shifts of the ratios. This behavior may reflect strong dependence on the global and domestic uncertainties faced by the financial system.

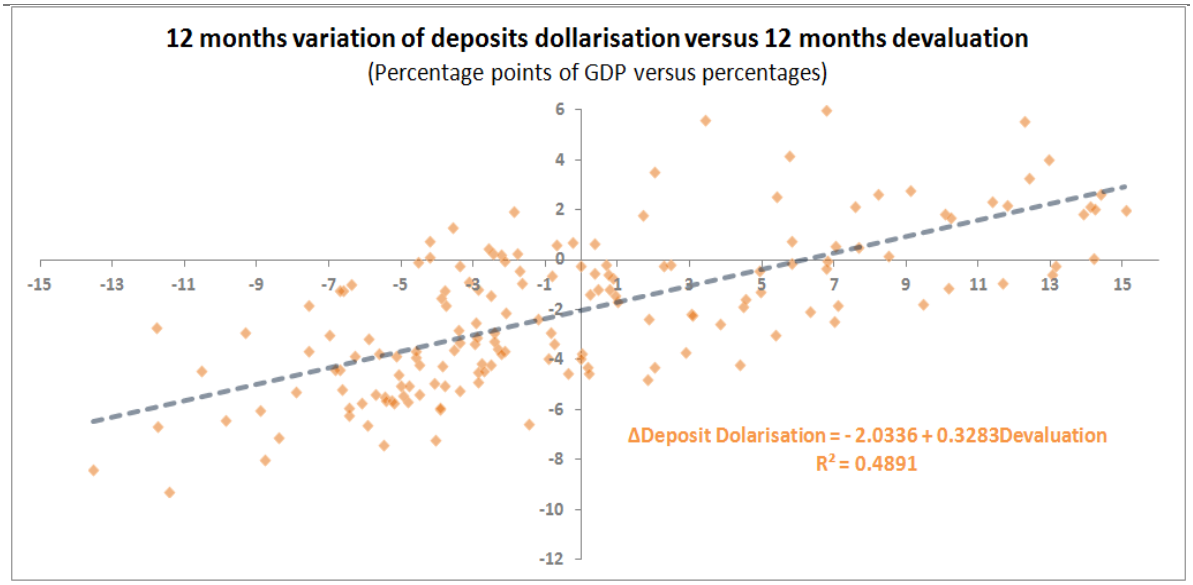
Figure 4 shows that the process of de-dollarization of loans to the private sector has been persistent over the long-term, with negative variations between December 2003 and June 2016, with the exception of one episode during the period October 2010 to September 2011, in contrast to the process followed by the de-dollarization of deposits which represents up to six episodes of positive variations of its dollarization ratio, with the period from February 2009 to September 2009, during the sub-prime financial crisis, as the most critical episode reaching an increase of 6 percentage points of GDP.

The evolution of the deposits dollarization ratio reflects quick adjustment in the currency composition of the assets of depositors due to changes in the financial conditions influencing its opportunity costs. A depreciation of the domestic currency induces them to increase the deposit dollarization in order to protect the value of their savings. Figure 5 reflect the depositor's behavior by increasing their deposit dollarization in response to depreciations of the domestic currency. Similarly, due to the credit risks associated to loans in foreign currency, the variations in loans dollarization is negatively correlated to the devaluation rate of the domestic currency, reflecting changes in the structure of liabilities of the economic agents in order to prevent important losses due to the exchange rate variability. (See Figure 6)

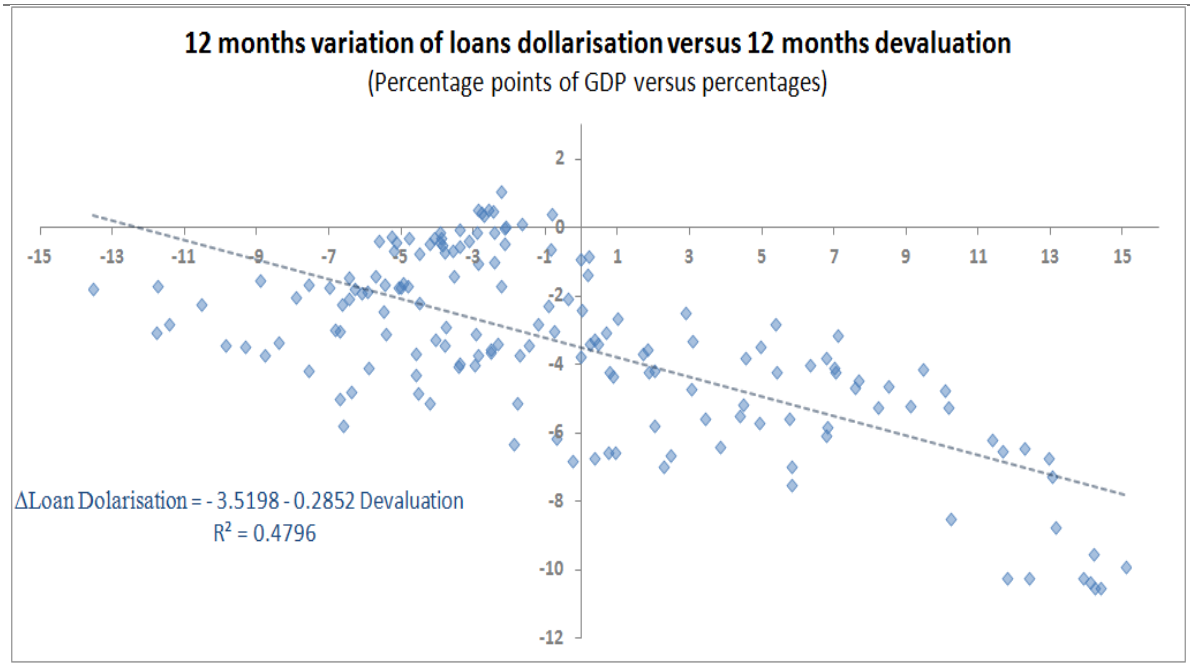
**12-months variation of lending and deposit dollarization[1/]**
**(Percentage points of GDP)** **Figure 4**



**Deposit dollarization and depreciation**
**(12 month variations, in percentages)** **Figure 5**




**Lending dollarization and depreciation**
**(12 month variations, in percentages)** **Figure 6**




The dynamics of the financial dollarization shows clear signals of persistency in the degree of dollarization. As Rossini et.al (2016), mentioned, "the high degree of dollarization inertia can be attributed to transactional costs associated to contract revisions, or due to insufficient incentives to change market practices. The dollarization literature mostly emphasizes the financial risks involved with dollar liabilities with the local banking system. However the

existence of an extended practice of keeping prices in dollars generates important complications to the objective of price stability, given the greater uncertainty about the pass-through of depreciation to the inflation and the feedback loops of these variables with the inflation expectations". Consequently, measuring the real dollarization in terms of the structure of costs of the non-financial firms, classifying them according to their industrial sector will provide important insights for the design of monetary policy.

