



BANCO CENTRAL DE RESERVA DEL PERÚ

## **Capital Flows, Monetary Policy and FOREX Interventions in Peru**

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# Capital Flows, Monetary Policy and Forex Intervention in Peru\*

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## Abstract

This article explains the main features of the sterilized intervention in the foreign exchange market and the use of non-conventional policy instruments as applied by the Central Reserve Bank of Peru in order to avoid credit booms or busts in a context of a partially dollarized financial system. This monetary policy framework is based on a risk management approach that includes as the main policy tool the short-term interest rate within an inflation targeting regime. This framework helped to reduce the impact of the recent global financial crisis on the Peruvian economy and allowed to rejoin the path of growth with low inflation, avoiding major disruptions from the surge of capital inflows.

**JEL Classification:** E52, E58, F31, F32.

**Keywords:** Central banks, policy framework.

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# 1 Introduction

This article explains the main features of the sterilized intervention in the foreign exchange market by the Central Reserve Bank of Peru (BCR), in a context of an economy with a financial system that operates with two currencies. The possibility that local banks can extend credit in foreign currency complicates the normal transmission mechanisms of the monetary policy because on the one hand the policy rate cannot affect these flows and its interest rate, and on the other, a sharp depreciation can produce a credit contraction resulting from the deterioration of the quality of the assets of banks linked to balance sheet effects on the partially dollarized non-financial private sector portfolio of assets and liabilities.

As a result of the risks and vulnerabilities related with partial dollarization, the BCR has adopted a policy framework that adds to the conventional policy rate as a tool, several instruments that can be grouped as quantitative or non conventional instruments. For example, higher reserve requirements on short term foreign exchange liabilities are used to modulate this source of credit, also the BCR intervenes in the foreign exchange market sterilizing the excess of liquidity with its own instruments that are restricted to local participants. Foreign exchange intervention is aimed to reduce the volatility of the exchange rate and to accumulate international reserves, without any type of signalling or commitment about the level or tendency of the exchange rate.

This policy framework has allowed the BCR to prevent major disruptions from the recent global financial crisis, and has allowed it to maintain the flow of credit during this event. Additionally, the conventional transmission mechanism is in place with the interest rate as the instrument to control inflation.

In this article we discuss four issues related with this policy framework. First, we discuss the selection of a discretionary type of FOREX intervention vis-a-vis a rule-based one. Second, we revise issues related to sterilization with respect to its cost, the instruments used and the degree of access to non residents. Third, we revise the use of reserve requirements as a complement to the conventional policy rate tool. Finally, we assess the issue of competitiveness in an environment marked by strong capital flows.

## 2 Monetary Policy under Partial Dollarization

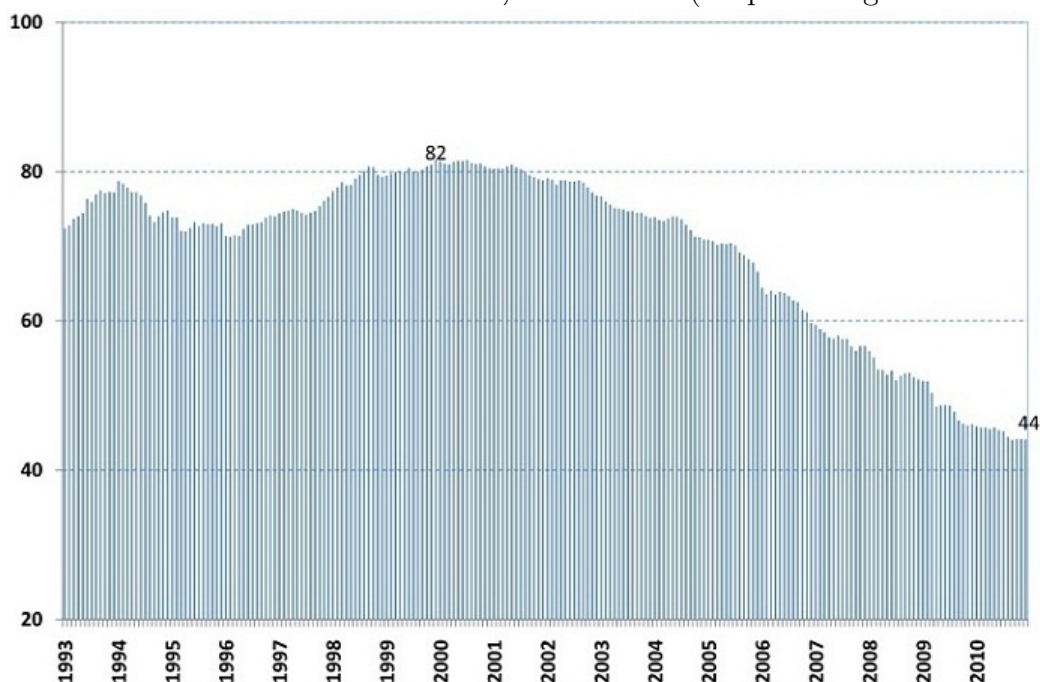
A persistent high inflation and severe macroeconomic imbalances in Peru during the 1970s and 1980s, and the lack of inflation-adjusted instruments led households to hold foreign currency as store of value. This process of financial dollarization increased significantly during the hyperinflation of 1988-90. In the years that followed, a wide-ranging package of reforms in the financial system and in the conduct of monetary and fiscal policy was introduced to stabilize the economy. After achieving macroeconomic stabilization during the 1990s, the BCR implemented in 2002 a fully fledged inflation targeting regime with an initial point target of 2.5% and, since 2007, a continuous point target of 2.0%, both with a tolerance range of 1%. As a result, during the last decade the average annual inflation rate has been 2.3%. However, despite improved economic conditions and stable macroeconomic fundamentals during the last 20 years, inertia, transaction costs and a still underdeveloped capital markets explain the slow, but continuous, decline of the im-

portance of deposits and credits in dollars from a peak of 82% in 1999 to 44% in 2010 (Figure 1).

