

BANCO CENTRAL DE RESERVA DEL PERÚ



**MONETARY POLICY IN A DOLLARIZED ECONOMY: TWO
YEARS OF INFLATION TARGETING EXPERIENCE IN PERU**

Adrián Armas

**“STRATEGIES FOR IMPLEMENTING MONETARY POLICY IN THE AMERICAS: THE ROLE
OF INFLATION TARGETING”**

Research meeting

October 2004

TABLE OF CONTENTS

	Page
1. Introduction	3
2. Features of the Inflation Targeting regime in Peru	4
a. The Central Bank's autonomy	4
b. Announcement of the inflation target	5
c. Decision making in a pre-emptive manner	10
d. Transparency	11
e. Operational target	11
f. Floating exchange rate and the level of international reserves	16
3. The practice of Inflation Targeting: 2002-2004	18
a. Fulfillment of the target 2002 – 2003	18
b. Inflationary pressures in 2004	21
c. Turbulence in 2002	22
d. Foreign exchange intervention and NIR accumulation 2003-2004	24
e. Dedollarization of the economy	25
4. Inflation forecast and transmission mechanisms of monetary policy	28
5. Concluding remarks	34

MONETARY POLICY IN A DOLLARIZED ECONOMY: TWO YEARS OF INFLATION TARGETING EXPERIENCE IN PERU

Adrián Armas¹

1. Introduction

The theoretic and policy literature does not provide a clear answer about optimal monetary and exchange rate policy under an environment of a two-currency system. There is a recent trend of countries with financial dollarization to shift from hard-peg exchange rate systems to more flexible ones, in particular during the last years. However, there are still questions regarding the effectiveness of monetary policy, how to deal with the risks of dollarization in terms of both Central Bank's reaction function and regulatory issues, and how to rebuild confidence on the domestic currency. The answers to these questions are currently in permanent debate.

Inflation targeting (IT) as a monetary policy framework has become popular among several developing countries since the end of last decade. This regime gives an explicit and permanent commitment of price stability to the Central Bank. Therefore, the actions of the Central Bank are oriented in a transparent way to achieve the inflation target. This systematic behavior allows to anchor actual and expected inflation according to the target.

This monetary policy strategy is one possible way to get long-run confidence on domestic currency and to implement an independent monetary policy, despite the presence of financial dollarization. In this paper, I would like to describe the Peruvian experience, which as far as I know is the only case of Inflation Targeting implementation in a highly financially dollarized economy.

Since January 2002, the Banco Central de Reserva del Peru (BCRP) follows an Inflation Targeting regime (IT). In such a regime, actions of the Central Bank are driven to reach an annual inflation rate of 2,5 percent, with a margin of tolerance of 1 percentage point up (3,5 percent) or down (1,5 percent).

During the first two years of implementation, a number of challenges were successfully managed by the Central Bank. In the first place, the Bank managed to counterbalance deflationary pressures that appeared between the end of 2001 and early 2002. The annual inflation rate went from -0,1 percent in December 2001 to 1,5 percent in 2002 and to 2,5 percent in December 2003; that is, the target has been met, and all efforts from now on will be oriented to maintain a stable inflation rate in the long run around this level.

Secondly, the Peruvian economy successfully faced the financial turmoil that affected the region in 2002 (particularly in September). The high level of net

¹ The views in this paper are those of the author and do not necessarily represent those of the BCRP. He thanks Rafael Herrada, Marco Vega, Vicente Tuesta, Francisco Grippa, Gonzalo Llosa and Jorge Muñoz for the efficient assistance and insightful comments.

international reserves, as well as monetary and fiscal discipline, contributed to this outcome.

Another challenge that monetary policy faces is the high degree of financial dollarization. The Central Bank's commitment to monetary stability, by means of assuring a low and stable rate of inflation, and the development of the domestic government debt market in domestic currency, have both contributed to a gradual process of financial dedollarization in the Peruvian economy. Thus, the dollarization ratio of the banking system's broad money has reduced from 66 percent in December 2001 to 60 percent in August 2004. High level of international reserves and high reserve requirements on bank's dollar liabilities as well as central bank's action to limit high volatility of the exchange rate are some of the policy responses to control the risks of financial dollarization.

The paper is organized in the following way. In section 2, it discusses the main elements for adopting an inflation targeting regime. Section 3 describes the monetary policy evolution and highlights the main results: fulfillment of the inflation target, recent inflation pressures and reduction of financial dollarization. The inflation forecasting process is explained in section 4. Finally, the concluding remarks are stated in section 5.

2. Features of the Inflation Targeting regime in Peru

During the disinflation process (1991-2001), the Central Bank of Peru followed a monetary targeting framework. Under the new environment of low inflation rate, monetary base growth became more unstable and less reliable to communicate monetary policy. In this context, the Central Bank of Peru adopted the inflation targeting regime in 2002. In this section, the main features of the IT regime in Peru are described, including the following:

- a. The Central Bank's autonomy
- b. Announcement of the inflation target
- c. Decision making in an pre-emptive manner
- d. Transparency
- e. Operational target
- f. Floating exchange rate

a. The Central Bank's autonomy

A key condition for the Central Bank to be able to commit to keeping inflation under control is its autonomy from the government, that is, its independence from fiscal considerations in the monetary policy's decision process.

Thus, the autonomy of the Central Bank guarantees that monetary decisions are taken according to its legal mandate and independently of other goals. The Constitution establishes that the Central Bank's sole objective is to preserve monetary stability and stipulates its autonomy according to its Charter Law.

This autonomy is supported by explicit prohibitions for the Bank to take actions against this mandate, which include the prohibition of granting direct loans to the Treasury. However, the Central Bank can make open market operations with treasury bills and bonds for monetary purposes. The Law allows the BCRP to acquire Treasury bonds in the secondary market up to 5 percent of the previous year monetary base stock. Therefore, the Central Bank has full operational capacity over its monetary policy instruments in order to meet the inflation target.

b. Announcement of the inflation target

The announcement of the inflation target by the Central Bank establishes an explicit commitment to monetary stability. Charts 1 and 2 summarize how central banks that follow the IT regime measure their inflation targets, grouped in economies which are in a process of disinflation and economies which have already reached their long-term target level.

In general, it is observed that central banks of the first group announce their targets each year, while the others commit to maintain a long-term target level indefinitely (permanently). This long-term target level is set between 2 and 3 percent, being 2 percent the most frequent rate chosen by these central banks. Once the long-term target rate has been reached, central banks no longer revise this rate in order to give stability to savings and investment decisions in the long run.²

² Recently, the Bank of England modified both its inflation target level, from 2,5 to 2,0 percent, and its methodology of measurement in order to meet the patterns of the Euro zone.

Chart 1
Features of the inflation targeting regime applied to low-inflation countries

Developed country	Indicator	Level of the inflation target	Horizon of the target	Assessment of compliance of the target and accountability
Australia	CPI	2-3 % since 1993	Medium term horizon	The target must be complied on average over the economic cycle. The Governor is required to attend twice a year to testify about conduction of monetary policy.
Canada	CPI Monitoring of core inflation as an operational guide	Middle point of the range: 1-3% since 1998	Medium term horizon. (Valid target until year-end 2006).	Monetary policy decisions are oriented to maintain the inflation trend in the middle point of the target range. The effective intermediate objective is to minimize the difference between inflation forecasted 6 to 8 quarters in advance and the inflation target.
Chile	CPI	2-4 % centered in 3 % since 2001	Medium term horizon (2 years)	The target must be accomplished in a permanent basis in a medium term horizon. Both end-of-period and average inflation are observed.
England ³	CPI	2,0 %	Medium term horizon	The target must be met at all time. The YoY CPI percentage variation is evaluated. When the target is exceeded in +/- 1 percentage point, it is required an explanation. Monetary policy decisions are made up with a two-year horizon in the future
Mexico	INPC	3% with an variability interval of +/- 1 percentage point	Medium term horizon	Until 2003 accountability was established on the compliance of the target using the December-to-December percentage variation. Since 2004 the inflation target operates continually and not only for year-end inflation.

³ Until 2003 the inflation target was 2,5 percent measured by the Retail Price Index (excluding interest payments). Since 2004, the target is measured using a CPI elaborated by the methodology of Harmonized Consumer Price Index used by the European Central Bank. The methodology change has implied an adjustment in the inflation target from 2,5 to 2,0 percent.

Developed country	Indicator	Level of the inflation target	Horizon of the target	Assessment of compliance of the target and accountability
Norway	CPI It is emphasized a measure of core inflation for continuous assessment.	2,5 % with a fluctuation margin of +/- 1%.	Medium term horizon, with emphasis on a 2-year horizon.	The target would be met at all times. If there are significant deviations between observed inflation and the target, the Central Bank must explain the reasons in the Annual Report. A 2-year period is considered appropriate for monetary policy to reach the target following a deviation from it. The formulation of a flexible policy is preferable.
New Zealand	CPI	1-3 %	Medium term horizon	The target must be met on average in the medium term horizon. If the inflation rate during the medium term horizon deviates from target range, a report must be made explaining the actions to be taken in order to meet the target.
Poland	CPI	2003: 3% with a tolerance range of +/- 1% After 2003: 2,5 % with a tolerance margin of +/- 1%	Medium term horizon	The assessment of a different inflation target at the end of each year has been changed for a continuous evaluation in a medium term horizon. In case of deviation from the target, the monetary policy objective is to return gradually to it in the medium term horizon.
Peru	CPI	2,5 % with a margin of tolerance of +/- 1%.	Medium term	Accountability on the fulfillment of the target is made using the December-to-December CPI percentage variation.
Czech Republic	CPI	A continuous fixed range of 3-5% in January 2002, which might finally be of 2-4% at the year-end 2005.	Medium term horizon (year-end 2005).	Monetary policy is assessed periodically using inflation forecasts made 12 to 18 months back, period in which monetary policy decisions were taken in order to reach the inflation target in that period. Clauses of escape are considered in the occurrence of external shocks.
Sweden	CPI	2% with a range of fluctuation of +/- 1 percentage point	1 or 2 years	Both the YoY CPI percentage variation and the YoY CPI moving average percentage variation are permanently assessed. When the observed rates exceed the range of tolerance, an explanation must be disclosed.