## 3. Measuring real dollarization

The persistency of the partial dollarization led to the Peruvian economy to adapt their transactional technologies and market practices to the coexistence of two currencies. Actually, Peru allows holdings of any form of deposits in the financial system with no restrictions to foreign currencies such as the US Dollar. The automated Teller Machines (ATMs) are adapted for cash withdrawals in Soles and Dollars, the public can easily access to the foreign exchange market in both, the formal financial system and the informal market. Most of the durable goods (such as real state, automobiles, machinery, etc.) are traded in US Dollars. Furthermore, the trade openness of the economy together with the higher trade growth are factors which may induce to dollarization.

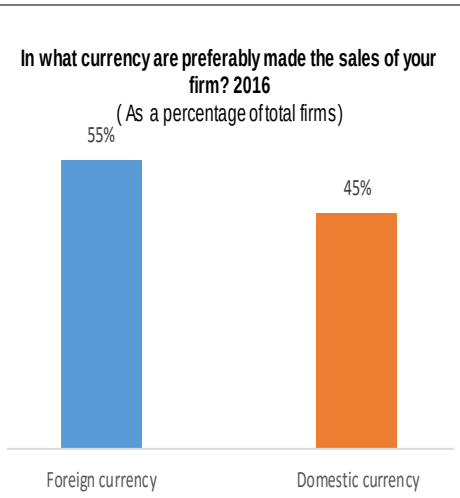
This section presents a series of qualitative and quantitative indicators characterizing the degree of dollarization of the main components of the costs and revenues of non-financial firms. The qualitative indicators allow us to evaluate the evolution of dollarization at microeconomic level. All information included in this section results from specially added questions to the Survey of Macroeconomic Expectations of the Central Bank of Peru (SME) implemented in 2015 and 2016. In the Annex 1, we explain the characteristic of the regular SME, and the Annex 2 presents the main results of the survey for September and December 2015 and for June 2016. The following section presents the currency composition of sales contracts of the non-financial firms.

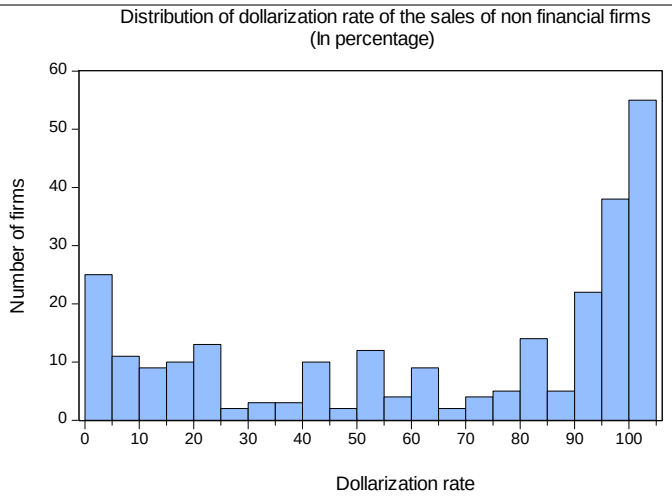
### 3.1. Currency composition of sales

According to the 2016 SME, 55 percent of non-financial firms base their sales contracts preferably in foreign currency and almost all of them prefer the US Dollar.

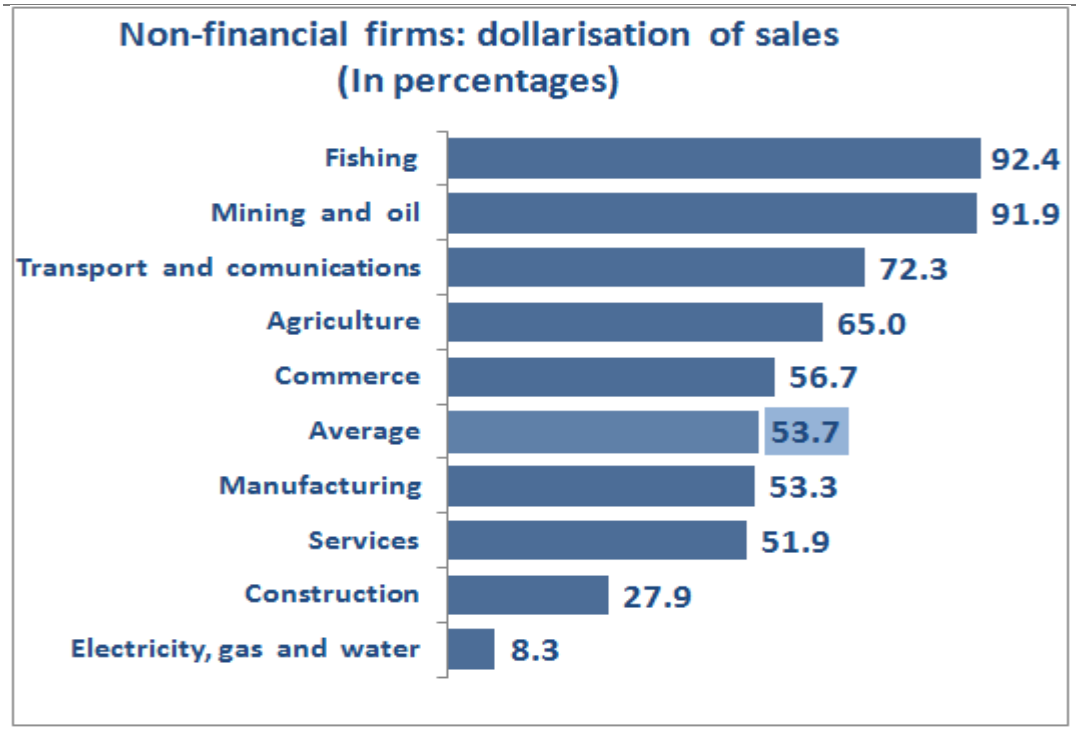
However, the distribution of the dollarization of non-financial firms according to their economic sector is asymmetric. The energy sector (including electricity, gas and water) shows the lowest level of dollarization. The services sector presents a 51 percent of dollarization. Mining and fishing, sectors whose productions are mainly oriented to exports, present a 92 percent of dollarization (Figure 8).