Dollarization magnifies the reaction of financial intermediaries to sharp movements in their funding or to high exchange rate volatility. As a result, the economy is prone to credit booms and busts associated to flows of foreign currency deposits, foreign credit lines or other capital flows; and to exchange rate movements that affect the quality of the credit portfolio. Dollarisation therefore alters the transmission mechanism of monetary policy and increases the liquidity and solvency risks of the financial system:

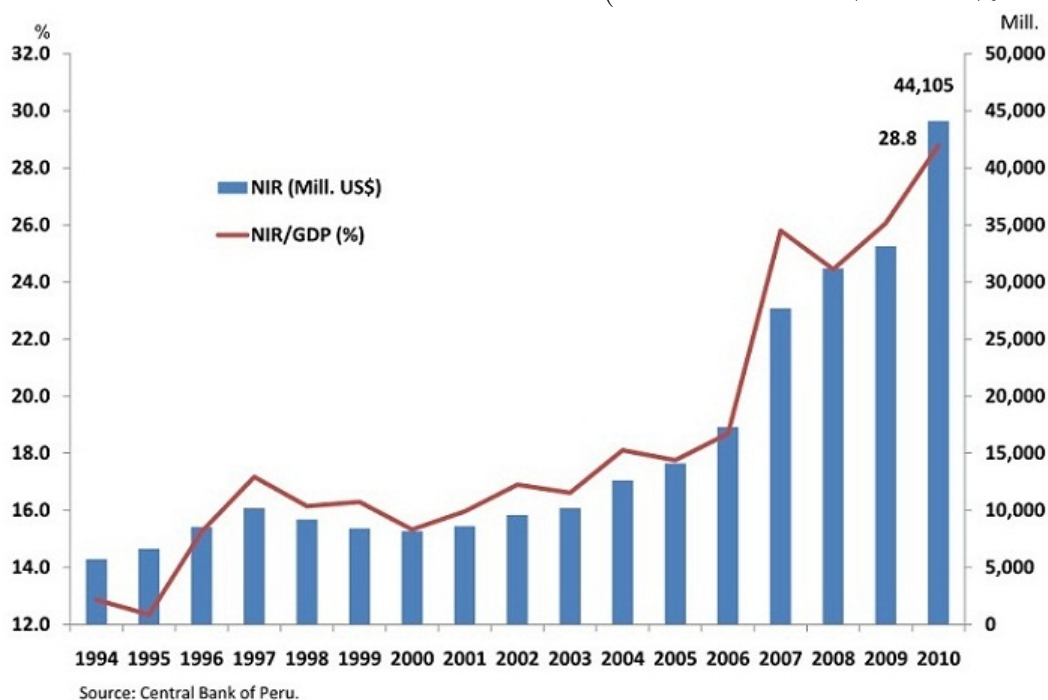
- The maturity mismatch generated in foreign currency introduces higher liquidity risks.
- Solvency risk increases when the assets of non financial economic agents are mainly denominated in domestic currency, while their liabilities are dollar-denominated.

Figure 1: **Peru: Credit Dollarisation, 1993-2010** (As percentage of total credit)



After various external shocks, especially the Russian crisis of 1998, the BCR designed an action plan to prevent a credit contraction during events of financial stress. Henceforth, the monetary policy framework in Peru, in addition to the common features of an inflation targeting regime, began to include a set of measures to deal with the risks of financial dollarization. The strategy included three levels of liquidity: accumulation of international reserves by the BCR; high liquidity requirements of financial intermediaries; and a solid public sector financial position, resulting from the disciplined and coordinated fiscal policy. In line with this strategy, international reserves increased from 12.9% of GDP in December 1994 to 28.8% in December 2010 (Figure 2).

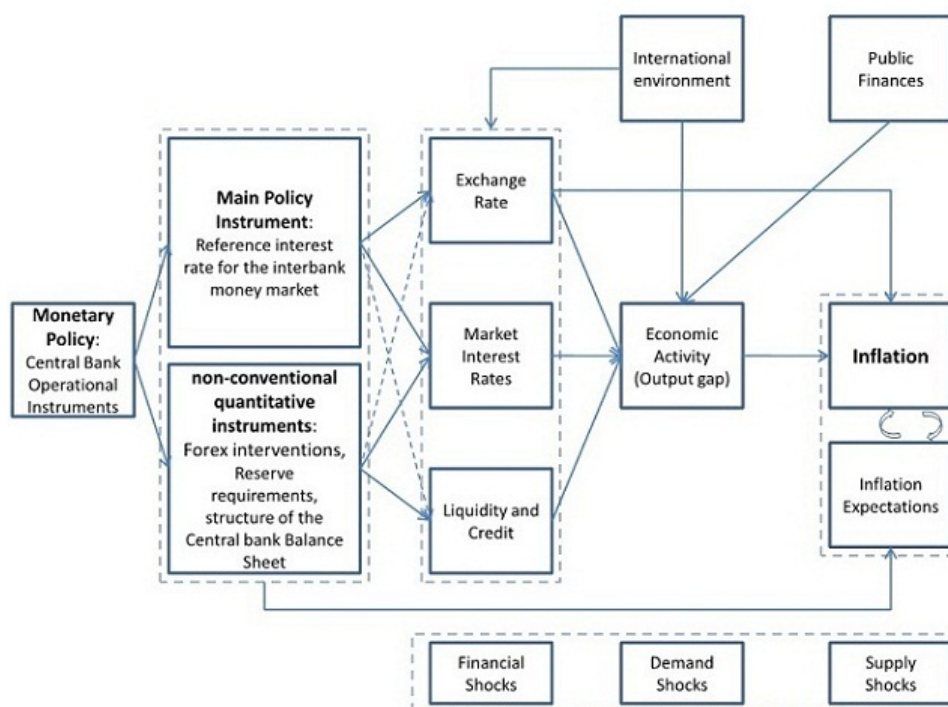
Figure 2: Peru: Net International Reserves (In Millions of US\$ and as % of GDP)



