

Christopher Blevins,\* Laurence Vagassky\*\* and José Carlos Wong\*\*\*

## Financial Liberalization and Money Demand in Peru: Implications for Monetary Policy

*In 1990 a process of financial liberalization was begun in Peru with the aim of achieving economic stability and sustained development. Due to the economic policies that had been applied throughout the second half of the 1980s, this took place in a context of hyperinflation and financial repression. This article examines the effects that financial liberalization has had on the demand for real balances in Peru and discusses the implications for the conduct of monetary policy.*

World financial activities have undergone significant changes in the past twenty years. Today, they are characterized by a lower presence of indirect financing, the development of capital markets, increased competition in banking systems, the emergence of new institutional investors (such as private pension funds), and the growth of transactions using derivatives. Financial deregulation as well as innovations and technological advances are the driving forces behind these developments, as they have facilitated a faster and more diversified allocation of capital. This process, which has led to changes in the demand for money away from currency and towards other substitutes, has been widely documented. In particular, Stephen Goldfeld's pioneering studies<sup>1</sup> have been followed by several empirical works for both developed and developing countries which relate periods of 'missing money' to unstable money demand functions. Since then, two major trends have been advanced to account for this instability: namely, increasing financial innovation and currency substitution.

In Peru, a process of financial liberalization was begun in 1990 with the aim of achieving economic stability and sustained development. However, due to the economic policies that had been applied throughout the second half of the 1980s, this opening of financial markets took place in the context of

hyperinflation and financial repression. Restrictive monetary and fiscal policies were necessary to reverse this economic stagflation. Consequently, the government has pursued such policies in order to keep price stability and thereby provide an appropriate environment for investment and growth.

The purpose of this article is twofold: it analyzes how recent structural reforms to the financial sector have affected the Peruvian demand for real balances and have influenced monetary policy. The article is organized as follows: it first introduces the issue of how financial innovations and technology have affected the demand for real balances; it then presents an analysis of the main reforms to the financial sector and looks at the effects of such changes on the banking system and capital market; next the stability of the money demand function in Peru for the period 1979-1997 is examined; this is followed by an analysis of the degree of control that

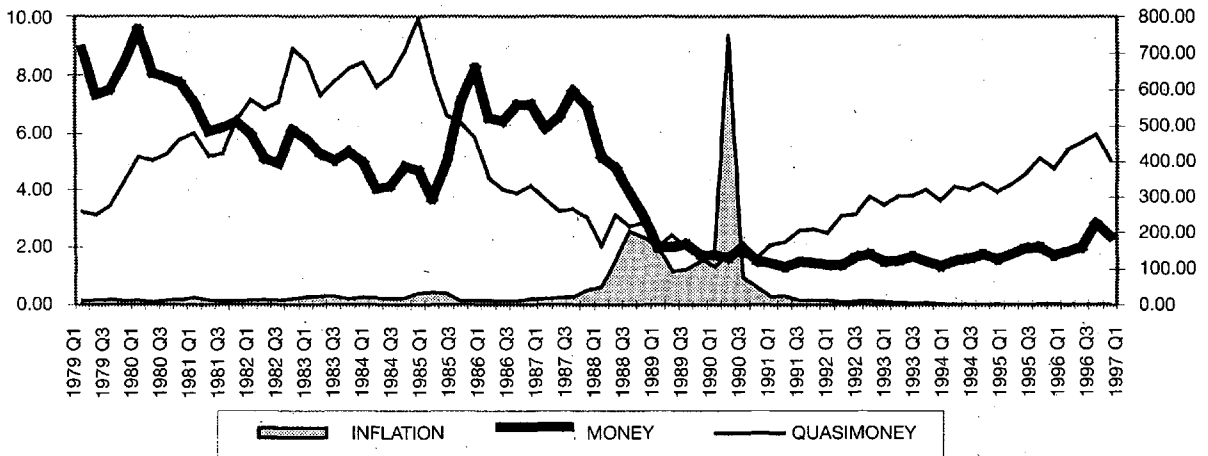
<sup>1</sup> See Stephen Goldfeld: *The Demand for Money Revisited*, Brookings Papers on Economic Activity, No. 3, 1973. Up until Stephen Goldfeld's research in 1973, evidence supported the view that only a few variables, such as interest rates and income, explained money demand movements. In this study, Goldfeld found the real stock of money balances to be a function of the following factors for the United States: real GNP, interest rates on savings and time deposits at commercial banks, and a lagged dependent variable. His model established reasonable estimates and showed stability over the period 1952:2 to 1972:4. The results yielded sturdy interest and income elasticities (as well as quick adjustments to income and interest rate changes) and showed no apparent instabilities in either the short run or the long run. However, three years later, Goldfeld re-tested his model and found that it systematically over-estimated real money balances. He concluded that as a result of financial deregulation, the introduction of innovations was the leading candidate for the unexplained change and error in his money-demand function.

\* Deutsche Bank, Frankfurt am Main, Germany.

\*\* London School of Economics, London, UK.

\*\*\* Institute for Advanced Studies Vienna, Austria.