**Dollarization of sales**
**(In percentages)** **Figure 7**




**Dollarization of sales, by sectors**
**(In percentages)** **Figure 8**




### 3.2. Currency composition of costs

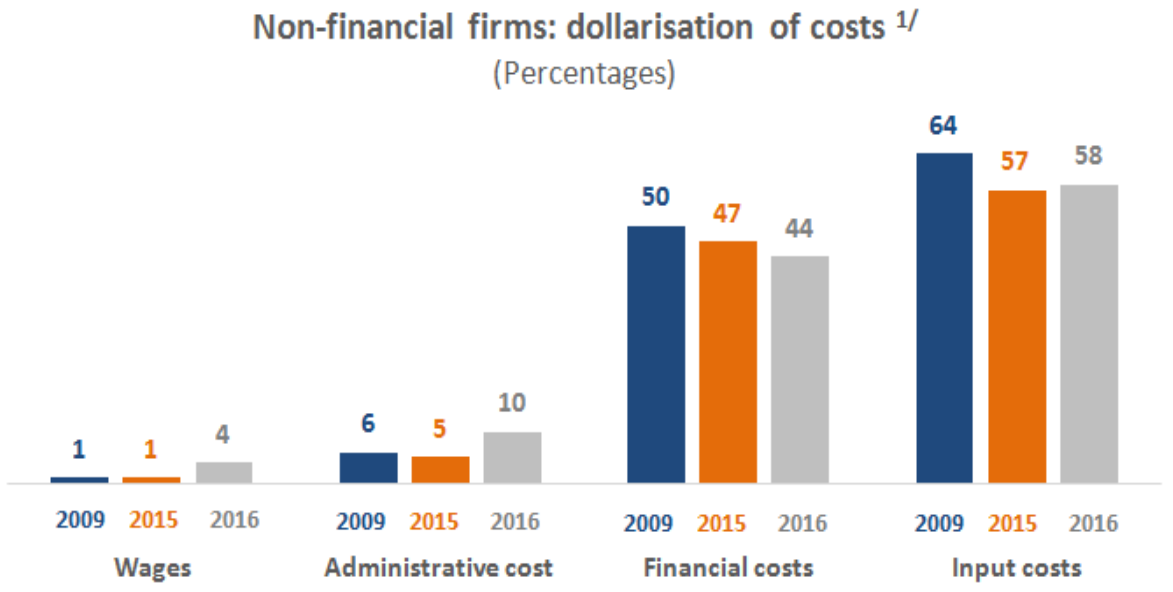
Evaluating the cost structure of non-financial firms, more than 90 percent of firms reveal that salaries and administrative costs are mainly denominated in domestic currency and

the degree of dollarization are 3.9 and 15.9 percent respectively; although in 2016 there is evidence of an increase in the role of dollar in these segments.

Concerning the financial costs, 44 percent of firms reveal the predominance of dollars although the domestic currency started to prevail in this segment. This evolution shows the impact of the de-dollarization policy implemented by the Central bank in order to reduce the vulnerabilities implied by higher levels of dollarization.

In December 2014 the Central Bank introduced a set of measures in order to enhance its de-dollarization policy which started in December 2013 with additional reserve requirements conditional to the growth of loans in dollars. The focus of the new measures are: a) provide liquidity in domestic currency in order to allow substitution of lending in dollars, b) ensure a declining tendency in the volume of loans in dollars, c) prevent the dollarization of deposits, and d) reduce the exchange rate volatility. These set of measures were introduced with exception to those operations associated to international trade and long term financing. One characteristic of these measures were the introduction of a specific period of time for a de-dollarization target; however, the goal has been accomplished even before the elapse of the specific period of time. Moreover, the de-dollarization process has been enhanced with an important downward break in the dollarization tendency of the lending to the private sector since 2014 (Encircled area of figure 2).

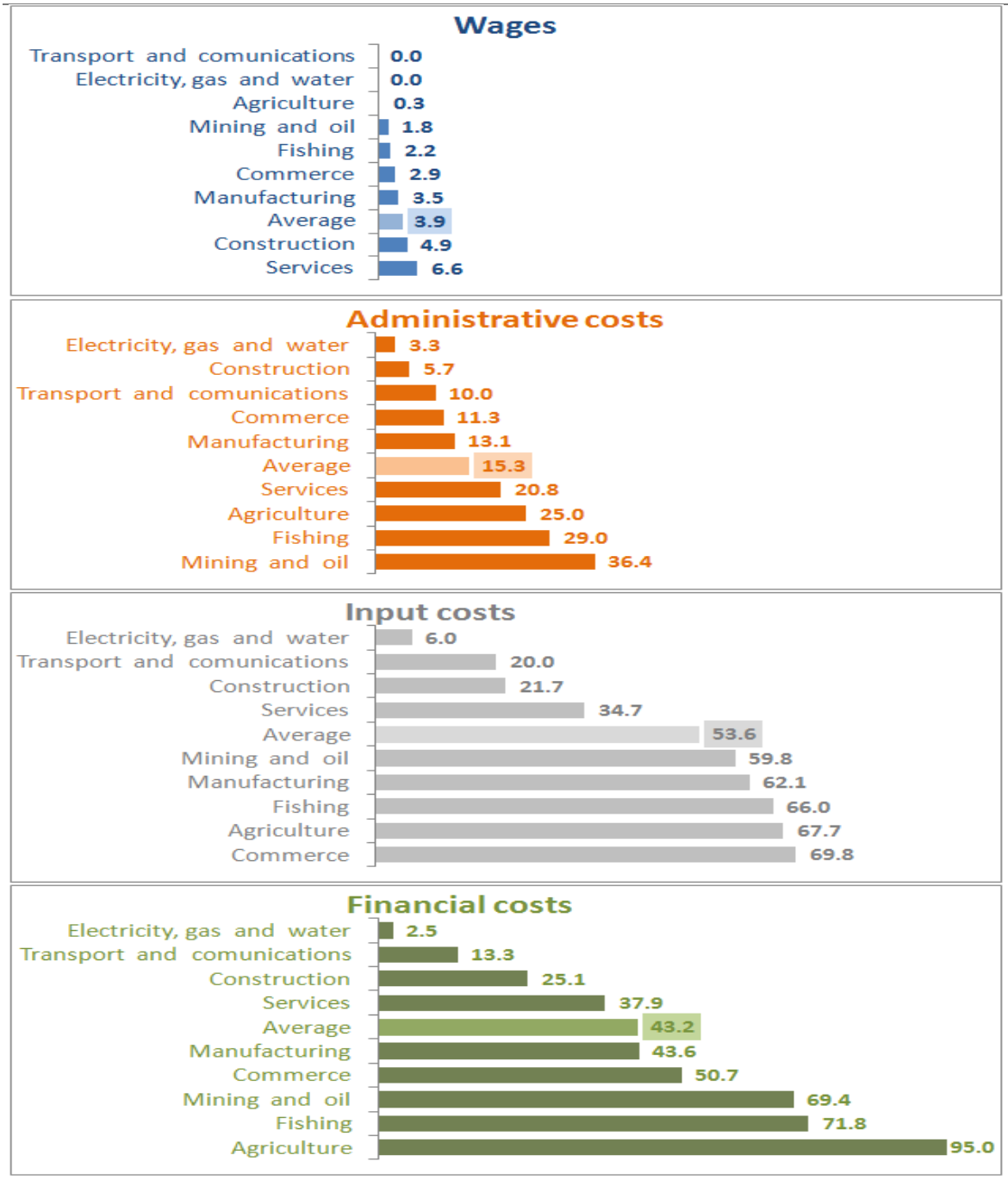
**Non-financial firms: dollarization of costs**
**(In percentages)** **Figure 9**