Chart 2
Features of the IT regime applied in countries with a disinflation process

Developing country	Indicator	Level of the inflation target	Horizon of the target	Assessment of compliance of the target and accountability
Brazil	CPIA	2004: 5,5 % 2005: 4,5 %	1 year	Accountability on the fulfillment of the target is made using a December-to-December percentage variation. During 2003, due to external shocks, it was communicated in advance an adjustment in the inflation target from 4,0 to 8,5 %.
Colombia	CPI	2003-2004: 5-6% 2005: 3.5-5.5%	1 year	Accountability on the fulfillment of the target is made using a December-to-December percentage variation.
Philippines	CPI	2004: 4-5 %	1 year	The target is established on the YoY average variation.
Turkey	CPI	2003: 20% 2004: 12%	1 year	Accountability on the fulfillment of the target is made at the end of the year using a December-to-December percentage variation.

Among central banks with IT regimes in Latin America, Chile and Peru finished their disinflation processes some years ago. Chile maintains an inflation target between 2 and 4 percent, while Peru has a target of 2,5 percent with a tolerance of 1 percentage point up (3,5 percent) or down (1,5 percent). Similarly, Mexico has recently reached its long-run target (3,0 percent with a tolerance of 1 percentage point up and down).

The inflation target level in the Peruvian case is similar to the long-term rate of inflation of the U.S. economy and is the lowest level in the region among countries with IT regimen. Under a two-currency system, domestic currency has to compete with the dollar in the long run in terms of keeping purchasing power, so the inflation target level has to be as close as possible to the long-run inflation of the U.S. economy. From an historical standpoint, the Peruvian economy did not register inflation levels around 2,5 percent since the 30's.

Chart 3
Inflation in Peru

Period	Inflation 1/
1901-1905	7,4
1906-1910	-1,8
1911-1915	0,7
1916-1920	13,4
1921-1925	-0,8
1926-1930	-3,3
1931-1935	-2,0
1936-1940	3,9
1941-1945	11,2
1946-1950	19,3
1951-1955	7,3
1956-1960	8,4
1961-1965	9,0
1966-1970	9,8
1971-1975	12,7
1976-1980	67,0
1981-1985	104,9
1986-1990	2342,2
1991-1995	113,3
1996-2000	6,9
2001-2003	1,5

1/ Annual percentage average in each period

Source: Statistic Yearbook of Peru

The measurement of the target is made by the annual variation of the consumer price index (CPI) of Lima City, which is the most well known indicator by the public and it is easily available (first day of next month).

In the literature about IT implementation, there is a discussion between choosing the most well-known inflation indicator by the public (CPI) or an indicator of inflation tendency which isolates temporary fluctuations on prices (core inflation). The advantage of the former (and thus its popularity among central banks with IT) is its easiness to be monitored by the public; therefore, it better communicates the commitment of the institution with monetary stability.

The core inflation rate, on the other hand, is a more appropriate indicator for monetary policy assessment, since it adequately measures the rate of growth on general prices. The Central Bank publishes this indicator in its Press Releases about monetary policy decisions and in the Inflation Report.

The range of tolerance from the target of 1 percentage point up or down enhances flexibility of monetary policy; given that this margin permits that monetary policy do not react to temporary fluctuations on prices⁴. The margin of 1 percentage point up or down in the Peruvian case is the range used by most central banks with both IT and inflation rates at international levels. A broader range is likely to suffer of a lack of precision with respect to the inflation target commitment.

c. Decision making in a pre-emptive manner

It is well established that monetary policy actions affects inflation with a lag. In the Peruvian economy case, this lag is estimated to be around one year (Armas et al, 2001), while in countries with more developed financial systems and a longer record of low rates of inflation this lag is higher (two years or longer). The previous preliminary evidence allows the Central Bank to take decisions in a pre-emptive manner to counteract inflationary or deflationary pressures that could deviate it from its target.

In order to make decisions in a timely basis, a system of inflation forecasts has been implemented to anticipate inflationary or deflationary pressures and to assess the monetary policy stance. These projections take into account inflation expectations, domestic conditions of aggregate demand and supply, and the expected evolution of local financial markets and the world economy.

In this sense, the Inflation Targeting regime does not imply that the monetary policy design is independent of the economic activity performance. Broadly speaking, it is usually considered that the interest rate channel (via changes in the short-term interest rate) is one of the most important mechanisms by which monetary policy affects inflation through aggregate demand. An economy in expansion may be exposed to inflationary pressures on the demand side, which justifies a tight monetary policy (increase in interest rates). In contrast, an economy in recession may face deflationary pressures, leading to a loosening of the monetary policy stance (reduction of interest rates).

However, in the case of an economy with a low development of domestic currency financial markets other channels such as inflation expectation and exchange rate play are also important. In any case, pre-emptive actions contribute that inflation expectations are compatible with target.

⁴ In certain cases, monetary policy could react facing temporary supply shocks in order to avoid deviations of inflation expectations from the target. The level of reaction depends on the persistence of the supply shocks and the size of deviations.

d. Transparency

Transparency is a key feature of the Inflation Targeting regime and, in general, of the new practices of central banks. In principle, it is a way to reward the society for the autonomy that has been granted. In terms of policy, transparency is a necessary condition to strengthen credibility in the Central Bank and thus to improve effectiveness of monetary policy.

The IT regime seeks to anchor inflation expectations of the economic agents around the announced target (2,5 percent). A central bank without credibility cannot comply with its target given that its actions do not induce the expected response on economic agents.

The Central Bank has traditionally obeyed to inform the public about the state of national finances and the evolution of main macroeconomic variables through its Weekly Bulletin and Annual Report. However, according to modern practices of communication in central banking, transparency is not only to make information available, but also to inform about the rationality of central bank's targets, policy decisions and forecasts. In this framework of new practices on transparency, since 2001 a Press Release is published the first Thursday of each month, in which the adopted monetary policy decisions are released.

Together, with the implementation of the Inflation Targeting regime since 2002, the BCRP started to publish three times a year (in January, May and August) an Inflation Report. In this report, the BCRP communicates to the agents the main determinants of the recent inflation trend, as well as previsions about future inflationary or deflationary pressures. This is complemented with a balance of risks that could deviate the rate of inflation from the central projection. The goal of the Inflation Report is to make monetary policy decisions more predictable, as long as agents have relevant information available. A central bank that tries to "surprise" economic agents will finally harm its credibility and, therefore, its effectiveness.

e. Operational target

Monetary policy decisions will translate in modifications of the operational target chosen by the Central Bank. In most cases, this operational target is an interest rate of very short term in the money market, particularly the overnight interbank loan rate. Therefore, daily monetary operations are oriented to lead the interest rate chosen as operational target into the level announced by the Central Bank.

The interest rate operational target has an advantage for communicating to the public, in a simple manner, the monetary policy stance, which reinforces its power and effectiveness. A reduction in the target level of interest rate indicates to the public that the Central Bank is loosening its monetary policy stance and vice versa. A second advantage of an interest rate operational target is that, by means of doing the short-term interest rate more stable and predictable, it helps to develop a yield curve of interest rates for different maturities.

Before the implementation of the IT regime, the BCRP used a banking liquidity operational target: the average aggregate balance of commercial banks' deposits at the Central Bank, similar to the "corto" used by Banco de Mexico. It means that BCRP's monetary operations attempted to reach this banking liquidity target, expressed as a nominal range in soles. Therefore, both nominal interbank interest rate and exchange rates were not determined by the Central Bank.

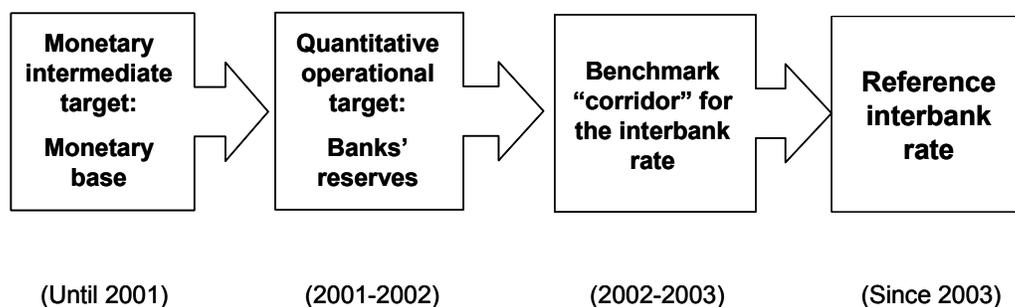
With the adoption of the IT regime, the target gradually passed from a banking liquidity target to an interbank interest rate target, taking into account two important aspects:

- a. The volatility of the interbank interest rate was very high. The use of an operational target of interbank interest rate required this variable to be more stable.
- b. The need of considering temporary deviations from the operational target of interbank interest rate to face upward pressures in the nominal exchange rate that could generate adverse balance sheet effects in a context of a partially dollarized economy.