The set of monetary policy instruments can be separated in the normal price instrument of the interest rate and the non conventional quantitative ones like the reserve requirement or the structure of the Central Bank balance sheet. The importance of the latter group of policies has gained attention with the innovative actions performed by central banks during the sub-prime financial crisis that were aimed to avoid or limit a collapse of credit. The motivation to consider measures which act more directly over the flows of credit -rather than waiting for the more indirect impact through changes in interest rates- is that during credit booms or crunches, short-term interest rates became less effective in signaling the stance of the monetary policy to financial intermediaries that become insensitive to policy actions based on movements in the interest rate but more inclined to react to changes in expectations and risk appetite.

The quantitative instruments are part of a more ample risk management approach of monetary policy that includes preventive and corrective measures oriented to avoid a credit boom or crunch and to preserve the transmission mechanisms of the monetary policy and financial stability. Figure 3 illustrates the common transmission mechanism of the monetary policy working from changes in the short term interest rate to inflation through its impact on the output gap, but adding the effect of the non- conventional quantitative policies impacting banking credit, and in this way on the output gap and the inflation rate.

Figure 3: **Transmission Mechanisms of Monetary Policy**



### 3 Forex Intervention

Interventions in the FOREX market by the BCR are aimed to reduce the volatility of the exchange rate but without signaling or committing to a certain level of the exchange rate. A predictable exchange rate would in practice transform the exchange rate system into a form of a pegged exchange type, and with that ensure success of one-sided bets by speculators, and thus transforming the intervention into a fruitless effort. One way to avoid predictability and to reinforce the central bank’s commitment only to price stability is to use a rule-type of intervention, based for example on pre-announced amounts of foreign exchange purchases in the market. However, it is possible that different events can make intervention either unnecessary or insufficient, forcing the bank to abandon or change the rule. An alternative type of intervention is one that is more discretionary, in which having a clear idea that it is important to avoid signaling an exchange rate, the central bank is able and willing to engage in FOREX operations without a pre-announced amount of operations.

The main type of FOREX intervention is through direct operations with commercial banks in the spot market and at the prevailing exchange rate. Additionally, the BCR can make swaps through temporary purchases or sales of foreign currency, using an auction procedure. The latter instrument is used in the case when the forwards market in foreign currency is putting pressure on the exchange positions of local banks. It is also important to consider that at maturity the swaps can be renewed or just be exercised, having both possibilities the same characteristic as an intervention in the market

Figure 4 illustrates the momentum of and the types of FOREX intervention of the BCR

together with the evolution of the exchange rate since 2007. Three clear episodes can be identified, first before the collapse of Lehman, second after the collapse, and third after the announcement of the second round of quantitative easing by the FED (QE2). It also identifies the direct intervention in the foreign exchange spot market, and the placements or maturing swap operations. During these three stages, the Central Bank did not attempt to reverse the tendencies, but to reduce the degree of volatility. It can also be noticed that the daily amount of interventions does not follow any type of rule.

Figure 4: **Peru: Exchange rate and Central Bank net forex intervention** (Exchange rate in PEN Soles per US Dollar, and forex interventions in millions of US Dollars)