1/ The dollarisation of costs corresponds to surveyed firms acknowledging that most of their costs are denominated in foreign currency

Figure 9 shows that despite important accomplishments in the goal of de-dollarization in all segments of expenditure of non-financial firms, the degree of dollarization of their input costs is still high; 58 percent of firms acknowledge that their input purchases are denominated in foreign currency, and the average degree of dollarization is 53.6 percent.

**Non-financial firms: dollarization of costs by sectors**
**(In percentages)** **Figure 10**




At the economic sector level, Figure 10 shows that wage dollarization is very low in most of the economic sectors, a maximum of 6.6 percent in the services sector; regarding the

administrative expenditures, the mining and fishing industry are the sectors with higher level of dollarization in this segment, which may reflect a certain natural matching with the revenues given that the currency denomination of their sales are mostly in dollars. In the case of the financial dollarization, the mining, fishing and the agricultural sectors present higher levels of dollarization. In the case of input costs, most of the economic sectors present a degree of dollarization close or higher than 60 percent.

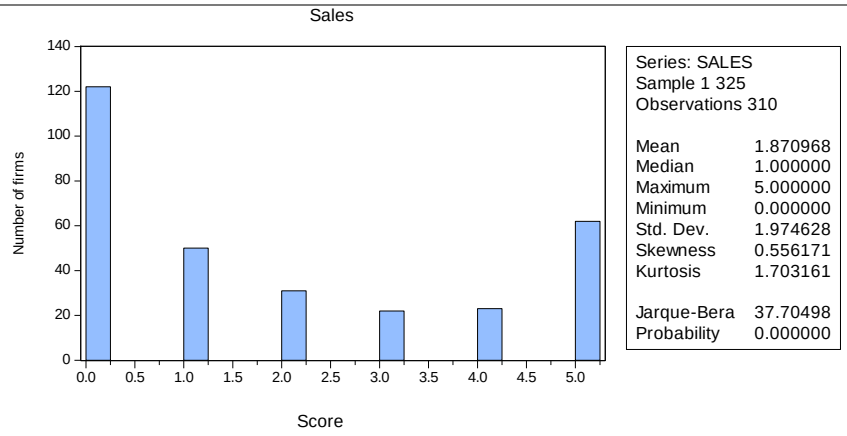
### 3.3. Dollarization rigidity

There are many hypotheses on the persistency of dollarization and in this section we will evaluate the difficulties faced by firms in changing from foreign currency to domestic currency some of the components of their income statements. We asked to the non-financial firms to grade from 0 to 5 their degree of difficulty of changing from foreign to domestic currency with 5 as the most difficult case (Table 1). In general, there seems to be not that difficult to move between currencies in most of the categories. However, in the case of purchases and sales of inputs the degree of difficulty is higher (this category also presents the higher degree of dollarization). This rigidity may explain the persistency in the dollarization of input costs and reflect some structural microeconomic characteristics.

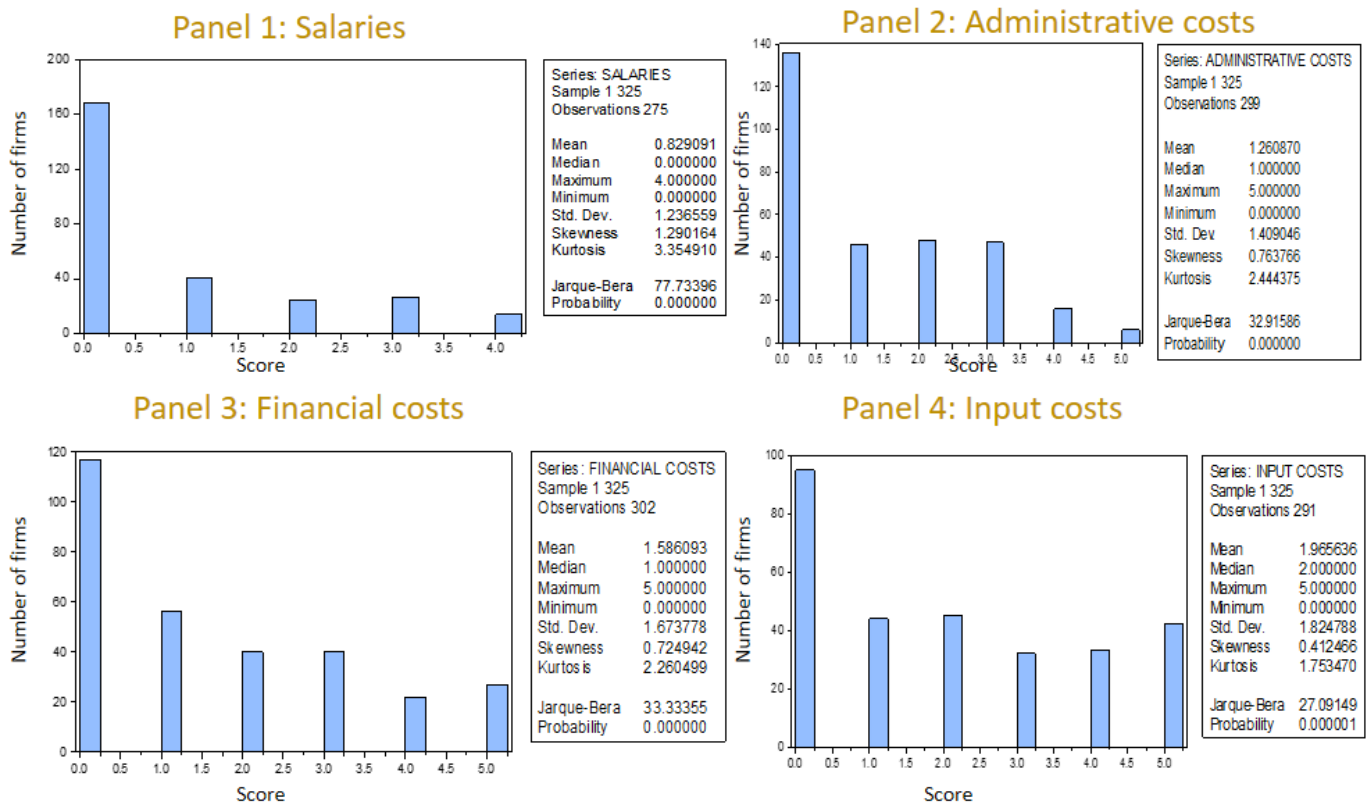
**Non-financial firms: dollarization of costs by sectors**
**(From 0 to 5, 5 the most difficult)** **Table 1**

