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Exchange Rate Volatility and Economic Performance in Peru: A Firm Level Analysis

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ABSTRACT

This paper analyzes the impact of the exchange rate volatility on the performance of the Peruvian economy using financial information from 163 non-financial listed firms. We find evidence that, for firms holding dollar-denominated debt, investment decisions are negatively affected by real exchange rate depreciation. The reasons behind this result are: (i) the high degree of liability dollarization and currency mismatch that create the conditions for a balance sheet effect and a financial stress in the aftermath of a currency depreciation, (ii) the strong bank-lending channel that follows and reinforces the balance sheet effect, (iii) the domestic demand shrinkage that affects severely the firms sales, and (iv) the relatively small and poorly diversified export sector.

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I. Introduction

Which is the impact of exchange rate volatility on the economic activity? This seems to be one of the most compelling questions in the economic literature in recent times. In the last decade, several countries experienced large exchange rate depreciations with different results. In some cases, such as Mexico in 1994 and Thailand in 1997, currency depreciations were followed by a large contraction in economic activity and the collapse of the financial sector. The most striking characteristics of these currency crises were that, previous to the crises themselves, the degree of exchange rate misalignment was considered small, and the macroeconomic fundamentals were considered sound in terms of low inflation, strong fiscal situation and prudent monetary stance, among other variables. On the contrary, in some other cases, such as South Africa in 1998, after the currency depreciation, economic conditions improved as output growth was restored.

What is driven these different results? Currency depreciation affects the real side of the economy through different channels. First, a real depreciation can have expansionary effects through increasing the operating profits in the export sector, as well as increasing the cost of the imported goods favoring tradable activities in the economy. The strength of this "competitiveness" effect depends heavily on the price elasticity of the export sector as well as on the price elasticity of the imports. In particular, when a large fraction of imports are highly inelastic to changes in the relative price, as is the case with imported inputs and capital goods, the higher cost of inputs and capital goods could offset the positive effects in the export/tradable sector, having an overall contractionary effect in aggregate output as well as in investment. The evidence of the existence of this channel is mixed. On one side Ghei and Prittchet (1999) and Duttagutta and Spilimbergo (2000) provide evidence of how exports increase after a currency depreciation. On the other side Agénor and Montiel (1996) and Reif (2001) show the contractionary effects of a real exchange rate depreciation due to the cost-of-input mechanism.

A second main channel emerges when there exists a significant currency mismatch in the economy. A currency mismatch means that a large fraction of firm's debt is dollar denominated while the flow of income as well as assets are mostly denominated in domestic currency. In such economy, a large real depreciation deteriorates the firm's net worth. As the firm's risk increases, credit becomes more expensive and more restricted, which finally affects investment and therefore, aggregate demand. As a result, through this "balance-sheet effect", currency depreciations have contractionary effects in the economy.

To understand this channel, on the theoretical side, a large body of literature is being developed around what is known as the "open economy Bernanke-Gertler" framework (a phrase coined by Krugman), which refers to the inclusion of some sort of imperfection in the domestic financial market within a standard model of open economy, along the lines of the Mundell-Fleming workhorse. Krugman (1999) and Aghion, Bacchetta and Banerjee (2001) present models that have as a common feature the existence of multiple equilibria. This feature is needed to explain the fact that most Asian countries experienced large currency depreciations without ex-ante significant changes in macroeconomic fundamentals.

Whether or not the competitiveness effect offsets the balance sheet effect is an empirical question that needs to be answered using firm-level data. So far the evidence is not conclusive. Most notably, Bleakley and Cowan (2002), analyzing a sample of firms in five Latin-American

countries during a period of 1990-1999, found evidence that firms holding dollar-denominated debt during a exchange rate realignment consistently increased their capital expenditures. This finding is at odds with the predictions of the theory, given the deterioration of firms´ net worth. In their view, this result provides evidence that the competitiveness effect dominates the balance-sheet effect.

On the other hand, Aguiar (2002) uses a sample of Mexican firms finding that after the 1994 Mexican peso crisis, there was a contraction on investment driven by the weak balance sheet position of the firms. Following different approaches, Forbes (2002) examines how 12 large depreciation events that took place in different countries during the period 1997-2000 affected firms´ performance. Interestingly enough, it is found that firms with higher indebtedness tend to have lower growth in their net income, but firms with a higher share of foreign sales tend to have a better performance after the depreciations. Also, Harvey and Roper (1999), analyzing the magnitude of the Asian crisis, found that the major factor contributing to the collapse of the economy was the growing indebtedness of Asian companies in dollar-denominated debt.