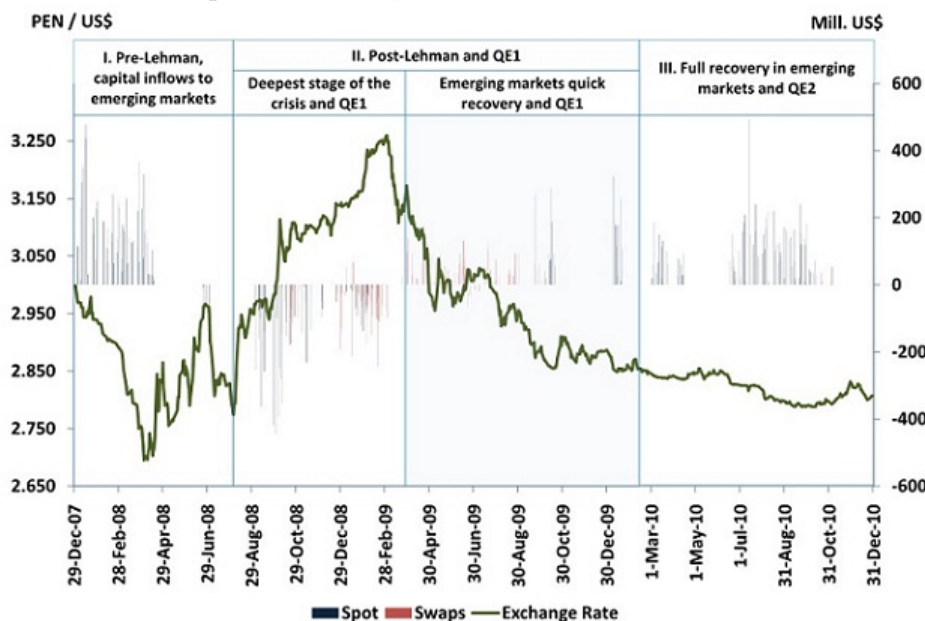


Table 1 shows the three recent stages of surges and contractions of capital flows, how they materialize in the exchange markets and the amount of FOREX intervention by the BCR. The amount of purchases were US\$ 8,7 billion before Lehman and US\$ 6,5 billion (including US\$ 0,2 billion in swaps) with the arrival of signals of normalization and the announcement and implementation of the QE2. On the opposite side, during the period of acute crisis in the last quarter of 2009, the BCR sold US\$ 4,8 billion totaling US\$ 8,0 billion if we include the US\$ 3,2 billion in balances at maturity of swaps.

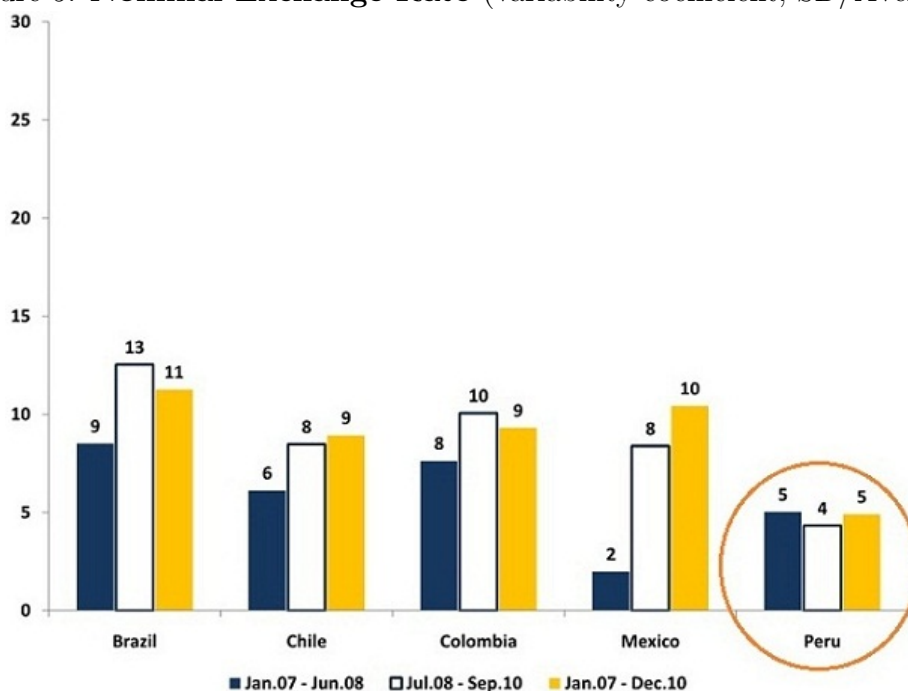
The BCR's FOREX intervention has been effective in reducing the volatility of the Peruvian Sol. As Figure 5 shows, the Peruvian currency has been very stable in comparison with those of other countries in the region. The coefficient of variability has been close to 4% whereas for other economies it has reached values between 8% and 13%.

Table 1: Peru: Spot and Forward Foreign Exchange Markets (In millions of US dollars)

|                                   | Pre-Lehman   | Post-Lehman  |  |
|-----------------------------------|--|--|--|
|                                   | Capital Inflows to emerging markets<br><br>Jan. 2008 - Apr. 2008 | Deepest stage of the crisis and QE1<br><br>Oct. 2008 - Mar. 2009 | Full recovery in emerging markets and QE2<br><br>Jun. 2010 - Dec. 2010 |
| <b>Pension Funds</b>              | <b>-1,596</b>  | <b>2,541</b>   | <b>-768</b>  |
| Spot                              | -171   | 968  | 332  |
| Forward                           | -1,425   | 1,573  | -1,100   |
| <b>Non resident Investors</b>     | <b>-1,013</b>  | <b>1,944</b>   | <b>-1,871</b>  |
| Spot                              | -2,388   | 1,604  | -1,932   |
| Forward                           | 1,376  | 339  | 61   |
| <b>Other residents</b>            | <b>-6,119</b>  | <b>3,499</b>   | <b>-3,830</b>  |
| Private, non-financial            | -6,119   | 2,489  | -4,450   |
| Financial Institutions            | -1   | 1,010  | 619  |
| <b>Central Bank Interventions</b> | <b>8,728</b>   | <b>-7,984</b>  | <b>6,469</b>   |

(positive figures imply net demand, negative implies net supply positions)

Figure 5: Nominal Exchange Rate (variability coefficient, SD/Average)



## 4 Sterilization

To avoid side effects of FOREX intervention on the ability to control the inflation, the central bank needs a sufficient capacity for sterilization. There are two crucial factors that helped to accomplish this goal in the case of Peru: a solid fiscal position and the increasing demand for monetary base. In table 2, a simplified balance sheet of the BCR is presented in terms of percentages of the GDP, where it can be noticed that the fiscal