| Sectors | Sales | Costs | | | |
|---|---|---|---|---|---|
| | | Wages | Administrative costs | Financial costs | Input costs |
| Agriculture | 1.7 | 2.0 | 2.3 | 2.0 | 2.0 |
| Commerce | 2.0 | 0.9 | 1.4 | 1.7 | 2.3 |
| Construction | 1.1 | 0.5 | 0.8 | 1.1 | 1.6 |
| Electricity, gas and water | 1.4 | 0.4 | 1.4 | 1.6 | 0.6 |
| Manufacturing | 1.8 | 0.9 | 1.2 | 1.6 | 2.2 |
| Mining and oil | 2.4 | 0.4 | 1.2 | 1.5 | 1.6 |
| Fishing | 3.8 | 1.2 | 2.3 | 3.3 | 3.2 |
| Services | 2.0 | 1.1 | 1.4 | 1.5 | 1.6 |
| Transport and comunications | 2.4 | 1.0 | 1.0 | 1.5 | 2.0 |
| Average | 1.9 | 0.9 | 1.3 | 1.6 | 2.0 |

**Degree of difficulty for changing currency denomination of sales**
**(From 0 to 5, 5 the most difficult)** **Figure 11**



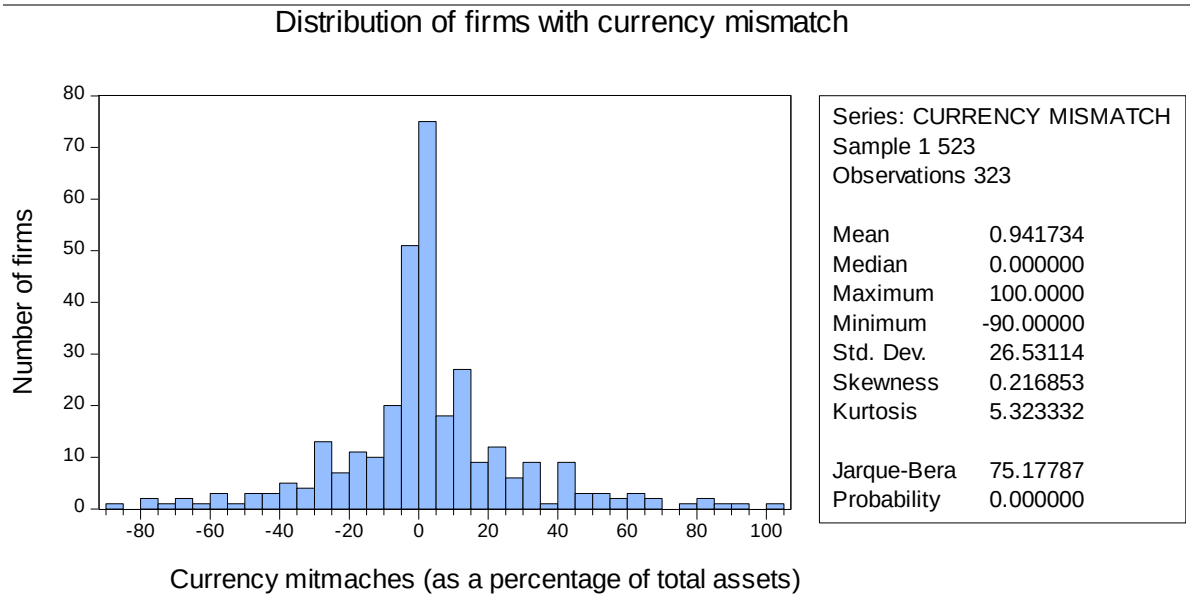

**Non-financial firms: distribution of the degree of difficulty for changing currency denomination of costs**
**(From 0 to 5, 5 the most difficult)** **Figure 12**



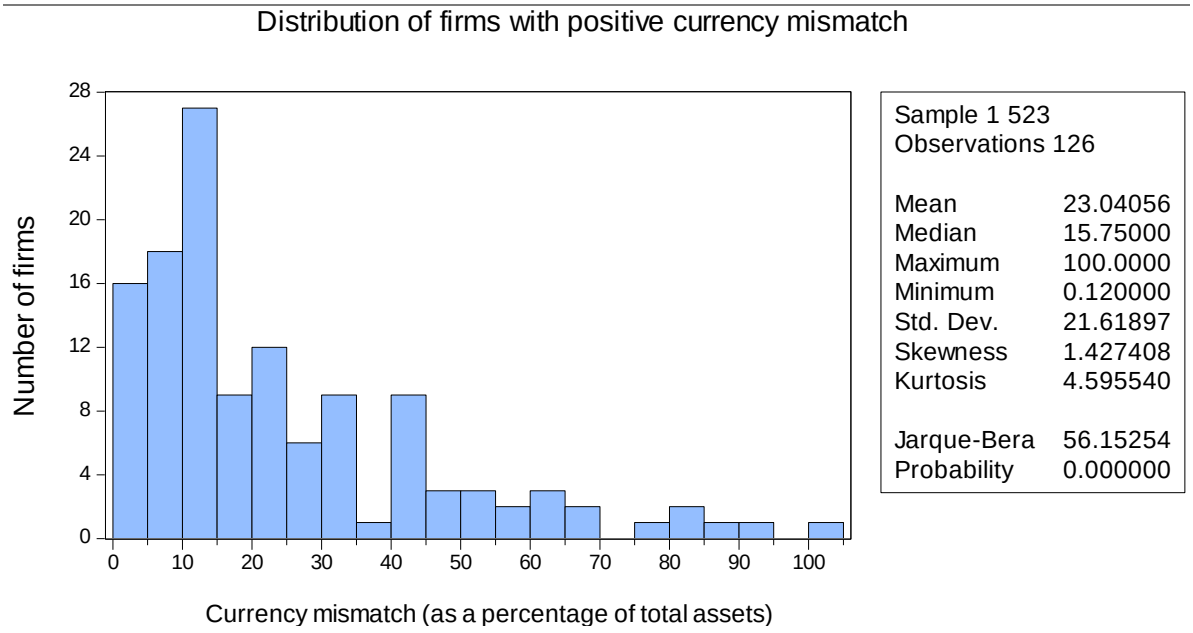
### 3.4. Dollarization of assets and liabilities