Given that this empirical issue has not been solved yet, the objective of this study is to find an answer to the question posed at the very beginning of the paper for the case of Peru. In order to do this, we use financial information from 163 non-financial listed firms finding evidence that for firms holding larger dollar-denominated debt, investment decisions are negatively affected by a real exchange rate depreciation. This result is explained by the high degree of firms' liability dollarization and currency mismatch, which created the conditions for a balance sheet effect and a financial stress in the aftermath of a currency depreciation. This result is important for policy design, specially in terms of monetary policy where the trade-off between higher interest rate volatility or exchange rate volatility is always present. Also, there are important implications for prudential regulations and policies oriented to develop capital markets since the contraction in the real sector could also have a negative impact in the financial sector. This relationship among real exchange rate depreciation, macroeconomic activity and financial fragility for the Peruvian economy has been analyzed in Carranza, et al.(2003) using aggregate data.

The Peruvian case is particularly interesting because Peru did not experience such a traumatic depreciation as the ones experienced by Asian or other Latin-American countries. On the contrary and by most standards, a real depreciation of almost 20% in a one-year period (March-98 to March-99) can be considered normal or even small. However such a small depreciation had strong negative effects on internal demand, as aggregate investment and private consumption plummeted. The small depreciation also caused financial stress in the economy as non-performing loans drastically increased, threatening the stability of the financial system, and deepening and spreading the negative effects of real exchange rate depreciation throughout the economy. Finally, the economy remained in recession for a long period of time and, by the end of 2002, private investment had not yet recovered its previous level, hovering around 2/3 of the level reached at the end of 1997.

The rest of the paper is structured as follows. The next section discusses the recent economic developments in the Peruvian economy. In the third section the firm-level data are presented. The fourth section is devoted to discuss the estimation strategy and the econometric results are presented in the fifth section. Finally, the conclusions and some policy recommendations are presented in last section of the paper.

II. Recent Economic Developments in the Peruvian Economy

The economic developments that took place in Peru during the early 90s illustrate one of the most remarkable cases of successful structural reforms and can be used as an example of economic growth with macroeconomic adjustment. At the end of 1990, the Peruvian economy was in a critical condition: the inflation rate exceeded 7,600 %, fiscal deficit reached 7.8% of GDP and public external debt was around 63% of GDP. In such a deteriorated macroeconomic environment, the GDP shrank by 5.1%.

By the end of 1997 a new economic scenario had emerged. A combination of prudent macroeconomic policies and an aggressive program of structural reforms were applied, yielding an impressive economic recovery. The average GDP growth rate during the post-adjustment period (1993-1997) reached 7%, inflation rate converged to a one digit figure; and investment and savings went from 16.5% and 11.8 % of GDP in 1990 to 24.6% and 19.4% of GDP in 1997, respectively. But one of the most remarkable improvements took place on the fiscal side: by 1997 the Peruvian economy experienced a modest fiscal surplus (0.2% of GDP) for the first time in more than two decades.

However, this performance was achieved at the expense of incurring in severe macroeconomic risks, as some of the most important structural weaknesses of the Peruvian economy remained in place throughout the decade:

- *A low level of internal savings*. Since the total savings in the economy did not grow at the same pace as investment, external savings were needed to finance GDP growth. This resulted in increasing current account deficits.
- *A high concentration of exports*. Four commodities (gold, copper, fish meal and zinc) represent more than 50% of total exports in Peru.
- *A loss of confidence in the domestic currency*. Due to the hyperinflation of the 1980´s, the domestic currency was replaced by the US dollar in several functions, especially as a store of value. Therefore, as people increasingly saved in dollar-denominated accounts, commercial banks also lent in foreign currency transferring the exchange rate risk to lenders.

These macroeconomic weaknesses explained the fragility in the financial system:

- *The dollarization of the financial system*. Despite the dramatic improvements in price stabilization during the early 90's the commercial banking system remained highly dollarized. By the end of 1997, deposits in dollars were 74% of total deposits, while loans in dollars represented 75% of total credit.
- *A high exposure to short-term capital inflows.* The financial system relied on short-term credit lines form foreign banks to increase its loanable funds. In just three and a half years, from 1994 to June 1998, the short-term foreign liabilities of commercial banking skyrocketed by 830%, reaching a peak of US$ 3,701 million that represented more than 25% of total banking credit.

- *The short-term maturity of banking credit.* By the end of 1999, the banking loans with maturity less than one month amounted more than 25% of the total credit while for loans with maturity less than one year this percentage reached almost 65%.