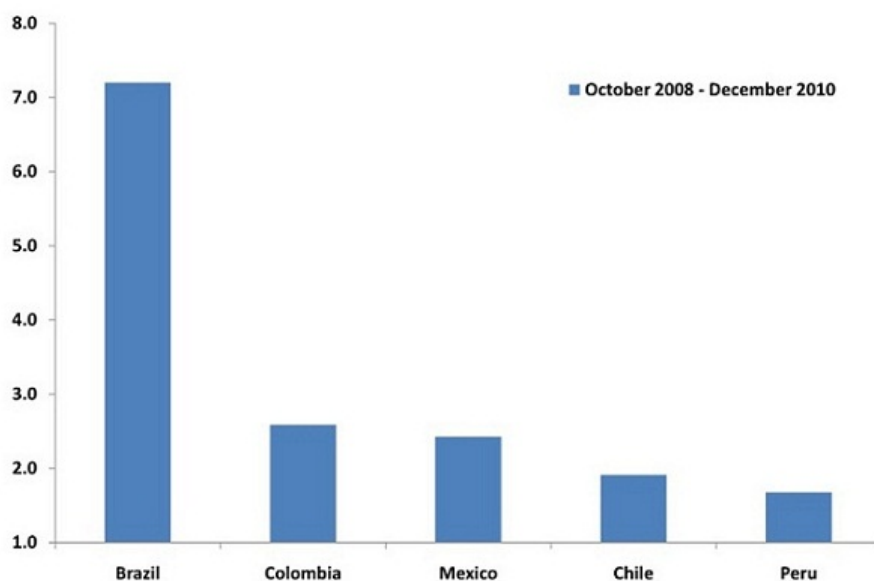
deposits in the bank represents 10% of GDP which is close to 35% of the size of the international reserves. The fiscal contribution to sterilize the liquidity created by the intervention in the exchange rate market also helps to reduce the pressure on the real exchange rate.

Table 2: **Balance Sheet of the Central Bank of Peru**

| Assets                            |              | Liabilities                       |              |
|-----------------------------------|--------------|-----------------------------------|--------------|
| <b>Net International Reserves</b> | <b>28.8%</b> | <b>Treasury's Deposits</b>        | <b>10.3%</b> |
|                                   |              | <b>Central Bank Securities</b>    | <b>1.8%</b>  |
|                                   |              | <b>Term Deposits of Banks</b>     | <b>4.2%</b>  |
|                                   |              | <b>Reserve Requirements</b>       | <b>6.1%</b>  |
|                                   |              | <b>Other liabilities</b>          | <b>1.0%</b>  |
|                                   |              | <b>Currency (notes and coins)</b> | <b>5.4%</b>  |

Sterilized interventions should not affect the ability to use the short-term interest rate as a policy tool. To assess the impact of FOREX intervention on the variability of the interest rate, we computed a ratio indicating the relative volatility of the interbank interest rate related to the variability of the exchange rate in different economies with floating exchange rate. Figure 6 indicates that Peru has the lowest ratio.

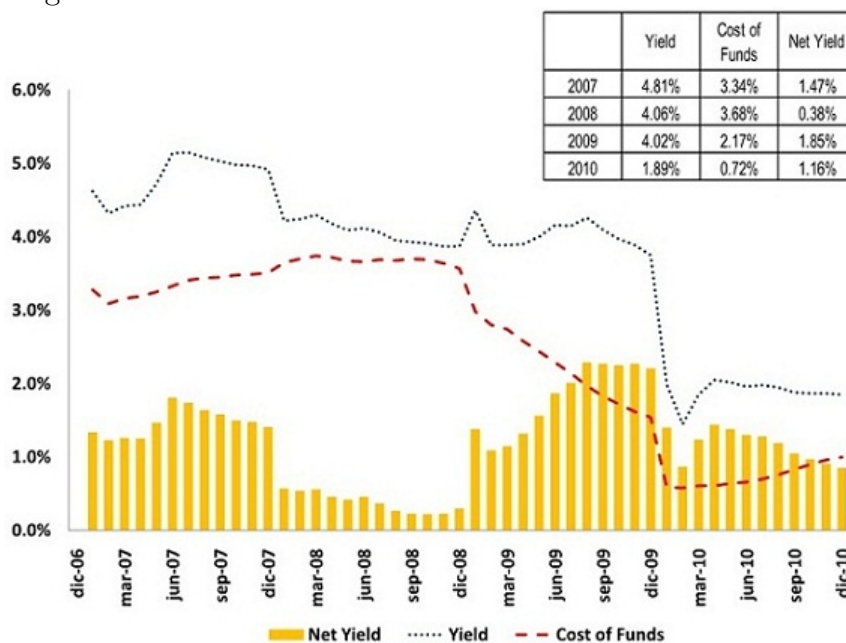
Figure 6: **Volatility of Interest Rate** (Relative to Volatility of Exchange Rate)



Another concern about sterilization is the financial cost from the carry cost or interest rate differential from the returns of the international reserves with the interest rate paid to the different liabilities of the central bank. In a situation with higher local interest rates, the central bank could face financial losses. One component that eases this burden is the currency which is a liability free of interest rate. As it is shown in Figure 7, the return on the foreign assets held by the BCR exceeds the average cost of its liabilities<sup>1</sup>.

<sup>1</sup>With respect to the exchange rate losses that can be generated by a currency appreciation on international reserves valued in local currency, there is not a consensus about the accounting treatment

Figure 7: Central Bank NIR Yields and Cost of Funds



Finally, an important issue with sterilized interventions is that they can create an incentive to attract further capital inflows due to the interest rate differential between the local and international interest rates. This possibility could neutralize the monetary policy, either by paralyzing the use of the policy rate or by attracting further foreign financing. These capital flows have as an additional incentive the expectation of appreciation of the local currency.