Figure 1  
Money & Quasi-money as a % of GDP vs. Inflation



Source: International Financial Statistics.

the Central Bank has over different monetary aggregates and the possibility of using them as intermediate targets; the subsequent part sets forth the possible implications that the new financial context has had for conducting monetary policy; and finally, the paper's main conclusions are presented.

### The Peruvian Financial System in the 1980s

There are four stylized facts that best describe the state of the Peruvian financial system throughout the 1980s: commercial banks dominated an uncompetitive environment; there was a considerable amount of seigniorage and an increasing inflation tax rate; imposition of high required reserve ratios;<sup>2</sup> and interest rates for deposits and loans were controlled. All of these affected the demand for real balances by reducing the incentive to hold money and other financial assets, thus decreasing the overall availability of loanable funds to investors. Table 1 shows clearly the increasing rates of seigniorage and inflation tax as well as the contraction of credit to the private sector in the 1980s. Concerning this last indicator, it is important to mention that credit at this time was heavily concentrated among only a few borrowers. Loans by the state were predominant and development banks, which relied on funds from the Central Bank, were not financially solvent.

<sup>2</sup> Although, in theory, the required reserve ratios can be used as a monetary instrument in order to restrict monetary growth, a high correlation between monetary growth or the inflation rate and the reserves to deposits existed during this period.

The peak of this financial repression culminated in the hyperinflationary process which lasted from August 1988 to July 1990. The hyperinflation stunted the Peruvian economy and, in particular, the demand for real balances. Liquidity plunged as money fell more quickly than quasi-money (see Figure 1).

It is in this context that a new government was elected and initiated a complete policy change in

Table 1  
Indicators of Financial Deepening

Year	Seigniorage to GDP <sup>1</sup>	Inflation Tax Rate <sup>2</sup>	Real Interest Rate on Deposits	Real Credit to the Private Sector (% change)	Credit to the Private Sector (as a % of GDP)
1979	3.40	0.39	-20.4	-5.5	10.75
1980	3.33	0.37	-16.5	18.3	11.35
1981	3.16	0.42	-10.0	24.3	12.88
1982	2.24	0.42	-3.1	11.6	15.68
1983	3.19	0.56	-24.6	-13.8	16.58
1984	2.63	0.52	-17.2	4.9	15.36
1985	7.38	0.63	-35.2	-20.0	13.20
1986	3.94	0.38	-25.7	6.9	11.86
1987	5.59	0.51	-42.3	-4.7	11.25
1988	9.06	0.93	-88.6	-67.6	7.33
1989	7.36	0.97	-67.8	-33.8	4.35
1990	6.59	0.99	-87.2	-24.0	3.47
1991	1.60	0.63	-6.8	58.3	5.43
1992	0.92	0.36	-5.8	23.0	7.90
1993	0.64	0.29	-3.4	21.4	9.55
1994	0.37	0.15	2.2	35.7	11.31

<sup>1</sup> Calculated by multiplying the money base by the inflation tax and dividing by nominal GDP. <sup>2</sup> Calculated as  $[\text{CPI inflation} / (100 + \text{CPI inflation})]$ .

Source: Central Bank of Peru (BCRP); Compendium of Monetary Statistics 1959-1995.

**Table 2**  
**Financial Intermediation (as % of GDP)**

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
1. Total financial saving	7.7	9.7	11.1	13.2	13.4	13.4	11.9	8.0	7.6	4.3	5.2	3.7	5.6	8.0	9.9	11.3	12.8
L/C financial saving	5.1	5.6	6.4	7.3	6.1	5.2	4.1	6.3	6.4	2.5	3.1	1.4	1.6	2.1	1.7	2.3	3.0
F/C financial saving	2.6	4.1	4.7	5.9	7.3	8.2	7.8	1.7	1.2	1.8	2.1	2.3	4.0	5.9	8.2	9.0	9.8
2. Money	6.5	6.9	5.9	5.1	4.4	4.2	4.3	6.5	6.7	3.9	2.6	1.9	1.8	2.2	2.2	2.6	3.0
3. Total liquidity	12.6	15.0	15.1	16.2	16.2	16.4	15.3	13.9	12.3	7.5	7.0	5.1	6.9	9.5	11.7	13.5	15.8
L/C liquidity	10.0	10.9	10.4	10.3	8.9	8.2	7.5	11.2	11.1	5.7	4.9	2.8	2.9	3.6	3.5	4.5	6.1
F/C liquidity	2.6	4.1	4.7	5.9	7.3	8.2	7.8	1.7	1.2	1.8	2.1	2.3	4.0	5.9	8.2	9.0	9.7

Source: Central Bank of Peru (BCRP): Compendium of Monetary Statistics 1959-1995.

August of 1990. It instituted a stabilization plan and began a structural reform program whose main objective was to deregulate markets and to create an environment conducive to maintaining low inflation.

### Main Reforms and Development in the 1990s

The process of stabilization and financial liberalization involved the elimination of interest rate controls in 1990 and the removal of the requirement for exporters to sell their foreign exchange to the Central Bank. These measures, coupled with the liberalization of the capital account in 1991 and the increase in confidence on the part of economic agents, all positively affected financial savings. As such, they led to the rapid expansion of total liquidity, which was composed mainly of foreign currency. Consequently, the trend of continuous financial disintermediation, which the expansionary and interventionist policies of the latter half of the 1980s had caused, was reversed in the 1990s (see Table 2).