In the aftermath of the Asian (1997) and the Russian (1998) crises the real exchange rate started to depreciate while the terms of trade worsened and the international liquidity flew out of the country. As a consequence, real GDP growth drastically slowed down, especially in sectors oriented to domestic markets (mainly manufacturing) or nontradable sectors (construction, commerce and services, among others). Besides, important tradable sectors such as mining, fishing and agriculture were mostly affected by weather disturbances (such as "El Niño"). Regarding private investment, after averaging a growth rate of 15.7% during the 1994-1998 period, it drastically decreased by (–15.3%), (-2.0%) and (–5.6%) in 1999, 2000 and 2001, respectively. Regarding the behavior of prices, as the nominal exchange rate depreciation triggered a severe downturn in internal demand, the pass-through from exchange rate to consumer prices was insignificant. That is, the higher nominal exchange rate was compensated with lower nontradable prices, stemming from reductions in profit margins and nominal wages (see Figure 1).

[FIGURE 1 HERE]

The severe downturn in private investment and, in turn, in aggregate demand, negatively affected the quality of the banks' assets. The non-performing loans ratio doubled in a few months and has remained stubbornly high since then. The deterioration of banks´ net worth caused a change in credit conditions and a severe credit crunch followed immediately after the sharp capital outflow of late 1998 and the real depreciation that followed. As a result, banking credit has remained very tight even when access to international credit markets was restored and domestic banks became quite liquid from early 1999 henceforth. That is, this bank lending channel would have reinforced the original balance sheet effect (see Figure 2)[1].

[FIGURE 2 HERE]

On top of the deterioration of the macroeconomic conditions, a period of severe political instability occurred in Peru. The political turmoil began by the end of 2000, when it was discovered that the last electoral process was fraudulent, forcing Alberto Fujimori to resign from presidency. A transitory government, lead by Valentín Paniagua was appointed by the Congress in November of 2000 and new presidential elections were announced. The political crisis ended with the final victory of Alejandro Toledo in the presidential race of mid-2001. This episode of extreme political uncertainty undoubtedly increased political and financial risks, which in turn affected firms' performance. Table 1 presents the chronology of the most important events that took place in the country during the period 1994-2001.

[TABLE 1 HERE]

[1] Carranza, et al. (2003) present evidence of the bank-lending channel for the Peruvian economy.

III. Data Description and Summary Statistics

The empirical analysis has been conducted using firm-level data obtained from those firms that present their financial statements to CONASEV[2], the stock market regulatory agency in Peru. Our database consists of accounting information for non-financial, publicly listed firms from 1994 to 2001.

The number of firms varies from year to year due to problems in the process of gathering financial information and problems with the quality of the data. That is, from an universe close to 250 firms, we were forced to used only information from an average of 110 firms each year. In particular, the following problems were found: (i) the electronic data were incomplete and financial statements were lost in CONASEV´s archive, (ii) in some cases large discrepancies between the balance sheet and the independent auditing reports were found, and (iii) there were some cases of inconsistent information (i.e., end of period capital stock was different from the initial figure of the following year or the fraction of dollar-denominated debt with respect to total debt was higher than 100%, among many other problems). In any of these cases the corresponding observation was not considered in the study. Finally, firms with less than three consecutive years of data were also not considered in the empirical analysis.

Regarding the issue of how representative of the economy our sample is, it should be mentioned that publicly listed firms are the largest firms in the country. This could be a source of size bias in the sample as the largest firms tend to be less credit constrained than the smallest ones, which obviously affects their investment decisions. This is particularly relevant in economies with highly imperfect credit markets and, on top of that, suffering from credit contractions as it seems to be the case of the Peruvian economy during the period of analysis. In addition to the bias related to firm size, the sample could have a bias related to economic activities as well. As it can be seen in Table 2, most of the firms in our sample are dedicated to manufacturing activities, while in the total GDP structure, manufacturing represents only 16% of economic activity. On the contrary, most nontradable productive sectors, such as services, commerce, and construction—which contribution to GDP amounts 39.2%, 14.6% and 5.6%, respectively—are under represented in the sample. This limitation should be acknowledged when analyzing the empirical results.

[TABLE 2]

Considering the year 2001 as a reference, we observed that the average size of the firms across the sample (measured as total assets) was 470.1 millions of soles with a standard deviation of 1,094.1 millions.[3] A majority of the firms (81%) were under the mean while only 21% of the firms were considered "large" as they were above the mean. On the other hand, the median of the size distribution was 140.8 millions of soles. Note that the mean is almost three times the median. This characteristic is present in every year of our period of study.

[2] CONASEV is the Comisión Nacional Supervisora de Empresas y Valores, equivalent to the Securities Exchange Commission.