The recent episodes of surge of capital inflows before the Lehman collapse and with the QE2, has been reflected in Peru in the growth of the demand of different financial instruments in local currency by non-resident participants, including the sterilization papers of the central bank. To avoid the circularity of sterilized intervention attracting more capital inflows, the central bank implemented the following measures: (a) Imposition of a 4% fee for the purchase or sale of BCR paper to participants different than local financial institutions in order to reduce the re-sale to non-resident players; (b) Increase to 120% of the reserve requirement on deposits in local currency to non-resident agents; and, (c) Substitution of the certificates for term deposits as instrument of sterilization to avoid the resale of other instruments in local currency to non-resident agents and its subsequent replacement by BCR paper.

Also some macro-prudential measures were put in place by the Superintendencia of Banks (SBS) and the Treasury. The SBS cut the limit for long net foreign position for banks from 75 to 60 percent; it also limited the amount of daily and weekly FX operations by pension funds and recently has pre-published a norm that limits the long-position in

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of this valuation effect, some central banks register it in the Profit and Losses report, while others register it in a separated item in the Capital account. From an economic point of view the change of valuation in local currency of the international reserves is not relevant. An example can illustrate that, since it could be meaningless to register and distribute dividends originated in a depreciation of the currency that increases the nominal amount of international reserves.

derivatives for banks of 40 percent of their net worth.

On the other hand, the Treasury has taxed the capital gains generated by forward contracts with a tax rate of 30 percent, and recently it has issued in the international markets bonds denominated in domestic currency but paid in foreign currency, an operation that increased the demand for foreign currency by those domestic agents that purchased those bonds. The BCR increased the limit on foreign investment of the pension funds from 17% to 30% in 2010.

## 5 Reserve Requirements

The liquidity accumulation of foreign currency by the financial intermediaries has been determined mainly by macro prudential policies. In particular, the BCR uses reserve requirements to manage capital flows and at the same time accumulate a buffer stock of international reserves. For instance, during the capital-inflow episode of the first quarter 2008, the Central Bank raised the reserve requirements in domestic and foreign currency, combining this policy with a series of other measures aimed at discouraging holdings of central bank instruments by non-resident investors. The rate of marginal reserve requirements in domestic currency was raised from 6.0 to 25.0% (Table 3); the rate of reserve requirements for deposits of non residents to 120%, the rate of marginal reserve requirements in foreign currency was raised from 30% to 49%<sup>2</sup>.

Also, due to the Quantitative Easing measures in the developed world, we observed a resurgence of the capital inflows during the second part of 2010. In this case the BCR, resumed its reserve requirement policies raising them to 25% in domestic currency, to 55% in foreign currency, and to 75% for the external short term liabilities of the financial system; also, reinstated the reserve requirement ratio for domestic currency deposits of non-resident investors to 120%. Observing a higher dynamism of the lending to the domestic market from domestic banks subsidiaries abroad, the BCR also included their liabilities within the total liabilities subject to reserve requirements<sup>3</sup>.

In Rossini and Quispe (2010), it is described the credit crunch event in Peru of 1999-2001, as caused by the combination of an initial surge of capital inflows and a subsequent expansion of banking credit, followed by a sharp contraction of credit produced by a sudden-stop of capital flows combined with a sharp currency depreciation originated by the Russian crisis of 1998. In Figure 8, it is shown the evolution of the banking credit as a proportion of GDP, including a band of +/- 2 standard deviations of credit/GDP ratio over the sample constructed around a smoothed series by Hodrick-Prescott filter, which can be used to identify periods of excessive credit expansion or contraction. As it can be verified the after the recovery from the financial crisis, credit has been evolving inside this band.

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<sup>2</sup>During the intensification of the global financial crisis in the last quarter of 2008, the reserve requirements were reduced in order to avoid a credit contraction.

<sup>3</sup>In September 2007, the Central Bank eliminated the reserve requirements for external loans with 2-year or longer maturities of commercial banks in order to extend their maturities. The longer term external funding of banks increased from 17% of total external funding in October to 50% in December 2007

Figure 8: Peru: Credit/GDP Ratio: 1993-2010 (Annual ratios from quarterly data, in percentages)



Table 3: Peru: Monetary Policy interest rate and reserve requirement ratios, 2006 – 2011