Moreover, competition in the banking system has increased due to the privatization of state banks (which started in 1993). This has translated into an expansion of credit to the private sector. Similarly, financial innovations in the form of credit cards and automatic teller machines have experienced rapid growth and are now commonly used.<sup>3</sup> Checking accounts, little used during the hyperinflation era, also have gained popularity and demand deposits now make up over 55 percent of money in circulation.

In terms of legal reforms to the banking system, in July 1991, the Law on Banking, Financial, and Insurance Institutions entered into force, strengthening the supervisory role of the Superintendency of Banks and Insurance Companies (SBI), and leading the way towards full-service banking. This law was superseded by another in October 1993 which kept the essentials of the old law, but made amendments with

respect to the amount of provisions that banks must hold. It also introduced the authorization of bank-issued mortgage notes and enhanced competition by giving banks the right to establish new subsidiaries (leasing companies and mutual funds).

In 1996, a new law was enacted which placed more emphasis on the norms that the SBI would need to ensure for the adequate control and supervision of financial institutions. Measures which improved the quality of securities and financial companies were introduced, and prudential regulation was strengthened in accordance with the Basle Capital Framework. This law went further by permitting insurance and financial companies to carry out new operations such as factoring, securitization and operations with future contracts, swaps, options and other derivatives.

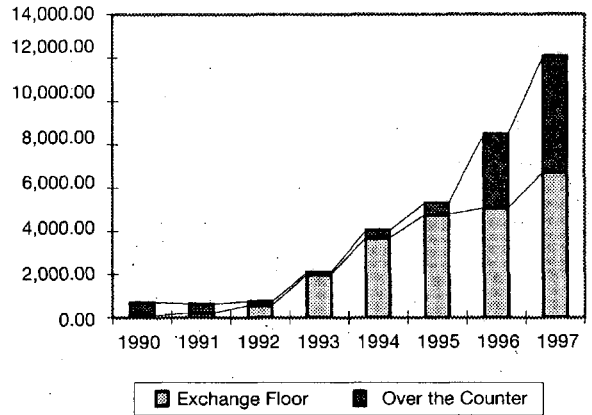
With respect to the legal reforms to the capital market, a Securities Market Law was enacted in 1991 which aimed at modernizing the institutions and instruments involved in the Peruvian financial market. In 1996, a new Securities Market Law (which replaced the former one) and the Law for Investment Funds were passed, allowing for a higher level of diversification and investment into new instruments such as corporate bonds (particularly for institutional investors). This law also encouraged the 'democratization of the stock market' through the sales of state-owned shares.

As a result, the volumes traded in the Peruvian capital market have grown rapidly. In 1997 for example, the amount traded on the stock exchange was more than 15 times that recorded in 1990, with the OTC market (where corporate bonds and deposit

<sup>3</sup> A study carried out by the consultancy Apoyo Opinión y Mercado S.A. in 1997 revealed that 95% of people considered in socioeconomic level A and 15% of those in level B had access to credit cards (out of four socioeconomic levels).

**Figure 2**  
**Lima Stock Exchange: Volumes Traded, 1990-1997**  
 (US\$ millions)

Years	Exchange Floor	Over the Counter	Total
1990	92.20	612.00	704.20
1991	209.80	413.90	623.70
1992	558.70	186.90	745.60
1993	1,993.40	90.30	2,083.70
1994	3,691.90	362.70	4,054.60
1995	4,754.30	525.40	5,279.70
1996	5,064.70	3,426.40	8,491.10
1997	6,699.80	5,351.30	12,051.10



certificates are mostly traded) registering impressive increases as of 1996 (see Figure 2).

Besides the reforms in the banking system and capital market mentioned above, the development of the financial system was reinforced by the emergence of new institutional investors: in 1993 a new system of private pension funds and mutual stock funds, which encouraged the use of long term instruments, was launched. Two years later, credit rating agencies and securities clearing and settlement institutions were established.

In summary, since the beginning of the 1990s, Peru has experienced a fast development of its financial sector. Figure 3 shows the rapid growth in the total stock of financial assets, which has increased faster than GDP (particularly in the case of quasi-money and corporate bonds).

In conclusion, while the ending of hyperinflation undoubtedly contributed to the recovery of intermediation and development of the financial system in

the 1990s, it is the stabilization policies (which themselves caused hyperinflation to subside) and the regulatory changes that in great part are responsible for this growth.

Having presented an analysis of the main reforms to the financial sector and its development since 1990, we now analyze the effects that such liberalization has had on money demand holdings in Peru for the period 1980-1997.

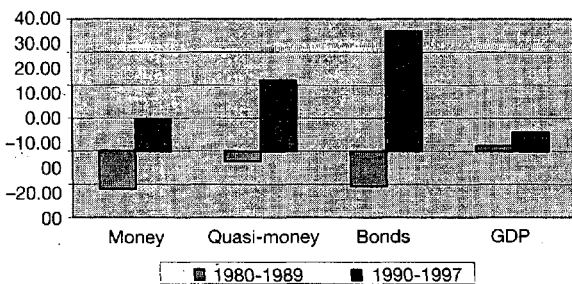
**Analysis of the Money Demand Function**

The ability to forecast and to control inflation effectively requires a stable and predictable money demand function. Without a stable relationship between money demand and its determinants, the potential absence of causality in the evolution of the time series makes forecasting inflation appear more uncertain. Consequently, basing policy solely on the use of monetary aggregates would not necessarily lead to price stability.