[3] With a nominal exchange rate of 3.5 soles /dollar in 2001, this means that the average size of firms' total assets was around US$ 134 million.

Regarding our variables, all the detailed information can be found in Appendix Table A1. However, it should be mentioned that our main explanatory variable, *investment,* is defined as the firm's expenses in land, equipment, machinery and constructions and buildings during the year. This information is collected directly from the external auditor's reports which show the change in gross fixed assets along the fiscal year due to new purchases or sales. We did not take the information on *change in net fixed assets* from the balance sheet as they include changes in valuation of asset values which are not related to capital expenditure but to firm-specific accounting practices[4].

After having clarified the definition of investment, we can describe its behavior during the period of study. As it is shown in Table 3, we observe a dramatic fall in the investment ratio from a mean of 33.4% in 1994 to a 2.1% level in 2001. This slump is shared by the median of the sample, which falls from 15.0% to 1.2%. It is interesting to note that the collapse of investment expenditures in our sample matches the downturn behavior of private aggregate investment, in particular from 1999 onwards, although these figures are not fully comparable because we do not have aggregate capital stock. Another variable that could be used to measure firm's performance is the sales over lagged assets ratio, which also shows a declining pattern with a mean of 124.3% in 1995 and an ending level of 68.1% in 2001, while its median also falls from 109.7% to 54.0% during the same period. Regarding firms' profitability, proxied by EBITDA over lagged assets, it is found the same behavior as in other variables, that is, a decline pattern since 1994 onwards. It is interesting to note that these three indicators show the deterioration of firms' performance during the period of study.

[TABLE 3 HERE]

We also report other financial characteristics of the firms. Regarding firms´ leverage (total debt over assets), we observe that both the mean and median declined at a faster pace after 1999. As it is discussed below, the reduction in firms´ leverage was strongly related to the collapse of investment. With respect to the composition of liabilities, we see that the fraction of dollar-denominated liabilities with respect to total liabilities shows an increasing pattern during the period, with the mean starting at a level of 53.7% in 1994 and ending at 63.5% in 2001, after a peak of 67.2% in 1998 (pre-crisis year); while the median also increases from 53.1% to 71.6% in the same period. This is consistent with the aggregate level of dollarization of the economy, although some differences are due to the fact that firms´ total liabilities include liabilities related to taxes and labor compensation that are denominated in domestic currency, while the aggregate level of dollarization is measured taking into account only the currency composition of banking loans. With respect to the maturity composition of the debt, the short term debt ratio registers a

[4] Accounting regulations in Peru allow firms in some sectors to have an accelerated depreciation schedule of fixed assets to promote investment. Also, due to a tax law approved in 1994, merged companies were allowed to revaluate assets and depreciate them again, as a measure to fostering mergers and acquisitions and avoiding bankruptcies. As a result, information on changes in the net fixed assets is seriously distorted. Another implication is that from 1997 onwards a number of mergers were observed for the sole purpose of tax elusion. Up to now, there is an ongoing controversy between the state and several companies that were involved in this practice to take advantage of the tax benefits.

downward trend, starting at 74.8% in 1994 and ending the year 2001 at 62.1%, while the median observes the same pattern falling from 78.3% in 1994 to 57.7% in 2001.

It is worthwhile to notice that, in spite of using a biased sample of firms, which is not very representative of the general productive structure of the economy, the behavior of sales, investment and the currency composition of debt match the behavior of the aggregate variables in the Peruvian economy.

IV. Balance Sheet versus Competitiveness Effect: Methodological Issues

From the discussion above it is clear that firms' investment will depend on exchange rate movements. The relationship will be positive if the competitiveness effect dominates the balance sheet effect that appear when firms´ liabilities are mostly denominated in foreign currency. Therefore an initial specification will be:

$$(I/K)_{it} = \theta_0 + \theta_1 \Delta RER_t + \theta'_2 Z_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

Where $(I/K)_{it}$ is the investment ratio of firm i in year t, ΔRER_t is the variation of real exchange rate in log terms in year t, Z_{it} is a set of firm-specific variables, such as leverage, cash flows, lagged investment and so on, and μ_i is the firm-specific effect. The sign of θ_1 reflects the impact of the exchange rate on the firm's investment decisions. However, the impact, as we discussed previously, will depend on the relative strength of the competitiveness effect and the balance sheet effect, that is:

$$\beta\theta_1 = \beta + \gamma D^*_{it-1} + \lambda X_{it} \quad (2)$$

Where D^*_{it-1} is the firm i's foreign currency liabilities over total assets in period $t-1$, and X_{it} is an indicator of tradability or the fraction of total export over total sales of firm i in period t. The first variable takes into account the balance sheet effect, while the second captures the competitiveness effect. Therefore plugging (2) into (1), we obtain:

$$(I/K)_{it} = \theta_0 + \beta \Delta RER_t + \gamma(D^*_{it-1} x\, \Delta RER_t) + \lambda\,(X_{it}\, x \Delta RER_t) + \theta'_2 Z_{it} + \mu_i + \varepsilon_{it} \quad (3)$$