Defining currency mismatch as the difference between assets and liabilities in foreign currency as a percentage of total assets, in this section we evaluate the degree of dollarization of the balance sheet of firms. In Figure 13, from a sample of 323 non-financial firms, 18 percent of surveyed firms present a currency matched balance sheet, 39 percent of firms have a positive mismatch (more assets in dollars) and 43 percent of firms present negative currency mismatch (more liabilities in dollars), presenting a higher vulnerability to exchange rate fluctuations. From the sample, the average currency mismatch represent 23 percent of total assets in the case of firms with positive currency mismatch (Figure 14), while it depicts 18.8 percent of total assets of the firms with negative currency mismatch. (Figure 15)

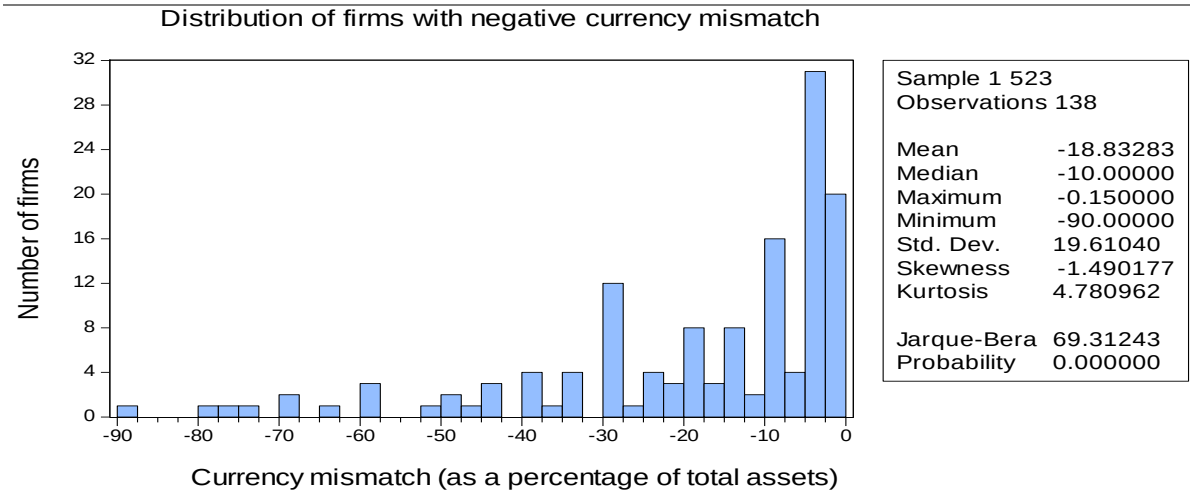
**Non-financial firms: Distribution of firms with currency mismatches (Percentages of total assets)** **Figure 13**



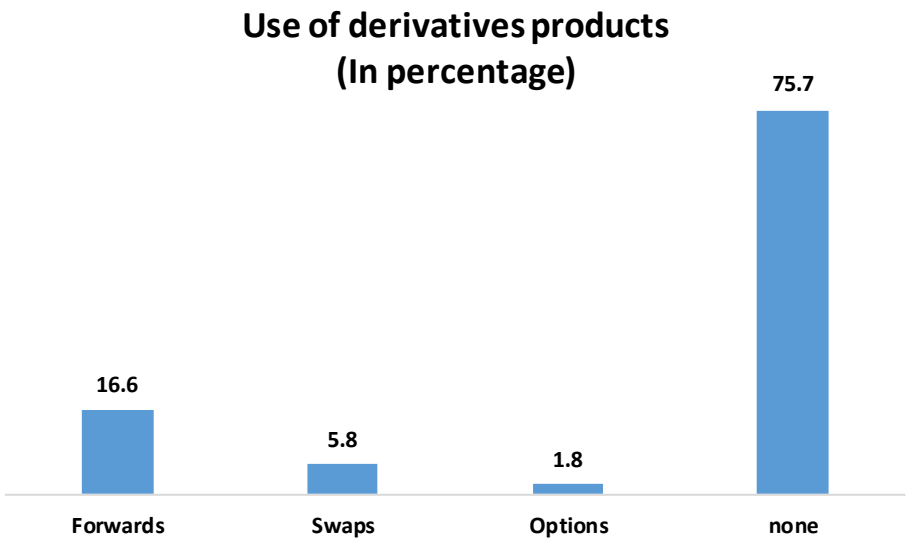
**Non-financial firms: Distribution of firms with positive currency mismatches (Percentages of total assets)** **Figure 14**




**Non-financial firms: Distribution of firms with negative currency mismatches (Percentages of total assets)** **Figure 15**