The following part looks at the money demand function in Peru for the period 1979:I-1997:II. It presents empirical evidence that supports the hypothesis of a permanent shift in the money demand function due to financial liberalization and consequently to a faster adjustment of people's money holdings to their desired levels.

One of the main constraints to specifying a money demand function is to define the opportunity cost of holding money. In Peru, the presence of high inflation during part of the period being studied, along with controlled interest rates and the application of a fixed exchange rate regime throughout the 1980s up to the

**Figure 3**  
**Growth in Turnover**  
 Annual Average, % real terms\*



Source: International Financial Statistics. \* Deflated by CPI.

beginning of the 1990s, makes it more difficult to state that these variables represent a 'true' opportunity cost of holding real balances. Taking into account the events that have characterized the Peruvian economy throughout the period under consideration, the following money demand<sup>4</sup> was used:

$$(M/P)^d = a \cdot y \cdot e^{-\pi^e}$$

where  $(M/P)^d$  denotes the demand for real balances (circulation plus demand deposits, deflated by the CPI),  $y$  reflects the level of transactions in the economy (real GDP) and  $\pi^e$  represents the expected inflation as the relevant opportunity cost of holding money. In this case, it is assumed that individuals' forecasts of future inflation are exactly equal to current inflation.

The quarterly data used in this analysis were obtained from the International Financial Statistics. The series for real GDP and real M1 were transformed into logarithmic form and were seasonally adjusted.

Prior to estimating the long-run demand for real balances, each variable was tested for unit roots in order to determine whether it was stationary ( $I(0)$ ) or non-stationary ( $I(d > 0)$ ). To test the null hypothesis that each variable is non-stationary, the Augmented Dickey Fuller Test was used. This consists in running a regression of the first difference of the series against the series lagged once, lagged difference terms, and optionally, a constant and a time trend. Due to the volatility of the Peruvian time series, the test was run with and without a constant, including two lags. Table 3 shows the outcome of these tests, suggesting that the null hypothesis of a unit root in the levels of all of the variables cannot be rejected. Clearly, the results of the ADF test show that these variables are non-stationary of order one ( $I(1)$ ).

Cointegration tests were carried out by means of the Johansen procedure, since it provides more robust results when several variables are included.<sup>5</sup> To estimate the long-run money demand function for Peru, the following equation was estimated:

$$m^d - p = \delta i + \gamma \pi$$

<sup>4</sup> This specification of the money demand function was formulated by Phillip Cagan when studying high inflation economies. See P. Cagan: *The Monetary Dynamics of Hyperinflation*, in: *Studies in the Quantity Theory of Money*, University of Chicago Press, Chicago 1956.

<sup>5</sup> Jesus Gonzalo: *Five Alternative Methods of Estimating Long Run Equilibrium Relationship*, in: *Journal of Econometrics*, No. 60, 1994, pp. 203-33, has analyzed different methods for testing cointegration and has found evidence which suggests that most tests provide weak results when more than two variables are involved.

where, respectively, the parameters  $\delta$  and  $\gamma$  are expected to have a positive and negative sign. The cointegration vector was estimated with an unrestricted regime intercept and a dummy variable for the period 88:III-90:III, which captures the effects of the hyperinflationary process (forcing them to lie outside of the cointegration space). Table 4(a) reports the log likelihood values, eigenvalues and associated maximum eigenvalues and trace statistics. The outcome suggests the presence of a cointegrating vector. However, when normalizing the cointegrating vector,

**Table 3**  
**ADF Test for Unit Root**

	None	Intercept
<b>Levels</b>		
LNM1	-0.4009	-1.6127
INFLAQ	-0.2263	-1.1700
LNGDP	-0.7129	-1.3967
<b>First Diff.</b>		
LNM1	-3.8402	-3.8499
INFLAQ	-5.3003	-5.2935
LNGDP	-9.4768	-9.5792
1% critical value	-2.5954	-3.5239

**Table 4**  
**Cointegration Analysis**

(a)					
Eigenv.	L-max.	Trace	H0:r	L-max. 90	Trace 90
0.4849	47.7700	55.4300	0.0000	13.3900	26.7000
0.0728	5.4500	7.6600	1.0000	10.6000	13.3100
0.0302	2.2100	2.2100	2.0000	2.7100	2.7100
BETA (transposed)					
Variables	LNM1	LNGDP	INFLAQ		
Coefficients	1.0000	14.5210	16.3260		
(b)					
Eigenv.	L-max.	Trace	H0:r	L-max. 90	Trace 90
0.5121	51.6700	64.6500	0.0000	13.3900	26.7000
0.1370	10.6100	12.9900	1.0000	10.6000	13.3100
0.0325	2.3800	2.3800	2.0000	2.7100	2.7100
BETA (transposed)					
Variables	LNM1	LNGDP	INFLAQ		
Coefficients	1.0000	-0.9660	1.2790		
(c)					
Eigenv.	L-max.	Trace	H0:r	L-max. 90	Trace 90
0.5607	38.6600	52.5900	0.0000	13.3900	26.7000
0.1466	7.4500	13.9300	1.0000	10.6000	13.3100
0.1289	6.4900	6.4900	2.0000	2.7100	2.7100
BETA (transposed)					
Variables	LNM1	LNGDP	INFLAQ		
Coefficients	1.0000	-0.8950	1.1650		

inconsistent elasticities of the determinants of real balances are found, suggesting the possibility of an unstable money demand function. This result also implies that there could be a misspecification problem due to the exclusion of a relevant variable in the model.