Where the interaction effect of foreign currency debt with exchange rate variations is measured by γ (note that γ captures the balance sheet effect and should have a negative sign), and the interaction effect of export share or tradability with exchange rate variations is measured by λ (note that λ captures the competitiveness effect and should be have a positive sign). The estimation of β could be difficult because this is a common effect for every firm. Thus an identification problem arises as β can be capturing not only exchange rate movements but many other macroeconomic effects such as aggregate credit conditions, aggregate demand dynamics, or even political uncertainty. Hence, we will control for all macro-variables, including the direct effect of real exchange rate, by using time dummies (η_t). Also, to account for some dynamics in the behavior of investment we use the lagged dependent variable. After explicitly including some firm-specific variables, the equation to estimate converges to the following expression:

$$(I/K)_{it} = \alpha(I/K)_{it-1} + \gamma(D^*_{it-1} x\, \Delta RER_t) + \lambda(X_{it} x\, \Delta RER_t) + \delta D^*_{it} + \phi D_{it} + \eta_t + \mu_i + \varepsilon_{it} \quad (4)$$

Where D_{it} is the firm i´s total debt over assets ratio. Regarding the estimation method of various versions of equation (4), we use the generalized method of moments (GMM) in differences proposed by Arellano and Bond (1991) to account for the problems of endogeneity arising from the inclusion of the lagged dependent variable. The basic idea is to write the regression equation as a dynamic panel data model, take the first difference to remove unobserved time-invariant firm-specific effects, and then instrument the right-hand side variables in the first-differenced equations using levels of the series lagged two periods or more, under the assumption that the time-varying disturbances in the original levels equations are not serially correlated.

In studying dynamic panel data models this procedure has important advantages over simple cross-section panel methods. First, estimates will no longer be biased by any omitted variables that are constant over time (unobserved firm-specific or "fixed" effects). Second, the use of instrumental variables allows parameters to be estimated consistently in models that include endogenous right-hand side variables, such as lagged investment or sales. Finally, the use of instruments potentially allows consistent estimation even in the presence of measurement error (see Bond, et al., 2001). Also, it should be mentioned that instead of the GMM system estimator (proposed in Arellano and Bover, 1995) the first-difference GMM was used. The reason is that the additional restrictions imposed by the first method were not valid since the individual series were not highly persistent.

V. Results

A. Explaining Investment Behavior

The estimates of the negative effects on investment derived from holding dollar debt during a real exchange rate depreciation are presented in Table 4. In Equation 1, we find that the interaction term (D^*_{t-1} *x* ΔRER), that represents the balance sheet effect, is negative and significant at the 10% level of significance. This means that for firms holding dollar-denominated debt, investment decisions are negatively affected by a real exchange rate depreciation. To take into account the potential financial distress in which firms can get into when large depreciations take place, we include the direct effects of lagged total debt over assets to reflect the firm's leverage. However, excessive borrowing would not cause a decrease in capital expenditure since the coefficient is not statistically significant[5].

[TABLE 4 HERE]

[5] Note that according to the regressions statistics shown at the bottom of Table 4, the Sargan test and the autocorrelation tests indicate that the number of lags used in the estimation were appropriate. Recall that under GMM estimation, when T > 3 and the model is overidentified, the key identifying assumption is that there is no serial correlation in the disturbances. It is of particular interest to test for the presence of second order serial correlation in the first-differenced residuals (see Arellano and Bond, 1991). In all our equations, we found no evidence of second order autocorrelation as indicated by p-values.

Variations of Equation 1 are estimated to test for the competitiveness effect. First, in Equation 2 in order to measure the competitiveness effect we include the interaction term given by (*tradability x ΔRER*), finding that this is negative but not significant. A possible explanation for this result is that most tradable firms are in the manufacturing sector which is mostly oriented to the domestic market (recall that manufacturing exports are quite low). As the real exchange rate shows contractionary effects, the slowdown of aggregate internal demand negatively affects those firms. Also, in this regression we include current firm's sales to capture firm's expected profitability, finding a positive but not significant coefficient. In Equation 3, we use the export ratio as a proxy of the competitiveness effect. Here again, even though the sign of the coefficient was positive as expected, it was not significant either. It should be noted that in both cases, the balance sheet effect coefficient (γ) is negative but not significant. On the contrary, the total leverage (ϕ) appears positive and significant which supports the hypothesis that, in the Peruvian economy, investment expenditure is strongly related to external financing access.