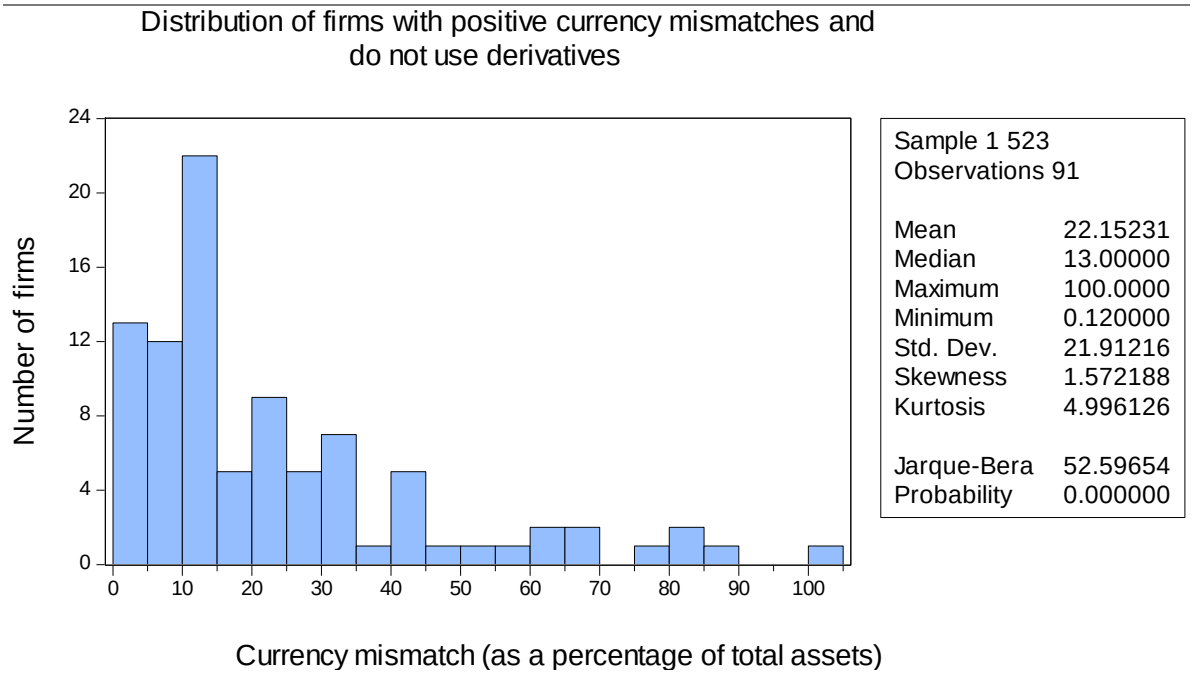


**Non-financial firms: use of hedging derivatives products**
**(Percentage of firms)** **Figure 16**

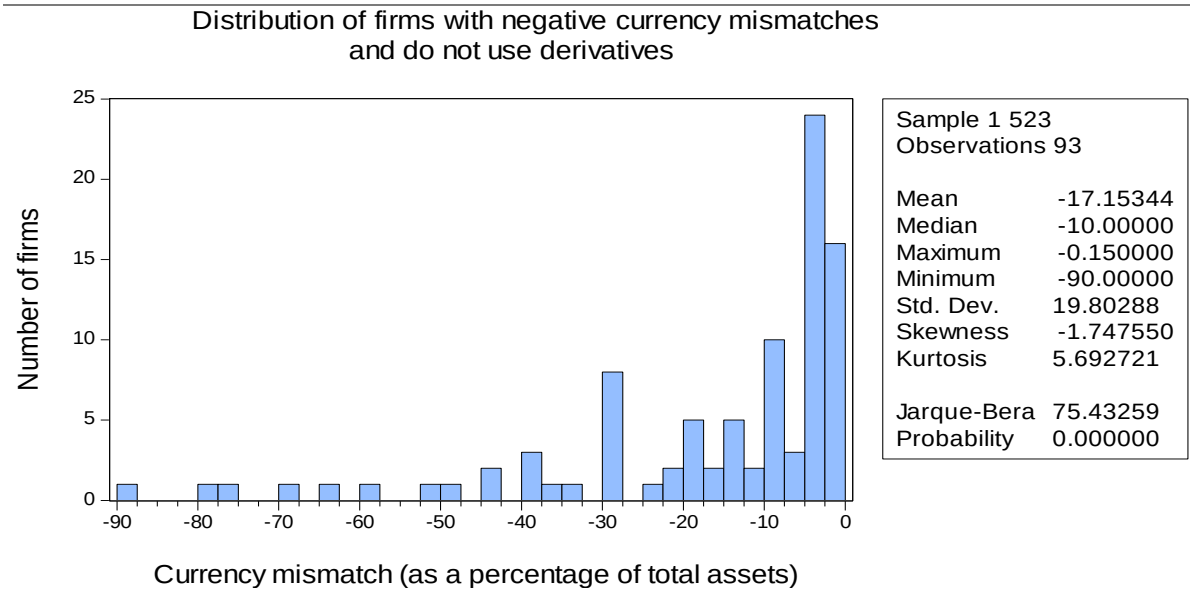



Another characteristic of the Peruvian economy is the scarcity of hedging instruments which combined with information problems leaves the firms vulnerable to currency fluctuations. Figure 16 shows that 75.7 percent of the surveyed firms acknowledged that they do not use derivatives for hedging purposes. Excluding from the sample the firms with currency mismatch but covered by any form of financial derivative (options, swaps or forwards), the average mismatch is only slightly smaller reaching 22.2 percent for positive mismatch cases (Figure 17) and 17.2 percent for negative cases (Figure 18).

**Non-financial firms: Positive currency mismatches and use of derivatives (Percentage of total assets)** **Figure 17**




**Non-financial firms: Negative currency mismatches and use of derivatives (Percentage of total assets)** **Figure 18**



### 3.5. A simple model of currency mismatches

Following Calvo and Rodriguez (1997) and Mwase and Kumah (2015), for the evaluation of the main determinants of currency mismatches we use a simple dynamic linear model of the form $CM_{i,t} = \alpha + \rho CM_{i,t-1} + \beta EERST_i + \gamma EERLT_i + \lambda SIZE_i + \theta EXP_i + u_i$, where $CM_{i,t}$ denotes the currency mismatch (as a percentage of total assets), $CM_{i,t-1}$ denote the currency mismatch in the previous year (as a percentage of total assets), $EERST_{i,t}$ is the expected level of exchange rate for the next year, $EERLT_{i,t}$ is the expectation of Exchange rate for the next 2 years, $SIZE_i$ denotes the size of the firm, measured as the total sales of the previous year and $EXP_i$ represent the exports as a percentage of total sales of the previous year.

We find evidence of persistency in the currency mismatch of firms. Table 2 shows that the previous period mismatches affect significantly to actual currency mismatch. There are also some indications of rigidity of the currency mismatch of firms given by the important explanatory power of the size. However, this may be the case of firms with positive mismatches considering that the biggest firms operate in sectors where the main proportion of their output is exported (i.e. mining, fishing etc.). The evidence also shows that expectations of exchange rate, as a proxy of the returns of taking bets in a direction of exchange rate are not a determinant of currency mismatches.

**Determinants of currency mismatches of non-financial firms (Percentage of total assets)** **Table 2**

**Determinats of currency mismatches**

Dependent Variable: CM
Sample: 1 523
Included observations: 143

| Variable | Coefficient | | | |
|---|---|---|---|---|
| CMit-1 | 0.462* | 0.50* | 0.498* | 0.514* |
| log(SIZE) | 2.905** | 2.69** | 2.573** | 2.87* |
| LOG(EERST) | -1.574 | -1.419 | -1.375 | |
| LOG(EERLT) | -2.337 | 5.155 | | |
| EXP | 0.066 | | | |
| R-squared | 0.244 | 0.26 | 0.24 | 0.243 |

* Significant at 5% level
**Significant at 10% level

## 4. Conclusions

Information gathered at the micro level shows that non-financial firms are still vulnerable to currency fluctuations due to currency mismatches at the level of the structure of their costs and at the level of their balance sheets. The persistency of the dollarization urges the Central Bank to maintain its efforts to de-dollarize the economy. The characteristics of non-financial firm's transactions and the structure of their costs may impose certain limits to the de-dollarization process. Further research is needed in order to measure the limits of the de-dollarization.