Following the specification of the demand for real balances found in the Baumol-Tobin and Miller-Orr models, as well as that found in Milton Friedman's redefinition of the quantity theory,<sup>6</sup> it is reasonable to think that in order to specify correctly the Peruvian money demand function for the period under consideration, a 'transaction cost' variable, which can be used as a proxy of the financial liberalization process, should be included. For this purpose, a dummy variable was entered unrestrictedly into the system.<sup>7</sup> The results in Table 4(b) support the hypothesis that there is one cointegrating vector which represents the money demand relation.

Up until this point, a stable demand function has been estimated and the inclusion of the proxy of transaction costs into the system suggests that a permanent shift in the money demand function in Peru took place in 1991:II. In order to confirm this finding, the money demand equation was estimated for the period 1979:I 1991:I (before the effects of reforms on financial system took place). As cointegration theory suggests, a stable demand function for this period is expected and no relevant differences in the elasticities should be found. The results reported in Table 4(c) confirm the existence of one cointegrating vector representing a money demand relationship with elasticities that do not differ from those found for the whole sample. In order to identify completely the cointegrating relation, the following restriction on the  $\beta$  vector was imposed:

$$\beta'_i = (a_i, -a_i, *), \quad i = 1,$$

where the '\*' indicates an unrestricted parameter. The restriction was accepted and the long-run elasticities were identified:  $(m^d - p) = i - 1.279\pi$ , being the long-run income and inflation elasticities within the range of previous studies for hyperinflationary economies.

### Short Run Money Demand Elasticities

In order to perform an analysis of the short-run dynamics of real balances, the variables' properties of exogeneity first must be discussed. In general, a variable is said to be weakly exogenous when it is independent of the level variables that are cointegrated.

**Table 5**  
**Weak Exogeneity Test**

Variable	F (3,62)
LNM1	2.56**
INLAQ	18.66*
LNIGDP	0.72

\*\* 5% significance level

\* 1% significance level

The test results in Table 5 indicate that income is weakly exogenous and should be restricted to the left-hand side of the equation, while real balances and changes in prices can be explained by all of the variables that comprise the system. Having defined the properties of these variables, a dynamic money demand function for Peru now can be modelled in the form of an error correction model.

This dynamic equation was derived by following the methodology employed by Hendry, Pagan and Sargan,<sup>8</sup> which consists in working from the general to the specific – in other words, the dynamic equation is continuously simplified and re-estimated. This short-run equation was estimated in its most general form with four lags for each variable. The results of the final version of this equation are presented in Column 1 of Table 6. All of the coefficients are significant and are of the right sign, suggesting a good fit in the estimation. However, the value of the error correction term is low, indicating that short-run deviations are corrected slowly. This can be accounted for by the rigidities present in the structure of the financial system during most of the period under consideration.

In order to insulate the effect of the financial liberalization process on money holdings, an interactive dummy in the error term was included into the system. The results presented in Column 2 are revealing. The coefficients do not differ greatly from those in Column 1. Yet here, the variable included not only is highly significant and shows the right sign, but also is larger in absolute value than the original error term. This confirms the hypothesis that in the presence of financial deepening, the speed of adjust-

<sup>6</sup> Milton Friedman: *The Quantity Theory of Money: A Restatement*, Studies in the Quantity Theory of Money, Chicago University Press, Chicago 1956.

<sup>7</sup> The dummy variable is zero until 91:I and unity thereafter, when technological, legal and institutional changes took place in the Peruvian financial system.

<sup>8</sup> F.D. Hendry, A.R. Pagan, J.D. Sargan: *Dynamic Specification in: Handbook of Econometrics*, Vol. 2, Northolland, Amsterdam 1984.