|  | Monetary Policy interest rate:<br>Reference rate for the interbank money market | Reserve requirement ratios   |                                   |                                       |                                  |                                   |                                       |            |           |    |
|--|---|------------------------------|-----------------------------------|---------------------------------------|----------------------------------|-----------------------------------|---------------------------------------|------------|-----------|----|
|  |   | Legal minimum required ratio | Domestic Currency                 |                                       |                                  | Foreign Currency                  |                                       | Short term | Long term |    |
|  |   |                              | Marginal requirement for deposits | Policy increases in the average ratio | Required ratio for non-residents | Marginal requirement for deposits | Policy increases in the average ratio |            |           |    |
| <b>I. Pre-Lehman: Capital inflows and inflationary pressures in emerging markets</b> |   |                              |                                   |                                       |                                  |                                   |                                       |            |           |    |
| May-06   | 4,50%   | 6,0%                         |                                   |                                       |                                  |                                   | 30%                                   | 30%        | 30%       |    |
| Jul-07   | 4,75%   | 6,0%                         |                                   |                                       |                                  |                                   | 30%                                   | 30%        | 30%       |    |
| Sep-07   | 5,00%   | 6,0%                         |                                   |                                       |                                  |                                   | 30%                                   | 30%        | 0%        |    |
| Jan-08   | 5,25%   | 6,0%                         |                                   |                                       |                                  |                                   | 30%                                   | 30%        | 0%        |    |
| Mar-08   | 5,25%   | 8,0%                         | 15%                               |                                       | 15%                              |                                   | 40%                                   | 40%        | 0%        |    |
| Apr-08   | 5,50%   | 9,0%                         | 20%                               |                                       | 40%                              |                                   | 45%                                   | 45%        | 0%        |    |
| Jun-08   | 5,75%   | 9,0%                         | 20%                               |                                       | 40%                              |                                   | 45%                                   | 45%        | 0%        |    |
| Jul-08   | 6,00%   | 9,0%                         | 25%                               |                                       | 120%                             |                                   | 49%                                   | 49%        | 9%        |    |
| Aug-08   | 6,25%   | 9,0%                         | 25%                               |                                       | 120%                             |                                   | 49%                                   | 49%        | 9%        |    |
| Sep-08   | 6,50%   | 9,0%                         | 25%                               |                                       | 120%                             |                                   | 49%                                   | 49%        | 9%        |    |
| <b>II. Post-Lehman and QE1</b>   |   |                              |                                   |                                       |                                  |                                   |                                       |            |           |    |
| Post-Lehman: Deepest stage of the crisis and QE1                                     |   |                              |                                   |                                       |                                  |                                   |                                       |            |           |    |
| Oct-08   | 6,50%   | 9,0%                         |                                   |                                       | 120%                             |                                   | 35%                                   |            | 0%        | 0% |
| Dec-08   | 6,50%   | 7,5%                         |                                   |                                       | 35%                              |                                   | 30%                                   |            | 0%        | 0% |
| Feb-09   | 6,25%   | 7,5%                         |                                   |                                       | 35%                              |                                   | 30%                                   |            | 0%        | 0% |
| Mar-09   | 6,00%   | 6,0%                         |                                   |                                       | 35%                              |                                   | 30%                                   |            | 0%        | 0% |
| Post-Lehman: Emerging markets quick recovery and QE1                                 |   |                              |                                   |                                       |                                  |                                   |                                       |            |           |    |
| Apr-09   | 5,00%   | 6,0%                         |                                   |                                       | 35%                              |                                   | 30%                                   |            | 0%        | 0% |
| May-09   | 4,00%   | 6,0%                         |                                   |                                       | 35%                              |                                   | 30%                                   |            | 0%        | 0% |
| Jun-09   | 3,00%   | 6,0%                         |                                   |                                       | 35%                              |                                   | 30%                                   |            | 0%        | 0% |
| Jul-09   | 2,00%   | 6,0%                         |                                   |                                       | 35%                              |                                   | 30%                                   |            | 0%        | 0% |
| Aug-09   | 1,25%   | 6,0%                         |                                   |                                       | 35%                              |                                   | 30%                                   |            | 0%        | 0% |
| Dec-09   | 1,25%   | 6,0%                         |                                   |                                       | 35%                              |                                   | 30%                                   |            | 0%        | 0% |
| Feb-10   | 1,25%   | 6,0%                         |                                   |                                       | 35%                              |                                   | 30%                                   |            | 35%       | 0% |
| <b>III. Post-Lehman: Full recovery of emerging markets and QE2</b>                   |   |                              |                                   |                                       |                                  |                                   |                                       |            |           |    |
| May-10   | 1,50%   | 6,0%                         |                                   |                                       | 35%                              |                                   | 30%                                   |            | 35%       | 0% |
| Jun-10   | 1,75%   | 6,0%                         |                                   |                                       | 35%                              |                                   | 30%                                   |            | 35%       | 0% |
| Jul-10   | 2,00%   | 7,0%                         |                                   |                                       | 40%                              |                                   | 35%                                   |            | 40%       | 0% |
| Aug-10   | 2,50%   | 8,0%                         | 12%                               |                                       | 50%                              |                                   | 45%                                   | 0,10%      | 50%       | 0% |
| Sep-10   | 3,00%   | 8,5%                         | 15%                               |                                       | 120%                             |                                   | 50%                                   | 0,20%      | 65%       | 0% |
| Oct-10   | 3,00%   | 9,0%                         | 25%                               |                                       | 120%                             |                                   | 55%                                   | 0,20%      | 75%       | 0% |
| Nov-10   | 3,00%   | 9,0%                         | 25%                               |                                       | 120%                             |                                   | 55%                                   |            | 75%       | 0% |
| Dec-10   | 3,00%   | 9,0%                         | 25%                               |                                       | 120%                             |                                   | 55%                                   |            | 75%       | 0% |

## 6 Real Exchange Rates

The nominal appreciation of the exchange rate caused by the capital inflows raised the concerns about the negative effect of this situation on the tradable sectors. To assess this impact we study the data of the real exchange rate and evaluate the deviations from the equilibrium real exchange rate. In both cases, the case of Peru shows that the surge of capital inflows has not involved a major negative effect on competitiveness.

In Figure 9 we present the evolution of the index of the effective real exchange rate and it can be observed that it has been around  $\pm 5\%$  of the average level of the period 1993-2010. This relative stable real exchange rate can ratify in international comparisons. In Table 4, the comparative coefficient of variability among 22 countries shows that the Real Effective Exchange Rate (RER) of the Peruvian currency is the 3rd less volatile for the period December 1994 to December 2010. Moreover, for a shorter period, from January 2001 to December 2010, Peru shows the least volatile RER.