In order to further explore this hypothesis, Equation 4 includes the lagged short-term debt ratio. As suspected, this variable is positive and significant at the 10% level of significance. This result can be explained by a liquidity-constrained hypothesis. Recall that since most of the banking and suppliers' credit are short-term credit, a firm that shows increasing short term debt ratio is probably obtaining fresh resources, while firms that show declining short-term debt ratio are probably repaying debt and suffering from working capital scarcity. As a consequence, this positive coefficient captures the liquidity-constraint effect on firms' new capital formation.[6] This firm-level evidence is consistent with the aggregate evidence in Peru where credit crunch and change in loans standards seem to be crucial to explain the post-Asian crisis economic recession.

The next equations labeled 5, 6 and 7 basically include new controls such as size, interest rate and firms profitability. The firm's size (measured by total assets) seems to condition the response of firms to shocks, i.e., larger firms seem to be able to invest more in the aftermath of an exchange rate depreciation than smaller ones. Regarding the interest rate effect, Equation 6 shows a positive effect of the interest rate on investment, which seems to be counter-intuitive. How is it possible than an interest rate decrease would trim down investments? This can be possible in a credit-constrained economy in which the quantity channel as opposed to the price channel is the main clearing mechanism in the credit market. In fact, when Peruvian commercial banks recovered adequate liquidity levels by early 1999, banking credit remained very tight in spite of the sharp interest rate reduction that followed as firms' creditworthiness severely suffered in the aftermath of the crisis. Finally, in Equation 7 lagged EBITDA over assets is included finding, as expected, that investment decisions positively react to firm's profitability.

It should be mentioned that in all regressions the lagged dependent variable shows a significant but negative coefficient. The explanation for this unlikely result is quite simple. As we have lost some years using dynamic GMM estimation, the information we keep covers the recession stage of the business cycle. Hence, what we are showing is probably just a statistic pattern derived from our sample. Note that the time dummies in these estimations try to capture the macroeconomic conditions, i.e. factors that are common to every firm as they are part of the

[6] From the firm's viewpoint, this is consistent with the Diamond hypothesis where "good" firms borrow short term as a way to signaling that, in fact, they are "good" firms (Diamond, 1991).

general economic environment. In consequence, the year dummies capture aggregate shocks, domestic credit availability, political climate, country risk assessments and the real exchange rate behavior.

Using a different estimation strategy and following Forbes (2002) we exclude all time dummies and use just a lagged dummy variable to take into account the large depreciation of 1999 and another dummy to reflect the political turmoil of the year 2000. In Equation 8, the balance sheet effect is negative and significant at the 10% level, but what is most important is that the large real exchange rate depreciation (our coefficient β) is strongly negative and significant at the 1% level. In the same vein, the political dummy is also negative and significant at the 1% level. In Equation 9, we drop the non significant lagged dollar debt finding the balance sheet effect to be negative and significant at the 5% level, while the dummies maintain their signs and significance. This adds evidence to the fact that, besides the balance sheet effect given by the interaction term (γ), the exchange rate depreciation by itself (β) produces strong negative macroeconomic effects affecting firms' investment decisions.

It should be of some interest to analyze if the relevance of foreign currency indebtedness on investment is constant through time or not. In order to test this, we interact the foreign currency debt over assets variable with time dummies ($D^*_{it-1} \; x \; \eta_t$). [7] The results shown in Table 5 tell us that in periods of real exchange rate stability (previous to 1997), the high level of foreign currency is not relevant to explain investment behavior as the coefficients are not significantly different from zero. However, in periods of large real exchange rate depreciation, the coefficients become more negative and very significant. This is particularly the case of the coefficient in 1999, which is significant at the 1% level. Similar results are obtained when we hit the interaction term with time dummies, (i.e., $\Delta RER \; x \; D^*_{it-1} \; x \; \eta_t$).

[TABLE 5 HERE]

Another variable to describe the firm's "health condition" is the dynamics of sales. Even though we do not tabulate our results here,[8] the sales equations share some interesting features. First, we find strong evidence of persistence of lagged sales throughout all the specifications. Second, the balance sheet effect seems not to be relevant in sales, at least not in a direct form. Third, the firm's leverage ratio appears to exert a negative impact on sales as opposed to the investment equations. In addition, the short term debt ratio also has negative effects while neither the tradability nor the export ratio shown significant impact on sales. Finally, it seems that there is no significant relationship between EBITDA and sales.