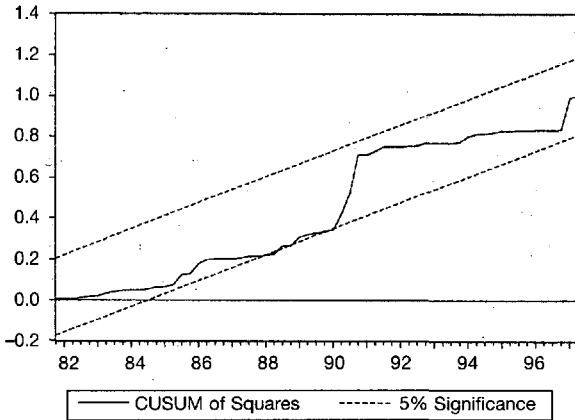
**Table 6**

Variable	Column 1	Column 2
Constant	-0.0306**	-0.0344*
DLNM1 (-4)	0.2420*	0.2409*
DINFLAQ	-0.0536*	-0.0466*
DINFLAQ (-2)	-0.0341*	-0.0321*
DGDP	0.4767**	0.4952**
COINTEQ (-1)	-0.0329*	-0.0248*
DCOINTEQ (-1)	-	-0.1103*

R-squared	0.3867	0.4554
Durbin-Watson	1.6913	1.8474
LM-test (2)	0.9190	0.1847
LM-test (4)	0.8519	0.5682

\*\* 5% significance level  
\* 1% significance level



ment of money demand to its determinants increases. Essentially, this demonstrates that, in a competitive financial system which brings transaction costs down, people can adjust their current money holdings faster to their desired levels. In order to confirm the model's good fit, Table 6 also presents the results of the serial correlation and parameter stability tests of the dynamic equation.

In summary, the paper's analysis of the money demand function for Peru has presented evidence of a permanent change in the relationship between money demand and its determinants. It also has provided empirical support concerning the effects of financial liberalization on people's behavior for holding money since 1991. Keeping these empirical findings

<sup>9</sup> Since 1993, the legal reserve was settled at 9% for deposits in both local and foreign currency. However, an additional marginal reserve of 45% for deposits in foreign currency was instituted in order to lessen the secondary expansion of foreign currency and permit (indirectly) the remonetization of the financial system.

<sup>10</sup> It can be argued that despite its nonstationary properties, a time series could be cointegrated with other variables (in this case inflation or GDP).

<sup>11</sup> Different publications of the Peruvian Central Bank were used for elaborating the series. The data is transformed into logarithmic form.

and the regulatory changes in mind, the paper now turns to analyzing the implications which this process entails for conducting monetary policy.

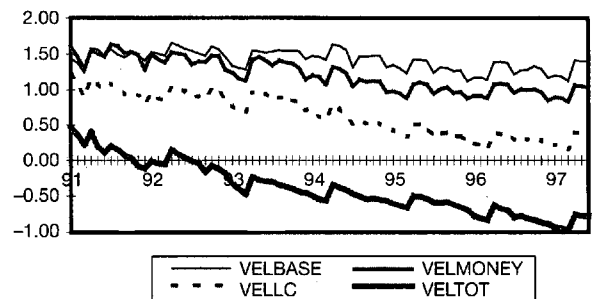
**Monetary Policy in Peru since 1991**

In the 1980s, monetary policy instruments primarily were used to finance the public sector and specific productive sectors (particularly agriculture) through credit lines at subsidized interest rates. In contrast, the main objective of monetary policy since 1991 has been the pursuit of price stability in the aim of remonetizing the economy. This policy has been based on the use of indirect instruments and the control of the monetary base by means of foreign exchange operations (and, to a lesser extent, through open market operations). Due to its effects on the bank multiplier, one of the most relevant indirect instruments used by the Central Bank has been the reserve requirement.<sup>9</sup>

The purpose of this section is to look at whether, in the context of financial liberalization, the central bank can use monetary aggregates as intermediate targets in order to pursue price stability. A formal approach to analyzing this issue is to refer to the quantity theory, which requires that the velocity of money be fairly stable if monetary aggregates are to be used in forecasting long-term inflation. Testing the stationarity properties of this last variable is a good way of measuring this stability.

In general, any short-run disequilibrium in a non-stationary time series could provoke a permanent deviation from its long-run equilibrium. This would make the velocity of the monetary aggregate not reliable enough to permit an analysis of the relation between money demand and its determinants.<sup>10</sup> Figure 4 shows the velocity of monetary base, money, liquidity in local currency and total liquidity (including foreign currency) for the period 1991:I-1998:III, using monthly data.<sup>11</sup>

**Figure 4**  
**Velocity of Monetary Aggregates**



Source: Central Bank.

Unlike monetary base and money, there is a clear downward trend in the velocity of liquidity in local currency and total liquidity. Moreover, the smoothness of this last time series points to the existence of a unit root. Table 7 shows the outcome of the ADF test for the velocity of monetary base, money, liquidity in local currency and total liquidity, suggesting that the velocity of monetary base is the only variable that presents no unit root. As such, it is possible to analyze the effects of money creation on changes in prices.

Although the Central Bank has considerable control over the stock of monetary base, the degree to which it can control other monetary aggregates also must be known in order to determine to what extent monetary policy can influence the financial system. For this reason, single regressor equations with monetary base on the left-hand side and the other monetary aggregates on the right-hand side were estimated in the form of an error correction model. In principle, an estimated coefficient that is close to 1 and highly significant could lead to the conclusion that it is

possible to control other monetary aggregates by means of the expansion or contraction of the monetary base.

Table 8 shows the short-run as well as the long-run coefficients of these different equations.

As was expected, a higher coefficient was found in the case of money than in that of liquidity in local currency and total liquidity. However, unlike the first two regressions, the third registered a low goodness of fit and showed the presence of serial correlation. This last result, along with the low coefficient, suggests that total liquidity cannot be explained solely by changes in base – meaning that other factors, such as the high level of dollarization, must be taken into consideration.