This process of changing the operational target was made in several steps. During the period 2001 –2002, the disclosure of the banking liquidity target was complemented by the simultaneous announcement of a corridor of benchmark interest rates in which the interbank interest rate should lie within. Thus, open market operations (through auctions) continued to lead the bank's liquidity target but the interbank interest rate was guided through this corridor.

Graph 1

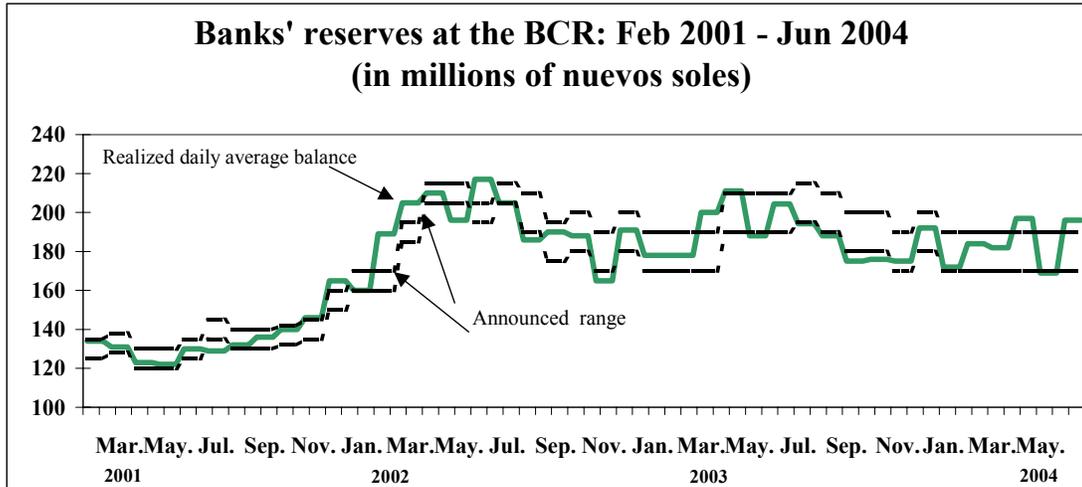
Evolution of the operational target



This corridor is determined by the interest rates BCRP's standing facilities, in order to put a cap and a floor to the evolution of the interbank interest rate. The benchmark cap is the discount window rate, while the benchmark floor is the rate for overnight deposit facilities at the Central Bank.

During the first year under the Inflation Targeting regime, open market operations were primarily guided to reduce the volatility of the interbank rate and to place this rate within the benchmark corridor, while the compliance of the bank's liquidity operational target remained in a second order.

Graph 2



Since 2003, the demand deposits held by commercial banks at the Central Bank have become a projection while monetary operations have been directed to keep the interbank interest rate within the center of the benchmark corridor.

During this gradual process of changing the operational target, the interbank interest rate volatility has been steadily reduced to achieve a currently low level and comparable to that of central banks that follow this operational target. This year standard deviation of the interbank interest rate has been 0,06 percentage points, in comparison to 0,04 percentage points of the Fed funds rate.

Chart 4

Interbank interest rate
(In percentage points)

Year	Average	Standard deviation
1998	19,0	6,5
1999	14,9	4,7
2000	12,7	2,7
2001	8,6	0,9
2002	3,2	0,5
2003	3,3	0,1
2004 1/	2,5	0,1

1/ As of August.

The reduction of the interbank interest rate variability has made monetary policy more predictable and therefore has significantly strengthened the impact of this rate on the other interest rates in domestic currency.

Box 1

Impact of the interbank interest rate on the other interest rates in soles

The Central Bank influences the behavior of the interbank interest rate through its monetary operations. The lending market among banks (interbank) is formed by suppliers and demanders of funds in soles at a very short term. A bank may find itself in an offering or demanding position in the interbank market, depending on its individual liquidity level. The Central Bank regulates the aggregate level of bank's liquidity thus affecting the determination of the interbank interest rate.

The level of this interest rate acts as a benchmark for the formation of the rest of interest rates in Soles, and generally affects more those interest rates of lower risk and shorter term. Given a change in the interbank rate, the stronger the response of interest rates in Soles is, the more potent the interest channel of monetary policy is.

To estimate these effects, data for the period 1995 – 2003 was considered; the information is divided in two sub periods in order to identify how a greater predictability of the interbank rate since the reduction of its volatility has strengthened this transmission channel of monetary policy. The results show that the effects of a one-percentage-point change in the interbank interest rate are significantly higher over lending and deposit rates for terms up to 360 days in the case of the second sub sample. Thus, for instance, the impact of a one-percentage-point variation in the interbank rate over the lending rate up to 360 days is 0,46 percentage points in a 5-month period.

	IMPACTS (in percentage points)	
	Apr.95 - Jan.01	Feb.01 - Mar.03
	Interes rates	
Loans		
Up to 360 days	0,11	0,46
More than 360 days	0,61	0,61
Deposits		
Savings	0,04	0,25
Up to 30 days	0,18	0,61
Among 31-179 days	0,06	0,44
Among 180-360 days	0,21	0,21
More than 360 days	0,13	0,13

Source: Inflation Report January 2004.

One of the BCRP's policy responses to financial dollarization risks is that the operational target of interbank interest rate has a "temporary escape clause".

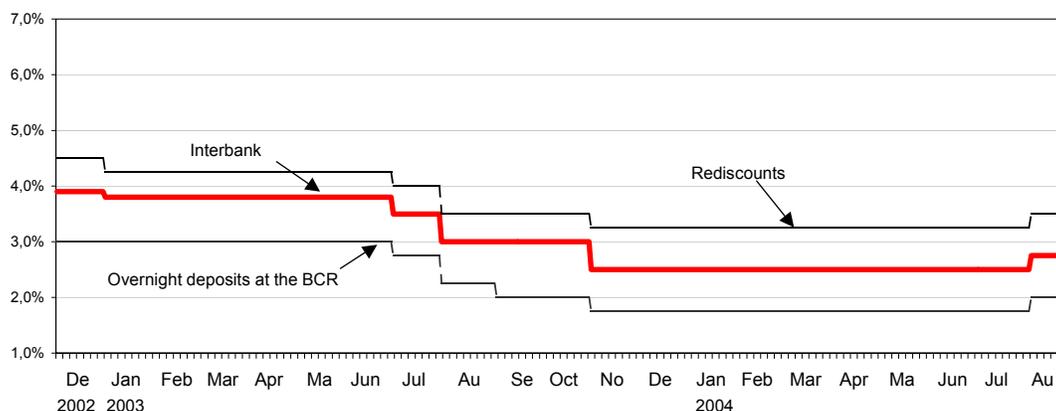
Under a contingency of currency and financial distress, the interbank interest rate may temporarily lie above the benchmark corridor⁵.

Under a “pure” floating exchange rate regime, an economy faces situations of financial turmoil (for instance, a significant deterioration of the country-risk) through adjustments in the nominal exchange rate, without affecting the interest rate in the money market. In contrast, under a fixed exchange rate regime, the adjustment is made through increments in the interest rates and loss of net international reserves (NIR).

The Peruvian Central Bank’s response in situations of financial turmoil has been a combination of temporary adjustment in nominal interest rates and the use of NIR to attenuate sharp depreciation pressures (1998-2002), without any commitment to certain level of exchange rate. In this context, the rise of the interbank interest rate is transitory; and therefore, once the pressure in the foreign exchange market is gone, the interest rate comes back into the benchmark corridor.

The application of the “escape clause” means that interbank rate during this very short time does not signal the stance of monetary policy. Since the beginning of the IT regime, there has been only one episode of financial turmoil that implied the application of the “escape clause”: September 2002, in a context of uncertainty in the region due to the election process in Brazil. In that episode, interbank rate increased from 2,8 percent in August to 5,4 percent in September (above the reference corridor) and decreased again to a level of 3,8 percent afterward (within the reference corridor).

Graph 3
Interest rates in domestic currency
 (December 2002 - August 2004)



⁵ This “temporary escape clause” is stipulated in the press release on monetary policy decisions when the lending rate of BCRP’s standing facilities is the highest between the announced benchmark rate and the average interest rate of the interbank market.

f. Floating exchange rate and the level of international reserves

The existence of an independent monetary policy in a context of free capital mobility is only consistent with a floating exchange rate regime. Any commitment with a certain level of exchange rate is a limitation to monetary policy independence, because it could undermine the primary objective of the monetary authority. Latin American economic history contains several examples of abandonment of fixed exchange rate regimes in a context of financial and balance of payments crises.

The presence of financial dollarization makes necessary for the Central Bank to follow a dirty floating exchange rate regime, that is, the exchange rate is determined by market forces but the Central Bank intervenes to avoid excessive exchange rate volatility. In a dollarized economy there is a potential vulnerability of the financial system to a sharp depreciation (negative balance sheet effects), which calls for avoiding extreme exchange rate volatility. On the other hand a stable exchange rate may encouraged dollarization given the fact that economics agents do not internalize the currency risks of dollarization.