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The Survey of Macroeconomic Expectations of the BCRP in Table 6 collects information from entrepreneurs, bankers and analysts, with respect to their perception on the future behaviour of the main macroeconomic variables such as inflation, GDP growth, exchange rates and interest rates, and also seeks information on the principal drivers of the production cycle and the business environment.

The expectations of the behaviour of the main macroeconomic variables, resulting from the survey, are among the main indicators analysed and used by the central bank for the design and implementation of its monetary policy.

The survey of Macroeconomic Expectations implemented by the Central Reserve Bank of Peru (BCRP by its initials in Spanish) since July 1999, initially had the purpose of collecting information on the forecasts of inflation, exchange rate and GDP growth, from the financial entities. Since September 2001 the sample was extended to include firms from the different sectors of the economy; and since April 2002, the survey amplified the questionnaire to include aspects of the business confidence. The Survey allows us two groups of indicators: Diffusion indexes and Indicators of Macroeconomic Expectations.

**Diffusion index**: Survey based index applied to non-financial firms. The Questionnaire follows the methodology formulated by the OECD in its Business Tendency Surveys: A Handbook, where, the diffusion index is computed as the percentage respondents who expect a better situation (above normal) minus the percentage of respondents who expect worse scenario (below normal) plus one (which represents normal), the resulting number is multiplied by 50, such that the diffusion index will tell us, if greater than 50, that more survey respondents expect a better situation than normal. If below 50, the diffusion index tells us that more survey respondents expect a worst situation than normal.

**Expectation of Macroeconomic Variables:** Macroeconomic expectations (inflation, rate of growth of GDP and exchange rate) are computed based on the median of the answers provided by financial system entities, economic analysts and non-financial firms to the survey on their projections for the macroeconomic variables. In the case of expectations for the short term interbank interest rates, the information used corresponds to the median of the information provided by the financial system entities and economic analysts. Using the median as the indicator of the expectations allows us to separate the extreme values bias.

**The sample framework**: The survey uses two formats, according to the characteristics of the respondents. One format is for non-financial firms, the other for financial entities and economic analysts. For the sample of non-financial firms the population objective are the Peru's top 10 000 firms from all the economic activity sectors. For the financial entities and

economic analysts, the population are the main banks and other financial entities, consulting firms, the main economic research departments, and universities.

In theory, with a confidence interval of 95 percent, 5 percent of marginal error, the minimum sample size representative of the population would be 368 firms. The actual sample size for the Macroeconomic Expectations Survey in Peru is 400 non-financial firms, 26 economic analysts and 26 financial entities. The non-financial firms are grouped in different sectors of the economy: Agriculture and fishing; mining and oil; manufacturing; electricity, water and gas; construction; transportation and communications; commerce; and services.

The frequency of the survey is monthly, and its implementation begins in the second week of every month. In addition to the monthly survey, the central bank implements two surveys of quarterly frequency: On special survey applied to the construction sector and another survey implemented in the regions of the country.

The economic indicators obtained from the Survey of Macroeconomic Expectations, in particular those corresponding to the diffusion index, are published in the Studies Notes (Notas de Estudios) on a monthly basis in the web page of the Central Bank, according to a schedule published in the Weekly Notes (Nota Semanal). The indicators of the Expectations of Macroeconomic Variables obtained from the survey are published in the Informative Summaries (Resumen Informativo) together with the data of the actual inflation corresponding to the previous month, during the first week of every month.

## Survey of macroeconomic expectations — Annex 2

Survey of Macroeconomic Expectations

| | Sep-2015 | Dec-2015 | | Jun-2016 | | Correlation |
|---|---|---|---|---|---|---|
| General Economic Situation, present | | | | | | |
| Business Situation, present | 55.4 | 57.9 | ↑ > | 58.9 | ↑ > | 0.57 |
| Sales situation | 48.0 | 50.0 | ↑ > | 52.5 | ↑ > | 0.60 |
| Purchase orders, in comparison to previous month | 45.5 | 45.1 | ↓ < | 50.6 | ↑ > | 0.62 |
| Output level | 49.5 | 50.7 | ↑ > | 52.1 | ↑ > | 0.52 |
| Demand level, in comparison to expected level | 40.6 | 41.1 | ↓ < | 44.8 | ↑ > | 0.69 |
| Inventories, in comparison to previous month | 51.5 | 51.0 | ↓ > | 51.2 | ↑ > | 0.35 |
| Employment situation | 45.5 | 46.4 | ↑ < | 48.5 | ↑ > | 0.74 |
| Expectations | | | | | | |
| Firm's Expected demand for the next 3 months | 55.9 | 51.5 | ↓ > | 58.6 | ↑ > | 0.75 |
| Expected employment for the next 3 months | 47.8 | 45.5 | ↓ < | 49.9 | ↑ > | 0.74 |
| Expected Business Situation of the firm for the next 3 months | 55.3 | 54.4 | ↓ < | 58.6 | ↑ > | 0.64 |
| Expected Business Situation of the sector for the next 3 months | 48.1 | 47.7 | ↓ < | 56.0 | ↑ > | 0.75 |
| Expected Situation of the Economy for the next 3 months | 43.2 | 44.6 | ↑ > | 54.3 | ↑ > | 0.73 |
| Expected Business Situation of the sector for the next 12 months | 55.7 | 57.6 | ↑ > | 66.6 | ↑ > | 0.50 |
| Expected Situation of the Economy for the next 12 months | 50.6 | 56.0 | ↑ > | 68.0 | ↑ > | 0.58 |
| Confidence | | | | | | |
| Expectation of economic situation for the nex 12 months (APOYO) | 62.0 | 68.0 | ↑ > | 66.5 | ↓ < | 0.10 |
| Finances | | | | | | |
| Financial condition of the firm | 61.1 | 62.4 | ↑ > | 63.2 | ↑ > | 0.48 |
| Situation of credit availability for the firm | 63.4 | 64.3 | ↑ > | 66.9 | ↑ > | 0.16 |
| Prices | | | | | | |
| Expectations of the inputs avarage prices fo the next 3 months | 50.7 | 52.5 | ↑ > | 53.8 | ↑ > | 0.64 |
| Expectations of the sales avarage prices fo the next 3 months | 53.5 | 55.3 | ↓ < | 58.2 | ↑ > | 0.65 |

> : Greater than 50

< : Lower than 50

* Correlations computed from December 2007 to September 2015. For the General actual business and financial situations we show the contemporaneous correlation, for the rest the correlation is with the 3 months ahead GDP

** For the indicators for the present and future economic situation of the household, the likelihood of finding job and the level of prices, we only consider the expectations of the future economic situation of the household.

Source: Central Reserve Bank of Peru, Survey of Macroconomic Expectations, December 2015 and June 2016.