To conclude, while the Central Bank is able to exert a considerable amount of control over money, it has much less control over liquidity in local currency and almost none in terms of total liquidity. This is a direct consequence of the process of financial liberalization and, in particular, the result of the complete opening up of the capital account.

**Table 7**  
**ADF Test for Unit Root**

	Intercept*	Intercept and Trend
<b>Levels</b>		
LNVELBASE	-2.4558	-4.6093
LNVELMONEY	-1.2340	-3.8874
LNVELLC	-0.9821	-3.0097
LNVELTOT	-1.6843	-3.0592
<b>First Diff.</b>		
LNVELBASE	-6.3962	-6.3170
LNVELMONEY	-5.8908	-5.8599
LNVELLC	-6.1398	-6.1423
LNVELTOT	-5.7124	-5.9227
1% critical value	-3.5188	-4.0836

\* not significant, except for LNVELTOT.

**Table 8**  
**Degree of Control of Monetary Aggregates in the Short and Long Run Independent Variable: DLNBASE**

Period: 1991.I – 1998.III

Dependent Variable	DLNMONEY	DLNLC	DLNTOT
Long run coeff.	0.8386*	0.7613*	0.7005*
Short run coeff.	0.7165*	0.6353*	0.5458*
Cointeq. coeff.	-0.3189*	-0.4239*	-0.3190*
R-squared	0.6767	0.6314	0.2245
Durbin Watson	2.2661	2.3433	2.3314
LM-test (2)	1.507045	3.134536	5.852147*
LM-test (4)	1.272382	2.160562	4.5518*

\* 1% significance level.

**Global Financial Integration and Monetary Policy**

No consensus has emerged as to how global financial liberalization and the vast array of new instruments which accompany it influences the effectiveness of monetary policy. Certain views posit that the expansion of electronic cash may erode central bank control over the money supply. Likewise, the growing use of new financial instruments such as derivatives may allow firms to insulate themselves from changes in interest rates provoked by the monetary authorities. While these effects have taken root in market economies throughout the world, processes of financial liberalization in developing countries necessitate a distinct analysis.

Financial deregulations have had the effect of increasing competition between banks and encouraging the introduction of technological advances as well as the use of new instruments. In so doing, they have lowered transaction costs. This, in theory, can raise the velocity of broad and narrow money. However, in developing countries, the velocity of broad and narrow money may follow different trends when financial liberalization takes place.<sup>12</sup>

<sup>12</sup> See Robert Deckle and Mahmood Pradhman: Financial Liberalization and Money Demand in ASEAN Countries: Implications for Monetary Policy, IMF Working Paper, No. 36, March 1997.



Peru's experience at the beginning of the 1990s provides evidence of this phenomenon. With the freeing of interest rates on time deposits, and with the authorization of foreign currency deposits, economic agents shifted their assets out of currency and into these time deposits, thus raising the velocity of narrow money and simultaneously lowering that of broad money. Figure 5 shows the evolution of the velocities of narrow money (M1) and broad money (total liquidity) for the period 1985-1997, suggesting that even after the end of hyperinflation, the demand for narrow money did not return to its previous level. Moreover, its velocity followed a light upward trend until the first half of 1992, while that of total liquidity followed a downward trend. Since then, the velocities of both aggregates have followed similar paths. However, in absolute terms, the velocity of narrow money has registered a lower rate of growth.

Consequently, in causing shifts out of currency towards deposits and leading to a faster adjustment of people's money holdings to their desired levels, financial liberalization has rendered the central bank's targeting of monetary aggregates more difficult. The monetary authorities can no longer base their forecasts mainly on the movement of narrow money, and controlling broader aggregates becomes complex. For Peru, the high level of intermediation in foreign currency, coupled with the increasing use of new short and long-term assets, has caused the Central Bank to shift its policy of pursuing price stability such that it takes into account other financial and real sector indicators as well as monetary aggregates.

In this context, it is arguable whether price stability can be explained mostly by money growth. In fact, it is reasonable to think that there has been a close relationship between the control of money growth and the rate of inflation in Peru. However, since 1991, with complete capital account openness, the pressure on exchange rates also has led to a decrease in domestic prices. A problem arises when there is a continuation of this trend because the appreciation of the real exchange rate could lead to increasing current account deficits.

Such a situation is avoidable as long as the monetary authorities pursue real exchange rate stability as a means of increasing the domestic savings rate. However, policies focused on real exchange rate stability would lower the interest rate, and in so doing would lower capital inflows. As interest rates often are initially high in developing countries, and as domestic

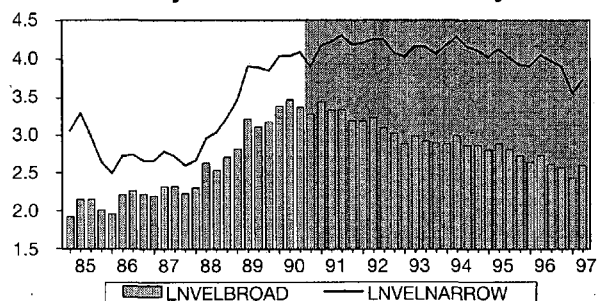
industry is not capable of generating sufficient capital, foreign inflows are crucial to stimulating investment and consequently private savings. In this context of capital account openness, the central bank's pursuit of price stability may be in contradiction with its goal of achieving economic growth. This draws further attention to the importance of capital account openness.