It is noteworthy that the balance sheet effect coefficient is non significant in explaining sales behavior, as it would mean that the currency depreciation does not generate direct or supply-side effects. In fact, the time dummies appear to be relevant in years 1998 and 1999 (when the largest currency depreciations took place and the liquidity crisis began) which would indicate that current shocks contemporaneously affect the sales function while they transmit with a lag in the

[7] In other words, the following equation is estimated:

$(I/K)_{it} = \alpha(I/K)_{it-1} + \Sigma_t \, \delta_t[D^*_{it} x \eta_t] + \phi D_{it} + \eta_t + \mu_i + \varepsilon_{it}$

Remember that η_t refers to the time t dummy. This equation is also estimated by GMM in differences.

[8] The results are available upon request.

investment function case. Our hypothesis is that the real exchange rate increase would generate a demand-side contraction in sales as opposed to a supply-driven effect in investment.

Summing up, our estimates show the following results:

- There is evidence of a negative balance sheet effect in the Peruvian firms that arise from three channels: (i) the interaction effect coefficient (γ) which is negative along all the specifications tested and presents statistical significance in some regressions; (ii) the dollar debt ratio coefficient (δ) which is always negative and significant in some regressions indicating that those firms with higher dollar debt ratios tend to invest less than those other firms whose dollar debt ratios are small; and (iii) the lagged effect of the real exchange rate depreciation by itself (our coefficient β_1**)** which is negative and significant.

- There is strong evidence of a financially constrained economy in which the quantity channel is the driving force in the credit market as opposed to the traditional price channel. We find support for this conclusion from the following facts: (i) the total leverage ratio (ϕ) is positive and significant in most specifications; (ii) the short term debt ratio is positive and significant; (iii) the current firms sales coefficient is positive; (iv) the assets coefficient is positive and significant; and (v) the lagged EBITDA coefficient is positive and significant. These last three features would indicate that firms' investing behavior is closely related with their own cash flow projections, fact that in some theoretical models is indicative of a financially constrained environment (see Bond et al., 1997).[9]

- There is no evidence of a sizeable "competitiveness effect", as both the export and tradability interaction effects (proxies to our λ coefficient) lack of statistical significance.

Note that our findings contradict the results of Bleakley and Cowan (2002), as they found that the balance sheet effect is positive, i.e., a real exchange rate depreciation increases investment expenditure in firms holding dollar debt. Hence, they conclude that firms that hold larger dollar debt during a devaluation actually go on to substantially increase their investment. Consequently, they do not find any evidence of the detrimental effect of the exchange rate on investment that balance sheet effect models predict. Their explanation for this result is that firms with higher participation in the tradable sector are more likely to hold debt denominated in foreign currency. Therefore, as the real exchange rate depreciates the expected increase in profitability (competitiveness effect) more than compensates the potential negative balance sheet effect. In order to assess this hypothesis, we discuss below the currency composition of debt in Peruvian firms.[10]

[9] There is a large microeconometric literature that investigates the role of financial factors in company's investment decisions. Most studies find that financial variables such as cash flow help to explain investment spending; however, this relationship should not occur under the null hypothesis that firm investment is not affected by financial constraints. Hence, the evidence of "excess sensitivity to cash flow" is interpreted as suggesting the importance of such constraints.

[10] Just for the sake of comparison, we ran regressions with several estimation methods using the same equation as Bleakley and Cowan (2002). Though we found that the balance sheet effect has no significance using OLS and Within Group methods, the GMM difference estimation found evidence of a negative and a significant (at the 10% level) balance sheet effect. Besides, we found robust evidence of a negative coefficient of the lagged dollar debt ratio and negative effects of the time dummies for years 2000 and 2001.

B. Explaining Debt Composition

What determines debt composition of Peruvian firms? Do large firms tend to have more dollar-denominated debt than smaller firms? Do tradable sector firms exhibit more dollar debt compared to non-tradable sector firms? These are the kind of questions we want to address regarding the debt composition of the Peruvian firms. For these purposes, we estimate the following equation:

$$(D^*/D)_{it} = \alpha' Z_{it} + \eta_t + \varepsilon_{it} \quad (5)$$

Where $(D^*/D)_{it}$ stands for debt denominated in dollars over total debt; Z_{it} is a vector describing firm specific variables, such as tradability (dummy variable that takes the value 1 if the firm belongs to the tradable sector or 0 otherwise), size (given by the logarithm of assets), and the sector's export ratio; and η_t refers to time dummies.