Figure 9: **Effective Real Exchange Rate**(Index based on 1993 – 2010 average = 100)



Table 4: **Coefficient of Variability of the Effective Real Exchange Rate**

|                | Dec 1994-<br>Dec 2010 | Jan 2001-<br>Dec 2010 |               | Dec 1994-<br>Dec 2010 | Jan 2001-<br>Dec 2010 |
|----------------|-----------------------|-----------------------|---------------|-----------------------|-----------------------|
| Brazil         | 21.3%                 | 22.7%                 | United States | 8.0%                  | 7.8%                  |
| Czech Republic | 20.9%                 | 11.5%                 | Israel        | 9.2%                  | 6.3%                  |
| South Africa   | 14.1%                 | 12.2%                 | Thailand      | 10.2%                 | 7.0%                  |
| Korea          | 11.9%                 | 11.9%                 | Euro area     | 7.3%                  | 5.3%                  |
| Indonesia      | 19.1%                 | 7.8%                  | Chile         | 7.7%                  | 6.9%                  |
| Philippines    | 11.6%                 | 11.3%                 | Sweden        | 7.7%                  | 5.4%                  |
| Australia      | 12.3%                 | 10.5%                 | India         | 4.6%                  | 4.5%                  |
| Canada         | 10.8%                 | 9.9%                  | Malaysia      | 9.5%                  | 3.7%                  |
| Japan          | 13.9%                 | 9.0%                  | Switzerland   | 4.9%                  | 4.0%                  |
| United Kingdom | 9.3%                  | 9.7%                  | Singapore     | 5.4%                  | 3.7%                  |
| Mexico         | 12.7%                 | 8.4%                  | <b>Peru</b>   | <b>5.1%</b>           | <b>3.6%</b>           |

Source: Bank for International Settlements

Calculations based on the BIS effective exchange rate indices

We use the Behavioural Equilibrium Exchange Rate (BEER) method to estimate the equilibrium real exchange rate. Table 5 shows the estimated elasticities of the RER from its fundamental determinants<sup>4</sup>. According to the estimations, this approach shows no mayor misalignments of the RER with respect to its equilibrium path (Figure 10).

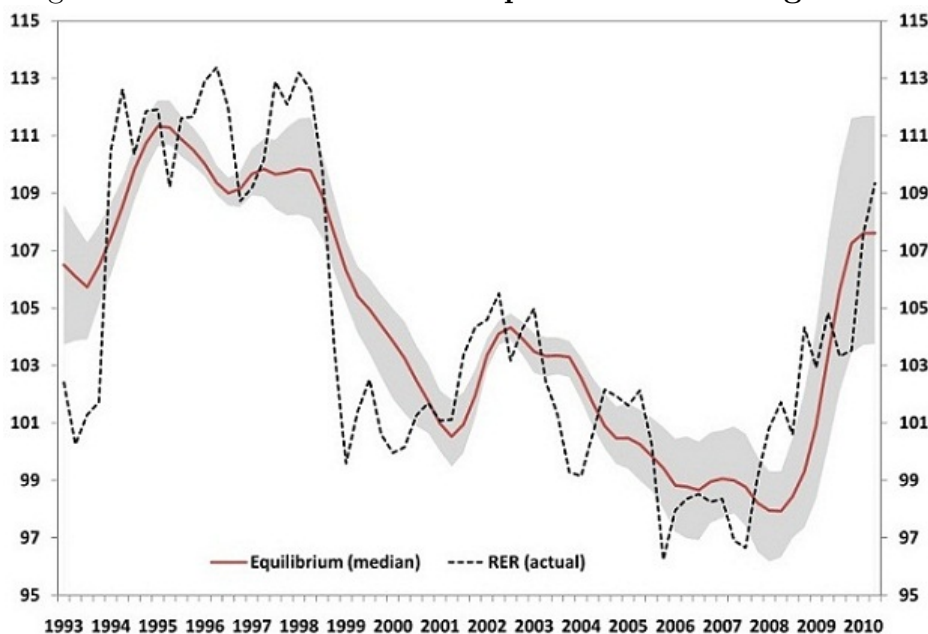
## 7 Concluding Remarks

The Central Bank of Peru has developed a policy framework based on a risk management approach. In this sense, the vulnerabilities associated to the partial dollarization of the banking system has been taken into account to add non conventional policy tools like intervention in the foreign exchange market, accumulation of international reserves, application of different forms of reserve requirements and different forms of liquidity sterilization. With this policy framework the Peruvian economy was relatively isolated from the effects of the global financial crisis and able to recover the path of growth with low inflation and to avoid major disruptions from the surge of capital inflows.

Table 5: **Empirical Results**

| Fundamental Variable                            | Elasticity |
|---|------------|
| Net Foreign Liabilities / GDP                   | 0.20       |
| Terms of Trade                                  | -0.24      |
| Trade Liberalization (exports and imports) /GDP | 0.14       |
| Peruvian GDP / GDP of Peru's trade partners     | -0.30      |
| Public Expenditure/ GDP                         | -0.01      |
| Credit Dollarization Ratio                      | 0.08       |

Figure 10: **Peru: Behavioural Equilibrium Exchange Rate**



<sup>4</sup>The calculations are based on Rodríguez and Winkelried (2011)

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