While the importance of capital inflows for developing countries in terms of providing investment and improving the efficient allocation of capital are undisputed, the question that remains is to what extent and at what speed should the capital account be opened? As experienced in Latin America in the early 1980s, exposure to large amounts of foreign investment can lead to over-indebtedness. For many of these countries, this was the consequence of the abrupt, under-regulated and wholesale opening of the capital account.

Consequently, it would appear that a gradual approach towards capital account liberalization would be more prudent, as this policy would avoid the flooding of the financial system and would give economic agents within the system time to adapt. Moreover, such an approach would allow sovereign credibility to build up, leading to more desirable investments, i.e. long-term investments. In essence, the success of financial liberalization lies within three important factors: price stability, fiscal prudence, and overall credibility.

In achieving this success, the Chilean experience offers a good comparison *vis-à-vis* Peru's recent policy orientation for analyzing the effects of different approaches to capital account openness and financial liberalization. Following the negative experience of sudden and complete liberalization in the early 1980s, Chile has taken a gradual approach towards opening

**Figure 5**  
**Velocity of Narrow vs. Broad Money**



Source: International Financial Statistics.

up its capital account. This approach has created political consensus and support that have allowed such policies as keeping the current account deficit low to be sustained over time. This, in turn, has helped the country gain international credibility with investors. Coupled with investment policies such as first year foreign credit reserve requirements and mandatory and private pension funds, this approach has resulted in long-term foreign investment and greater domestic savings. Furthermore, in order to avoid the mass liquidity and debt problems seen in the country in 1982-83, Chilean banking regulation has been made one of the toughest in the world.

Today, despite Peru's fast approach to financial liberalization, the measures undertaken in this process have benefited from considerable political consensus and support. As described above, the government has been careful to establish an adequate regulatory framework for the financial sector. It has done so with the aim of avoiding a financial crisis such as that experienced in Chile at the beginning of the 1980s. Consequently, measures to provide appropriate prudential regulation and supervision so as to avoid moral hazard problems also have been established. At present, the Peruvian financial sector is at the stage of consolidating its institutions and use of new instruments. As in the case of Chile, the success of Peru's financial liberalization process will depend upon the continuation of policies favoring price stability, fiscal discipline and credibility.

### Conclusions

This article has examined the effects of financial liberalization on the money demand function in Peru for the period 1979:I-1997:II. In so doing, it has presented evidence of a change in the long-run elasticities of money demand and its determinants which occurred in 1991. The shift in the money demand function was caused by the measures which the government took to bring down inflation (i.e. the closing of the fiscal gap, the elimination of tariffs and the freeing of the exchange rate and interest rates) as well as by the financial reforms that have been instituted and that have resulted in a change in money holdings into substitutes (particularly foreign currency). In general, since 1991, the development of the financial system has led to a more competitive atmosphere with lower transaction costs and new types of financial assets, enabling economic agents to adjust their current money holdings to their desired levels more quickly. Another important aspect is the emergence of new institutional investors which play

an important role in providing higher domestic savings rates through the use of long-term financial assets.

In this new context, the task of the monetary authorities has become more difficult. Specifically, the evidence suggests that the effectiveness of using broader definitions of money as intermediate targets to reach price stability has been blunted. The main explanation of this phenomenon lies in the high level of intermediation in foreign currency as well as the use of new types of short and long term assets, which cannot be directly controlled by the Central Bank.

Despite the changes in the structure of the financial system, there has been a close relationship between the rate of growth of money and the rate of inflation in Peru. As the evidence for the period 1991:I-1998:III suggests, the control of the growth of the monetary base could influence the rate of inflation. Today, the Central Bank's main objective is to maintain price stability by using the growth of the monetary base as an intermediate target.

However, in a context of financial liberalization with complete opening of the capital account, pressures on the exchange rate have also led to decreases in domestic prices. The problem arises when there is a continuous appreciation of the real exchange rate due to capital inflows. This could provoke increasing current account deficits which eventually could not be sustained and would lead to drastic devaluations and high rates of inflation. To avoid this situation, policy-makers must be also concerned about the stability of the real exchange rate.

By doing so, the Central Bank is facing a dilemma when determining the monetary policy goal: on the one hand it has to aim for price stability; on the other, it has to enhance economic growth (by attracting long term capital inflows, which are crucial for developing countries). Put in other words, it is difficult to set the real exchange rate as an intermediate target to reach price stability when there is a complete opening of the capital account.

There is no consensus about the sequence that must be followed in a process of financial liberalization with complete opening of the capital account in order to be successful in reaching price stability and economic growth. However, it is clear that in order to avoid financial crises, an adequate financial discipline associated with liberalization at both the national level and the level of financial institutions must be imposed. Otherwise, without strict financial discipline and a solid financial supervisory system, liberalization can lead to crises like those experienced by Chile in 1982 and by Mexico in 1994.