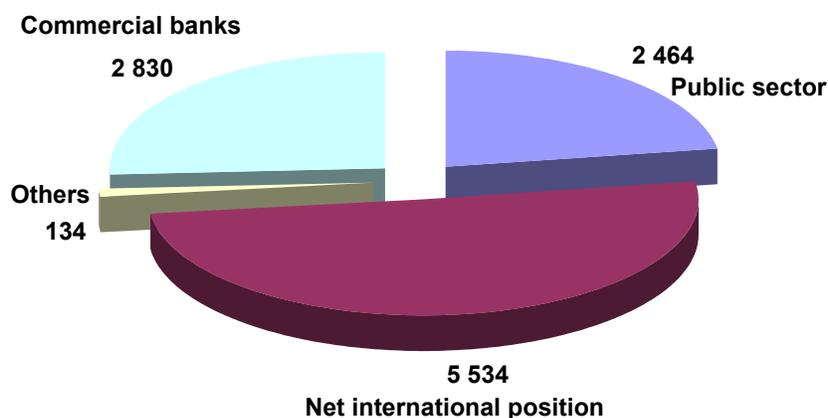
Additionally, a high level of international reserves plays the role of buffer stock and allows facing the risks involved in partial dollarization. Therefore, resources are available to support the financial system in an eventual bank run of dollar-denominated deposits and to intervene (if necessary) in the foreign exchange market.

According to Gulde et al (2004), deposit volatility is higher in dollarized financial systems, which can be explained by the fact that there is no exchange rate overshoot adjustment with dollar deposits. This adjustment –coming from portfolio changes from domestic currency to foreign currency- allows in the case of local currency liabilities to increase immediately their expected yield against dollar assets.

An important component of international liquidity, as reflected in the Central Bank's NIR, is the balance of deposits in dollars held by commercial banks at the BCRP coming from high reserve requirements on dollar liabilities. These deposits constitute liquid funds available for commercial banks to attend situations of lack of liquidity in foreign currency (due to transfers abroad or cash withdrawals). Dollar-denominated deposits of commercial banks at the Central Bank amounted to US\$ 2,8 billion as of August 2004 (about 30 percent of their dollar liabilities).

Graph 4
NIR in US\$ millions as of August 31, 2004

NIR = 10 962



The possibility of a currency crisis is reduced due to the following reasons⁶:

- The reduced size of the stock of soles with respect to the level of foreign reserves: NIR represents five times the monetary base and twice the total broad money in soles (including deposits).
- The level of international reserves and the interventions in the foreign exchange market act as a discouraging factor to limit excessive volatilities in the exchange rate. It is worthwhile to mention that interventions in the foreign exchange market are not intended to defend any certain exchange rate level. Likewise, in situations of turbulence, the adjustment in the interbank interest rate becomes an additional factor of dissuasion.
- The floating exchange rate regime reduces the possibilities of a maxi-devaluation associated to fixed exchange rate regimes.

Gulder et al (2004) analyzed the runs of dollar deposits in dollarized economies in South America during the event of Argentinean crisis (2001-2002) with some contagion effect on all the sample of countries, but Peru.

⁶ Like any other economy, this probability is also conditional to fiscal policy and banking supervision framework.

3. The practice of Inflation Targeting: 2002-2004

In this section, the Peruvian monetary policy under the Inflation Targeting regime is described. Firstly, the convergence of inflation to the target level from a starting point of null rate of inflation in a context of economic recession is explained, and then some comments about recent inflation trends are made. Finally, the episode of financial turmoil in September 2002 is described, as well as the interventions in the foreign exchange market to build up NIR in 2003 and the deepening of the financial market in domestic currency during the last years.

a. Fulfillment of the target 2002 – 2003

Regarding the effectiveness of the monetary policy to control inflation, Reinhart et al (2003) found for a sample of dollarized countries (including Peru) that partial dollarization does not have first-order effects on monetary policy. Comparing the performance of accomplishment of inflation control, Albagli (2004) showed that deviation of inflation target range in the case of Peru during the last ten years is lower than the average deviations of IT countries. The deviation biased in the case of Peru was in the direction of falling below the target range during the disinflation process (Armas et al, 2001).

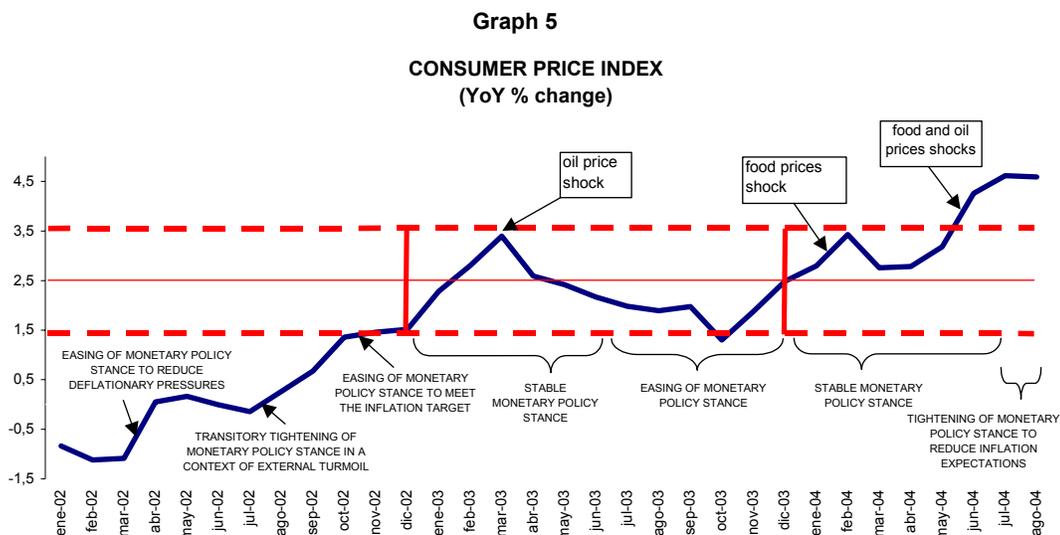
Under IT regime, the rate of inflation rose from $-0,1$ percent in 2001 to 1,5 percent in 2002 (lower bound of the target range) to 2,5 percent in 2003 (target level). For this year, the BCRP forecasts an inflation rate around the upper bound (3,5 percent) and a reversal trend to the target level for next year. In this period, the dynamics of inflation have been influenced by aggregate demand and supply factors, the evolution of imported inflation and the nominal exchange rate.

During these two years of IT experience, economic activity has been recovering with a negative and closing output gap. Short run fluctuations of CPI have been driven by supply shocks and imported inflation, meanwhile inflation expectations has been in general at the target level.

Monetary policy actions have followed a criterion of anticipation to inflationary or deflationary pressures using inflation forecasting systems conditioned to scenarios of monetary policy stance. These forecasts have been disclosed to the public through the Inflation Report to communicate monetary policy actions and to contribute to anchor inflation expectation.

At the beginning of the IT regime, the economy was still under recession (GDP growth was 0,3 percent in 2001) and there was a risk of falling in a deflationary environment (the inflation rate was zero in 2001 and negative during the first quarter of 2002). In this context, the monetary policy stance was expansionary to circumvent deflationary pressures and to achieve the target rate of inflation. The loosening of the monetary policy stance was aggressive and began in the second semester of 2001 (the interbank rate fell from 8,4 percent in July to 3,1 percent in December) and continued during the first semester of 2002, when the

interbank rate reached 2,5 percent (historically, the lowest rate in the money market⁷) with a spread of 50 basis points over the Libor.



Given the lags on the effects of monetary policy, the year-on-year rate of inflation began to show an increasing pattern in the second half of year 2002. The reversal of deflationary pressures occurred in a context of economic recovery (the growth rate rose from 0,3 percent in 2001 to 4,9 percent in 2002).

In the second semester of 2002, the Central Bank tightened its monetary policy stance and the interbank interest rate rose from 2,6 percent in June to 3,8 percent in December. This tightening of the monetary policy stance occurred in a context of upward pressures in the exchange rate due to the increased risk perceptions in the region for the electoral process in Brazil and the increasing trend in the rate of inflation.

In the period 2003-2004, the variability of the inflation rate was mainly explained by supply shocks. These shocks had a transitory impact on a specific set of goods but they did not affect the growing trend of prices. Therefore, the Central Bank did not respond to these shocks but emphasized their temporary nature in its Inflation Reports in order to guide economic agents' inflation expectations.

Indeed, the BCRP published in the balance of risks of the January 2003 Inflation Report the possible impact on the inflation forecast of an increase in the international oil price due to a war in Middle East:

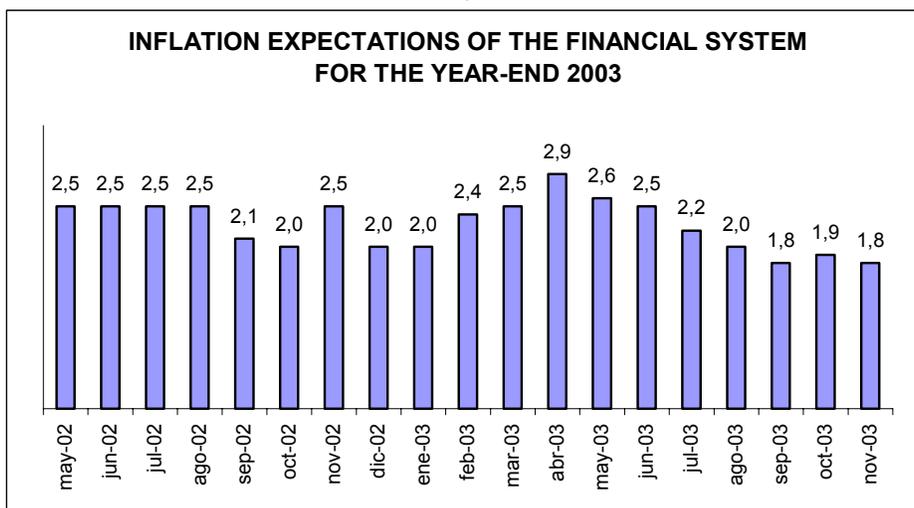
“The possibility of a war conflict in the Middle East. This would affect the international oil market, which would impact on oil prices. The magnitude of the impact would depend on the duration of the conflict. In the short run, raw oil prices would rise above projections, pushing the general

⁷ Between 1922 and 1930, the interest rate in the money market was 3,0 percent.

price level upwards. However, this increase could be transitory and would not get transmitted to other prices, which would not require any change in the monetary policy stance”⁸.

The rise of international oil prices due to the war in Iraq (WTI price rose from US\$ 29 in December 2002 to US\$ 36 in February 2003) caused a sharp increase in the rate of inflation, which passed from 1,5 percent in December 2002 to 3,4 percent in March 2003. Inflation expectations for 2003 (survey to financial institutions) passed from 2,0 percent in December 2002 to 2,5 percent in March and to 2,9 percent in April 2003.

Graph 6



Once the impact of the increase in oil prices vanished, BCRP’s inflation projections under an scenario of constant interbank interest rate at 3,8 percent expected a rate of inflation in the lower segment of the target range for 2003. The Inflation Report of May 2003 stated:

“With respect to the January Report’s projections, lower inflationary pressures are clearly observed. Thus, while in the January Report the projected rate of inflation was in the upper segment of the target range (2,5-3,5 percent), in the present Report it lies in the lower segment (1,5-2,5 percent). This update is due to lower depreciatory expectations (from a 3,1 percent cumulative depreciation projection for 2003 in the January Report to 1,1 percent) and the reversion of transitory increases in international fuel prices for the rest of the year”⁹.

⁸ Inflation Report of January 2003, page 27.

⁹ Inflation Report of May 2003, pages 23-24.

Thus, the May Report's projections clearly communicated the temporary nature of the inflation increase, anticipated downward pressures in the rate of inflation and, therefore, helped to the correct interpretation of the following loosening in the monetary policy stance.

In the first semester of 2003, the Central Bank kept stable its monetary policy stance with an interbank interest rate of 3,8 percent. In the second semester, the Central Bank loosed its monetary policy stance four times through reductions in its benchmark interest rates, which induced reductions in the interbank interest rate of 25 basis points in July, September and November, and of 50 basis points in August. Since then and until July 2004, the interbank interest rate has been at a level of 2,5 percent.

This loosening of the monetary policy stance was explained for the projections of a rate of inflation in the lower bound of the target range for years 2003 and 2004 and a lower than projected rate of growth in domestic demand for these years. In December 2003, the annual rate of inflation was 2,5 percent, that is, at the announced target level.

b. Inflationary pressures in 2004

The annual rate of inflation has accelerated in the first half of 2004. After some months of increasing trend since November 2003, the annual inflation rate in August hit 4,6 percent, above the upper limit of the target range (3,5 percent). This higher inflation rate has been related mainly to supply shocks resulting from higher imported food inflation (wheat and greases) and a lower agricultural domestic supply. These shocks were longer and stronger than the previous year and the level forecasted in the base line of the inflation report.

Because of the transitory nature of these shocks, the Central Bank has not reacted to them, as in the first quarter of 2003. The Inflation Report of January 2004 stated:

“The central scenario foresees the recent increase in prices as a transitory effect, both in the evolution of international food prices and in conditions of domestic agricultural supply. For example, it has been considered for this scenario that future prices of wheat and soy oil would stay at high levels in the first case, and would slightly diminish in the second semester in the case of soy oil. Likewise, it is considered a reduction in rice crops, and its impact on prices, due to lower sowing explained by lower availability of water.

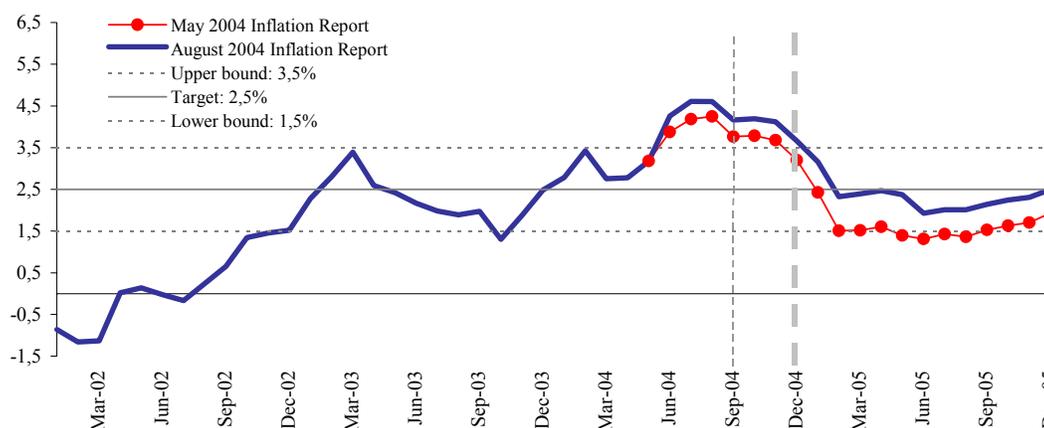
However, there is a risk of higher imported food inflation or higher instability in weather conditions (rains) with respect to the central scenario”.¹⁰

¹⁰ Inflation Report of January 2004, pages 47 and 48.

Under these foresights, a transitory acceleration of the rate of inflation and then a convergence to the target level was expected, without a modification of the Central Bank's monetary policy stance.

The central scenario for 2004 was revised twice upwards in the next two Inflation Reports (may and august). The inflation forecast for 2004 approached the upper bound of the inflation target range (3,5 percent). This higher inflation forecasting was due to stronger supply shocks (specially higher international prices) relative to those expected in the January Report. In this context and to prevent a rise of inflation expectations, BCRP raised interbank rate in august from 2,5 to 2,75 percent.

Graph 7
INFLATION FORECAST
(Annual percentage change of CPI)



c. Turbulence in 2002

One particular feature of Peruvian IT framework has been its response to sharp depreciation pressures in order to minimize adverse balance sheet effects on the economy. This response is a combination of temporary adjustment in nominal interest rates and intervention in the foreign exchange market as a seller and it has only been used in September 2002 during the period of IT regimen.

Between the second and third quarters of 2002, risk perception on the region increased significantly, linked to the uncertainty about the election process in Brazil and the higher risk aversion of international investors due to default events in the U.S. capital market.

Graph 8

**Sovereign Risk
(January 2002 - August 2004)**



Domestically, the higher country-risk temporarily encouraged a higher demand for foreign currency hedging instruments. During this period, exchange rate fluctuations of the Peruvian sol were closely related to those of the Brazilian real. Between May and September, the domestic currency depreciated 6 percent.

In this scenario, the Central Bank allowed interbank rate to increase and intervened in the foreign exchange market to counteract ongoing pressures on the domestic currency. These actions were made to smooth sudden fluctuations in the exchange rate. Thus, the interest rate rose from 2,6 percent in June to 5,4 percent in September.

Likewise, the BCRP intervened in the foreign exchange market through dollar sales of US\$ 127 million during 8 days of September. Moreover, the BCRP placed instruments indexed to the US dollar (CDR) for amount of US\$ 88 million in order to attend the banks' demand for hedging securities.

In the last quarter, the risk perception on the region decreased significantly. The Peruvian economy began to show signals of differentiation among the other countries of the region, based on its higher economic growth, low inflation, reduction of its fiscal deficit and accumulation on international reserves. In 2002, the nominal exchange rate depreciated 2,3 percent.

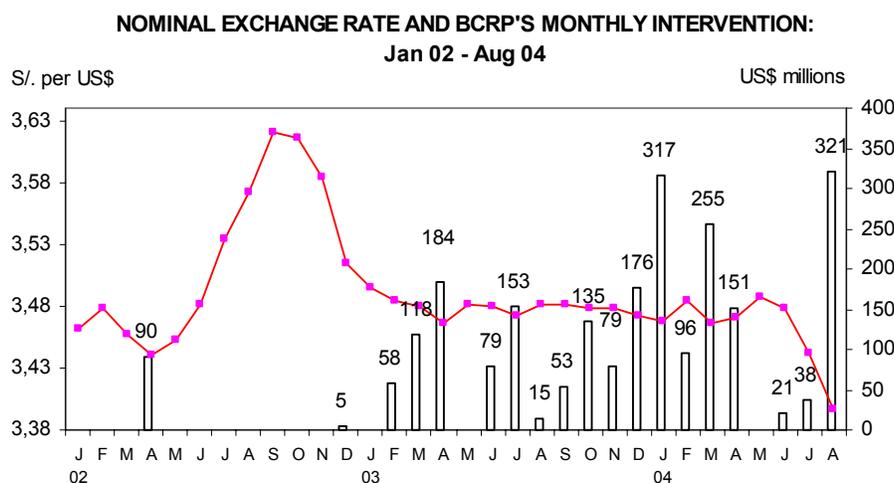
When conditions in the financial markets became normal in the fourth quarter of 2002¹¹, monetary policy actions were oriented to reduce the interbank interest rate in order to achieve a rate of inflation consistent with the announced target. In this way, the interest rate fell from 5,4 percent in September to 3,8 percent in December, while annual inflation rose from 0,0 in June to 1,5 percent in December.

d. Foreign exchange intervention and NIR accumulation 2003-2004

There has been an appreciatory trend during the last two years, as other currencies in the region, due to the weakness of the US dollar in international markets and the positive results of the external sector.

During this period, the BCRP has purchased around US\$ 2 billions (as of August 31, 2004) in the foreign exchange market. Dollar purchases have allowed to strengthen the position of international reserves and to accommodate portfolio movements in a context of financial dedollarization. These interventions occurred basically when appreciatory pressures on the Sol significantly increased due to portfolio movements from dollars to soles.

Graph 9

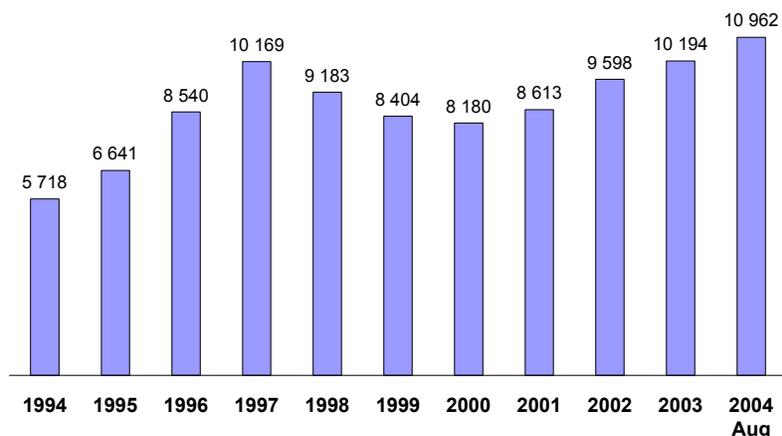


These interventions allowed the BCRP to accumulate net international reserves of US\$ 1,4 billions relative to December 2002. Thus, the stock of NIR reached a balance of almost US\$ 11 billions in August, the highest level registered and more than twice the stock of external debt due in one year.

¹¹The spread of sovereign bonds dropped from 8,2 percentage points in August to 6,2 percentage points in December 2002 and the domestic currency appreciated 3,5 percent in the fourth quarter.

Graph 10

NET INTERNATIONAL RESERVES
(Millions of US dollars)



e. Dedollarization of the economy

Goldstein (2002) proposed a scheme for emerging economies called “floating plus”, which basically recommended to follow an IT regimen and to develop local financial market in domestic currency. As it is described in this section, the Peruvian experience can be considered a case of floating plus for dollarized economies.

In the last years, a process of financial dedollarization has been observed. The dollarization ratio of the banking sector’s liabilities fell from 70 percent in 2000 to 60 percent in 2004 (as of August). A similar phenomenon has occurred with the degree of dollarization of the credit to the private sector. This process has been encouraged by a low and stable inflation, more stable domestic interest rates in soles, a greater supply of financial securities in soles and a relatively stable exchange rate.

Chart 5
DOLLARIZATION RATIOS
(In percentage)

Year	Banking system Broad money	Banking system Credit to the private sector	Credit of the Financial system to the private sector
1993	69	76	77
1994	64	74	74
1995	63	71	72
1996	67	74	72
1997	65	77	75
1998	69	80	79
1999	70	82	82
2000	70	82	81
2001	67	80	78
2002	65	79	76
2003	62	77	73
2004 ^{1/}	61	76	73

^{1/} As of July 31.

In the last two years, the economy has witnessed a greater dynamism of credit in soles granted by the financial system, with annual growth rates between 10 and 12 percent in the last two years. By financial institutions, micro finance (annual rates of growth of 26 percent in 2003 and 33 percent in 2002) and institutional investors (32 percent in 2003) stood out among the others.

Chart 6

FINANCIAL SYSTEM'S CREDIT TO THE PRIVATE SECTOR IN DOMESTIC CURRENCY							
	Millions of nuevos soles				Percentage change		
	Dec01	Dec02	Dec03	Aug04	Dec.02/ Dec.01	Dec.03/ Dec.02	Aug.04/ Aug.03
Commercial banks 1/	7 642	7 841	8 221	8 138	2,6	4,9	0,3
Banco de la Nación	222	434	511	868	95,6	17,6	83,9
Micro finance institutions	2 214	2 926	3 666	3 773	32,2	25,3	13,1
Institutional investors 2/	1 688	1 653	2 180	2 369	-2,1	31,9	31,9
Leasing companies and others	247	393	247	279	59,1	-37,2	-34,5
Total financial system	12 014	13 248	14 824	15 428	10,3	11,9	9,1

1/ Excludes micro finance credits.

2/ Mainly securities issued by the private sector

On the other hand, credit in dollars has fallen at annual rates between 2 and 3 percent during this period. The lower credit in foreign currency of the commercial banks (4 and 6 percent in the last two years) has been partially counteracted by the higher credit of micro finance institutions (20 and 29 percent) and institutional investors (23 and 36 percent).

Chart 7

FINANCIAL SYSTEM'S CREDIT TO THE PRIVATE SECTOR IN FOREIGN CURRENCY							
	Millions of US dollars				Percentage change		
	Dec01	Dec02	Dec03	Aug04	Dec.02/ Dec.01	Dec.03/ Dec.02	Aug.04/ Aug.03
Commercial banks 1/	10 294	9 971	9 409	9 484	-3,1	-5,6	-0,0
Banco de la Nación	36	36	22	22	-0,4	-38,1	-1,2
Micro finance institutions	428	410	511	572	-4,1	24,5	23,7
Institutional investors 2/	653	800	1 091	1 301	22,7	36,2	25,8
Leasing companies and others	915	858	637	631	-6,2	-25,8	-4,9
Total financial system	12 326	12 077	11 670	12 009	-2,0	-3,4	2,9

1/ Excludes micro finance credits.

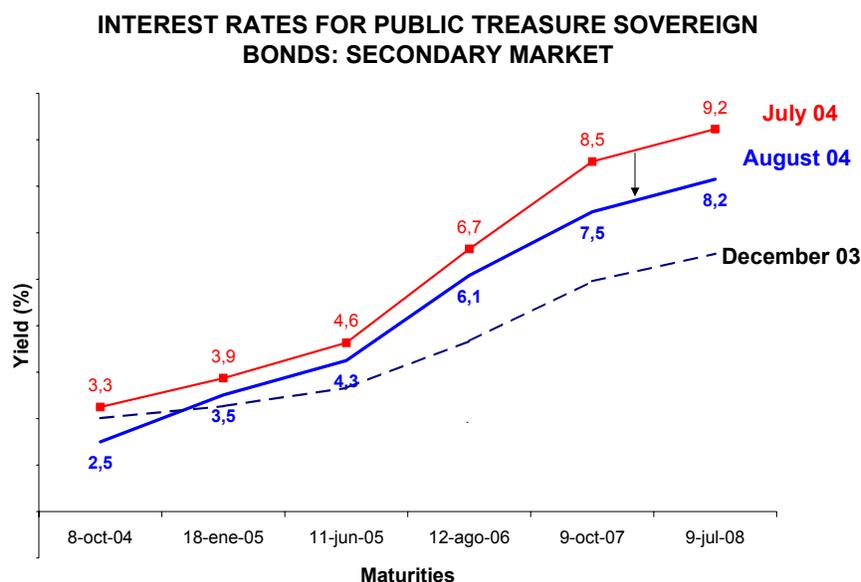
2/ Mainly securities issued by the private sector

The Inflation Targeting regime is a key element to explain the dedollarization process in the Peruvian economy, since it contributes to a greater stability of the real returns on assets denominated in soles through the reduction of the variability of inflation and nominal interest rates in soles. Financial dollarization is reduced when real returns on assets in soles become more stable than returns on assets in dollars.

Another key feature to encourage the dedollarization process in Peru has been the development of the domestic government debt market, which has recently contributed to the formation of a yield curve in soles that acts as a benchmark for long-term private issues. Until 2001, there were no benchmark interest rates

for the issuance of nominal securities in soles. Since 2001, the Treasury began to issue nominal bonds in soles with maturities of 2 and 3 years; however, the government bond market just showed a greater dynamism in 2003, when the primary dealers system was implemented. Currently, there are nominal Treasury bonds in soles with maturities up to 6 years.

Graph 11



As a result, securities denominated in domestic currency amounted to 34 percent of the private sector's portfolio of fixed-income securities in 2003 (22 percent in 2000). This evolution comes from an increasing share of nominal soles bonds meanwhile the share of bonds indexed to inflation (VAC) out of the total outstanding balance of bonds has remained relative constant in the last years.

Chart 8
COMPOSITION OF FIXED-INCOME SECURITIES
ISSUED BY THE PRIVATE SECTOR 1/
(In percentage)

Year	Domestic currency			Foreign currency
	Nominal	VAC	Total	
1998	1	26	27	73
1999	1	22	23	77
2000	2	20	22	78
2001	11	18	28	72
2002	13	17	30	70
2003	16	18	34	66
2004 ^{2/}	14	19	33	67

1/ Include bonds and short-term paper issued by private financial institutions.

2/ As of August.

To promote transparency in the information of prices, the congress recently passed a law that established that all prices should be listed in domestic currency, being optional whether it is also listed in dollars. This law also may encourage financial dedollarization in the long run given the fact that so far prices of durable goods have been set in terms of dollars. The latter implies that people demand dollars as a store of value – aside others reasons- because they may link their currency of savings with the value of durable goods, such as houses that are priced in dollars.

4. The Inflation forecast and transmission mechanisms of monetary policy

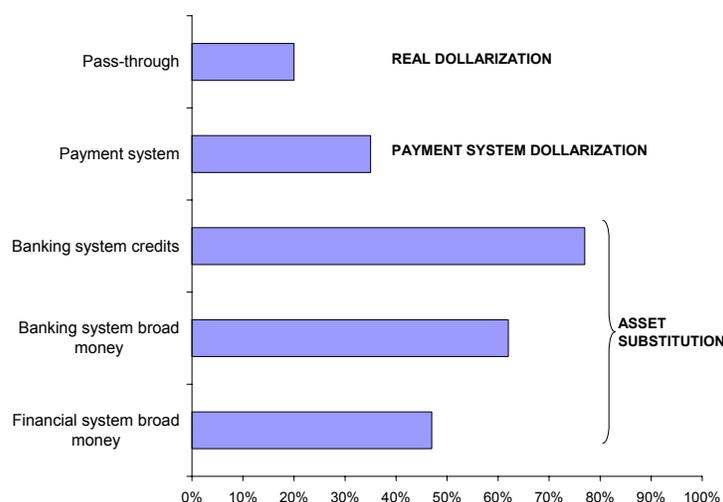
The BCRP, as any other Central Bank with IT regimen, employs an inflation projection system aimed to obtain inflation forecasts conditional on the monetary policy stance. However, there are two interesting characteristics in the standard semi-structural forecasting model of BCRP (the Quarterly projection model), regarding the financial dollarization:

- The Balance sheet effect and the impact of a dollar-denominated interest rate are included in the demand equation.
- Empirical low pass-through is incorporated to the model (estimated about 0,25), which corresponds to a low real dollarization and high financial dollarization.

The fact that most prices are established in soles and not indexed to dollar is a key factor to explain the low pass-through coefficient, which is estimated to be between 0,15 and 0,30 percent (Winkelried, 2003, and Miller, 2003).

The latter is due to the function of the Peruvian sol as a means of transaction, while the US dollar prevails as a store of value. Therefore, both real dollarization coefficient (measured by the pass-through) and the payment system coefficient represent about half of the financial dollarization coefficients.

Graph 12



Box 2
The pass-through effect of nominal exchange rate on domestic prices

The analysis of pass-through effect of nominal exchange rate takes into account three stages of the distribution chain: importers, producers and retailers. Based on the above-mentioned distribution chain, McCarthy (2000) develops an empirical model to analyze the transmission of nominal exchange rate. Applying this methodology to Peru, Miller (2003), Winkelried (2003), Moron y Lama (2004), estimate a pass-through coefficient from nominal exchange rate to consumer prices relatively low, between a range of 15 and 30 percent. Miller (2004) found a pass-through coefficient from nominal exchange rate to importer, producer and consumer's prices of 89, 46 and 16 percent in the long run, respectively.

Winkelried (2004) incorporates asymmetries in the analyses. This author estimates a pass-through to consumer prices of 15 percent, which increases to 30 percent on the expansionary phase of the business cycle. Finally, Moron and Lama (2004) add a monetary sector to the analysis. Their results indicate that the pass-through coefficient to importer, wholesaler and retailer's prices is 80, 30 and 20 percent, respectively. Furthermore, those authors found that the pass-through coefficient can change depending of the source of movement of nominal exchange rate. If the source is a monetary shock, the pass-through coefficient to final prices increases from 20 to almost 50 percent.

The theoretical relationship between nominal exchange rate and prices and the empirical evidence aforementioned have been considered in the development and calibration of the Quarterly Projection Model. The structure of the model allows identifying directly the source of variation in the nominal exchange rate analyzing the impulse response functions. For example, a one-quarter shock of 1 percentage point on the nominal exchange rate implies an accumulated deviation of the inflation rate of 0.15 percent after one year, while the accumulated depreciation is 0.60 percent. Therefore, the model considers a pass-through coefficient in the short run close to 25 percent.

On the other hand, in the case of a one-quarter shock of -1 percentage point on short-term interest rate, the model shows an accumulated deviation of inflation rate of 0.14 percent in the short run (after one year) beside an accumulated depreciation of 0.40 percent, implying a pass-through coefficient of 35 percent. In the medium run, pass-through effect is complete under this shock. This different pass-through result is due to the fact that under an exchange rate shock, the short interest rate raises to offset the inflationary pressures.

This projection system is revised at least once a year in order to incorporate methodological improvements into the forecast process. By conditioning the forecasts, it is possible to analyze the effects of different monetary policy responses on the rate of inflation. The resulting forecasts are part of the information assessed by the Board in the decision making process.

The inflation forecast system considers two different forecasting horizons: In the short term (a quarter ahead), both time series models and data gathered from specialists' assessments are used. These forecasts are not conditioned on the monetary policy stance; instead, they are based on the analysis of the recent evolution of prices and on specific information of shocks that could affect the short-term inflation dynamics. This procedure is considered to yield better one-quarter ahead projections than a structural model.

For the medium term (up to 8 quarters ahead) a semi-structural macroeconomic model is used, which incorporates a reaction function of the Central Bank (a Taylor-type rule, consistent with the adopted IT regime). In this way, it is possible to condition inflation forecasts to the response of monetary policy to the assumed macroeconomic scenario.

Short term (1 quarter ahead)

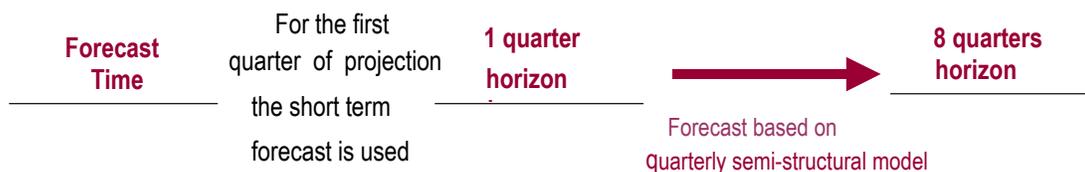
In order to make short-term forecasts, two groups of models are used:

- **Model of specialists' overview.** These projections are based on the analysis made by experts on the economic situation and on information that could affect the inflation dynamics in the following months. Analysts of prices and output indicators may anticipate some short-term shocks and their impact on the economy. For instance: weather conditions, information about crops and food supply; arrangements about taxes and regulated prices (public tariffs); recent evolution of input prices; short-term demand indicators; and seasonality.
- **Time series models.** These models correspond to vector auto regressive (VAR) models to forecast different items of the CPI basket, which then are summed up to obtain forecasts of core inflation, non core inflation and headline inflation.

To obtain a unique short-term forecast, the projections of both specialists' overview models and econometric models are combined. The final short-term forecast is a weighted average of the individual projections with weights depending inversely on the historical forecast error of each model.

Medium term (8 quarters ahead)

The medium term forecast begins at the second quarter of the forecast horizon after assigning the short term forecast in the first quarter.

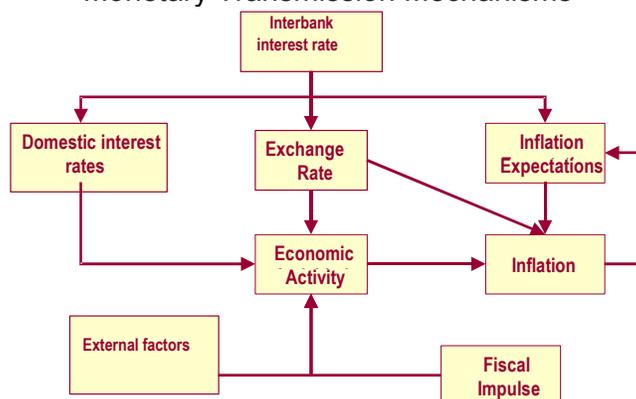


Given the objective of conditioning the variables of interest to the monetary policy stance, the medium term projection requires an economic model, with behavioral equations and structural relations.

For this purpose, the BCRP uses a semi-structural macroeconomic model that summarizes the main transmission channels of monetary policy: the interest rate channel or demand channel, the exchange rate channel and the expectations channel.

Graph 13

Monetary Transmission Mechanisms



The model analyzes the variables' dynamics *around their trends*, which are interpreted as short-term equilibrium. Therefore, the model is focused in a flow analysis (variables expressed as deviations or rates of growth) and imposes restrictions to ensure neutrality of nominal variables over real variables in the long run and to guarantee convergence of inflation toward its target (2,5 percent).

The model is comprised by a set of relations (behavioral equations, identities and definitions of the equilibrium variables), grouped in four main blocks:

- a) **Aggregate supply (Phillips curve).** It models the dynamics of core inflation, which incorporates: (i) demand factors, (ii) inertia, (iii) inflation expectations, and (iv) the effect of imported inflation or *pass-through*. Specialists (aside the model) make forecasts of supply factors and non-core inflation component.
- b) **Aggregate demand.** Aggregate demand pressures are represented by the output gap. Factors included to capture its dynamics are: (i) financial variables such as domestic interest rates in soles and dollars (to incorporate the effect of financial dollarization) and the exchange rate, (ii) fiscal conditions that show the effects of fiscal stance on the economic cycle, and (iii) external conditions that capture the effects of terms of trade and external demand on international trade. However, major changes on exchanges rates may have non-linear effects on economic activity that are not captured automatically in this model.

- c) **Uncovered interest rate parity.** This condition captures the exchange rate effects of the differentials in returns between sol-denominated assets and dollar denominated assets. Likewise, it takes into consideration a risk premium. In this way, the model's nominal exchange rate in the *spot* market is determined.

- d) **Monetary policy rule.** The rule includes: (i) an inertial term that smoothes the interest rate path, and (ii) a systematic component with the target variables to which the Central Bank reacts, which are deviations of the inflation forecast relative to the target and the output gap (to avoid wider economic cycles that could affect the dynamics of inflation). In the model, therefore, the Central Bank determines the evolution of the short-term domestic interest rate.

Risk Analysis and Uncertainty

The projection exercise with the semi-structural model assumes a baseline scenario that describes the more likely evolution of several exogenous variables in the forecast period. Some examples of such variables are consumer confidence, foreign demand, international interest rates, and country risk. However, the evolution of these variables may be different from the one assumed in the baseline scenario, which implies changes in the inflation forecast. This possibility requires a risk analysis about departures from the central scenario and how it could affect the inflation forecast. The risk analysis allows the Central Bank to conclude whether it is more, less or equally likely for inflation to be above or below the baseline scenario, thus determining the probability distribution function of the inflation forecast (skewed or not).

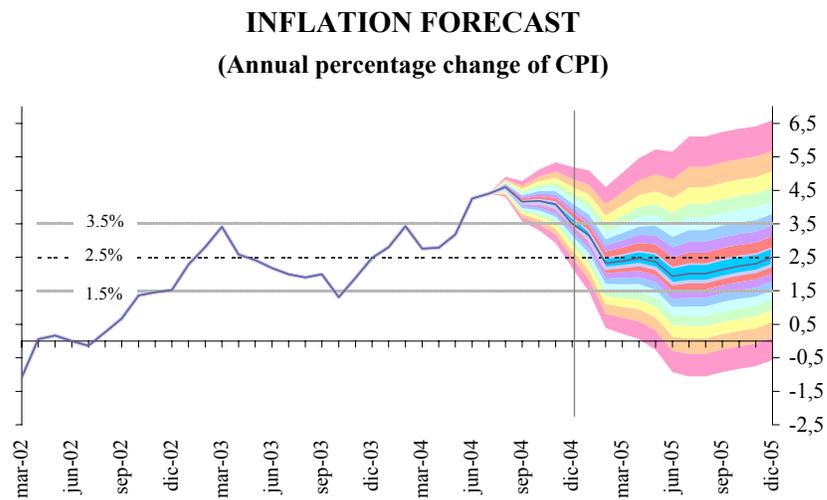
A key element taken into account for forecasting is that the longer the projection period, the greater the uncertainty, which means that the range of values of the inflation forecast widens. Thus, along with the risk analysis, uncertainty is incorporated, through forecast errors, in the construction of the inflation projection's probability distribution.

It is worth noting that each quarter (or month) in the projection period, there is a probability distribution of the inflation projection. The *fan chart* represents this set of distributions in a 2-dimension plane. The shaded areas in the same color show a 10-percent increment in the probability that inflation is within the interval depicted by that color related to the inner interval. Thus, the *fan chart* allows us to calculate probabilities of occurrence of certain projected values; namely, the probability that the inflation projection is within the target range in a given period.

The chart below shows the inflation *fan chart* disclosed in the Inflation Report of August 2004, which has been depicted assuming a monetary policy such that the interbank interest rate remains constant (at 2,75 percent) in the projection horizon. Given that the darker area corresponds to the central scenario, it can be observed that the balance of risks has been upward biased (an asymmetric *fan chart*). That is, the probability that inflation is above the central scenario would be higher to the probability that it would be below the central scenario.

Graph 14

Fan Chart of the inflation forecast from the Inflation Report of August 2004



5. Concluding remarks

The first two years of implementation of IT in a dollarized economy provides encouraging results and lessons.

First, the empirical evidence in the Peruvian case shows that financial dollarization does not preclude to have an independent monetary policy oriented to keep a low and stable inflation rate. The announced annual inflation target has been achieved every year (2,5 percent with a range of departure of 1 percentage point up or down). The annual rate of inflation was 1,5 percent in December 2002 and 2,5 percent in December 2003 with a moderate output volatility.

Second, the change of operational target from banking reserves to interbank interest has improved the transparency and predictability of monetary policy stance.

Additionally, a process of gradual dedollarization has been observed in the Peruvian economy during the last years, both in financial system's assets and liabilities. This process has been encouraged by the explicit IT regime, with a lower variability of both inflation and domestic interest rates, and the development of the domestic government debt market which is useful to set a benchmark for private issues of nominal securities in soles.

Fourth, the Peruvian IT framework includes monetary policy responses to control the risks of financial dollarization (currency and maturity mismatch), such as high level of international reserves with high reserve requirements on bank's dollar liabilities and Central Bank intervention to limit high volatility of the exchange rate without any commitment to a certain level.

Finally, the short Peruvian IT experience still can not provide a definite answer about the possibility of restoring the primacy of the local currency over the dollar in the long run even after a lasting period of low and stable inflation rates. However, it seems the right approach to the complex phenomenon of dual-currency systems for the Peruvian case.

REFERENCES

Albaglí Elías, “¿Cuánto se alejan de su objetivo los países que siguen metas de inflación?”, *Economía Chilena*, volume 7, No.2, August 2004.

Armas Adrián, Francisco Grippa, Zenón Quispe and Luis Valdivia, “De metas monetarias a metas de inflación en una economía con dolarización parcial: El caso peruano”, *Estudios Económicos*, No. 7, June 2001.

Armas Adrián, “Exchange Rate Regime and Monetary Policy Under an Economy with Partial Dollarization: The Case of Peru”, in *Regional Integration in Europe and Latin America, Monetary and Financial Aspects*, P. Van der Haegen and Jose Viñals (eds.), Banco de España and European Central Bank, 2003.

Banco Central de Reserva del Peru, Annual Report 2001.

Banco Central de Reserva del Peru, Monetary Program for year 2002, January 2002.

Banco Central de Reserva del Peru, Annual Report 2002.

Banco Central de Reserva del Peru, Inflation Report: Evolution and perspectives, several editions (June 2002, September 2002, January 2003, May 2003, August 2003 and January 2004).

Ball, Lawrence, “Reglas de política y choques externos”, *Estudios Económicos*, No. 7, June 2001.

Clinton, Kevin and Jean-Francois Perrault, “Metas de inflación y tipos de cambio flexibles en economías emergentes”, *Estudios Económicos*, No. 7, June 2001.

Goldstein, Morris, “Managed floating plus: The great currency regimen debate”, Institute for International Economics, 2002.

Gulde Anne-Marie, David Hoelscher, Alain Ize, David Marston, and Gianni De Nicoló “*Financial Stability in Dollarized Economies*”, Occasional Paper No. 230, International Monetary Fund, 2004.

Ize, Alain, “Implicancias de la dolarización parcial para el régimen de metas de inflación: Un análisis basado en la literatura sobre dolarización”, *Estudios Económicos*, No. 7, June 2001.

Luque, Javier and Marco Vega, “Usando un modelo semi-estructural de pequeña escala para hacer proyecciones: Algunas consideraciones”, *Estudios Económicos*, No. 10, November 2003.

McCarthy (2000), "Pass through on exchange rates and import prices to domestic inflation in some industrialized economies". Federal Reserve Bank of New York, Staff Reports 111.

Miller, Shirley, "Métodos alternativos para la estimación del PBI potencial: Una aplicación para el caso de Perú", *Estudios Económicos*, No. 10, November 2003.

Miller, Shirley, "Estimación del *pass-through* del tipo de cambio a precios: 1995-2002", *Estudios Económicos*, No. 10, November 2003.

Morandé, Felipe and Klaus Schmidt-Hebbel, "Política monetaria y metas de inflación en Chile", *Estudios Económicos*, No. 7, June 2001.

Morón and Lama (2004), "El traspaso de tipo de cambio a precios en la economía peruana: ¿Talón de Aquiles del esquema de metas de inflación?. Concurso de Investigación 2003. Consorcio de Investigación Económica y Social.

Reinhart Carmen, Kenneth Rogoff and Miguel Savastano, "Addicted to Dollars" in *NBER Working Paper Series*, October 2003.

Rossini, Renzo, "Aspectos de la adopción de un régimen de metas de inflación en el Perú", *Estudios Económicos*, No. 7, June 2001.

Stone, Mark, "Aspectos prácticos sobre la adopción de un esquema de metas de inflación en economías emergentes: posibles implicancias para el Perú", *Estudios Económicos*, No. 7, June 2001.

Vega, Marco, "Reportando la distribución de la proyección de inflación", *Estudios Económicos*, No. 10, November 2003.

Webb, Richard and Adrián Armas, "Monetary Policy in a Highly Dollarized Economy: The Case of Peru", in *Challenges to Central Banking from Globalized Financial Systems*, P. Ugolini, Andrea Schaechter, and Mark Stone (eds.), International Monetary Fund, 2003.

Winkelried, Diego, "Hacia una meta explícita de inflación: Anticipando la inflación en el Perú", *Estudios Económicos*, No. 9, March 2003.

Winkelried, Diego, "¿Es asimétrico el *pass-through* en el Perú?: Un análisis agregado", *Estudios Económicos*, No. 10, November 2003.