Also, as it is of interest to test the determinants of the debt's maturity composition, we run the following regression:

$$(D_{ST}/D)_{it} = \alpha' Z_{it} + \eta_t + \varepsilon_{it} \quad (6)$$

Where $(D_{ST}/D)_{it}$ stands for liabilities with maturity less than one year relative to total liabilities. We have estimated equations (5) and (6) using different econometric techniques, though we report here only the probit and tobit estimations.[11] In the case of the probit model we assume that firms having a dollar debt ratio above the median are "dollar indebted", so the value of their dependent variable is 1. Similar procedure was followed in the case of the tobit model as the censored point was also the median. The results are shown in Table 6.

[TABLE 6 HERE]

Both methods are quite consistent and yield the same results. Regarding the debt currency composition, firms in industries with higher export ratios are more likely to borrow in foreign currency. Therefore, firms are partially hedged against exchange rate risk. On the other hand, neither size nor tradability is relevant to explain the dollarization of firm's liabilities. This is a somewhat surprising finding as one would think that larger firms tend to borrow more heavily in foreign currency than smaller ones.

Bleakley and Cowan argued that their finding of a positive effect of real exchange rate adjustments is due to the match between currency composition of firms' debt and the elasticity of their income to the exchange rate. In fact, they mentioned that in their sample, liabilities dollarization was higher in firms whose income was expected to be more positively correlated with the real exchange rate. In the Peruvian case, even though firms operating in export-oriented industries tend to borrow more in foreign currency, non-export firms are also heavily indebted in foreign currency. This means that the high level of exposure to exchange rate risk in the non-export sector dominates the partial hedge in the export sector. Finally, regarding the maturity

[11] Equations 5 and 6 were also estimated with a sequential cross section technique and FGLS fixed effect panel data. The results were very robust and coincident with the ones presented here. They are available upon request.

composition of debt the results are conclusive: larger firms are more likely to borrow long-term relative to smaller firms. On the contrary, firm's productive activities (tradability and industry export ratio) are not important to determine the maturity composition of debt.

VI. Conclusions

In this paper we find evidence that currency depreciation negatively affected the firms' investing behavior in the Peruvian economy between the years 1994 and 2001. In particular, we find evidence of a negative balance sheet effect that arise from three channels: (i) the interaction effect of dollar denominated debt times the real exchange rate depreciation; (ii) the fact that firms with higher dollar debt ratios tend to invest less; and (iii) the effect of the real exchange rate depreciation by itself. On the other hand, we find no evidence of a significant "competitiveness effect", as both the exports and tradability seem to play no role in the investment behavior. Finally, we find support for a bank-lending channel hypothesis that underpins the balance sheet effect, given the following results: (i) the positive effect of total leverage ratio; (ii) the Diamond-like signaling element of short term debt ratio, and (iii) the fact that firms' investing behavior is closely related to cash flow projections.

Our findings contradict the results of Bleakley and Cowan (2002) as they found that the balance sheet effect is positive. They argue that firms with higher participation in the tradable sector are more likely to hold debt denominated in foreign currency. On the contrary, the high degree of liability dollarization and currency mismatch observed in the Peruvian economy would have created the conditions for the existence of a negative balance sheet effect and the financial stress that took place in the aftermath of the currency depreciation episodes of the late 90's. If we take into account the financial constraints that reinforce the balance sheet effect, we can understand the economic forces behind our findings.

What are the main lessons of this exercise from the policymaking point of view? As precautionary measures, the government should pursue structural reforms seeking to increase the degree of openness of the real sector which effectively reduces the currency mismatch at the macroeconomic level. At the same time, market-friendly strategy aiming at the dedollarization of the economy should be followed. This strategy should be based on fostering internal savings in domestic currency (i.e., issuing inflation-indexed government bonds as a saving instrument) and on pricing in the negative externality of foreign currency indebtedness (i.e., increasing general banks' provisions for loans in foreign currency to non-export firms).

What should be done in the aftermath of a crisis? It is clear that monetary policy should be as prudent as possible, taking into account that a period of banking illiquidity should be faced by the central bank. The central bank should be prompt to avoid severe banking liquidity droughts via flexible dollar reserve requirements. On the other hand, domestic interest rates can go as high as needed to fight speculative attacks against the currency without any significant impact on the real sector, as long as the short-term debt in domestic currency is rather small. Regarding fiscal policy, it can be countercyclical if public sector financial needs can be healthy funded, otherwise it could be another source of instability through deterioration of credibility and higher country-risk perception.

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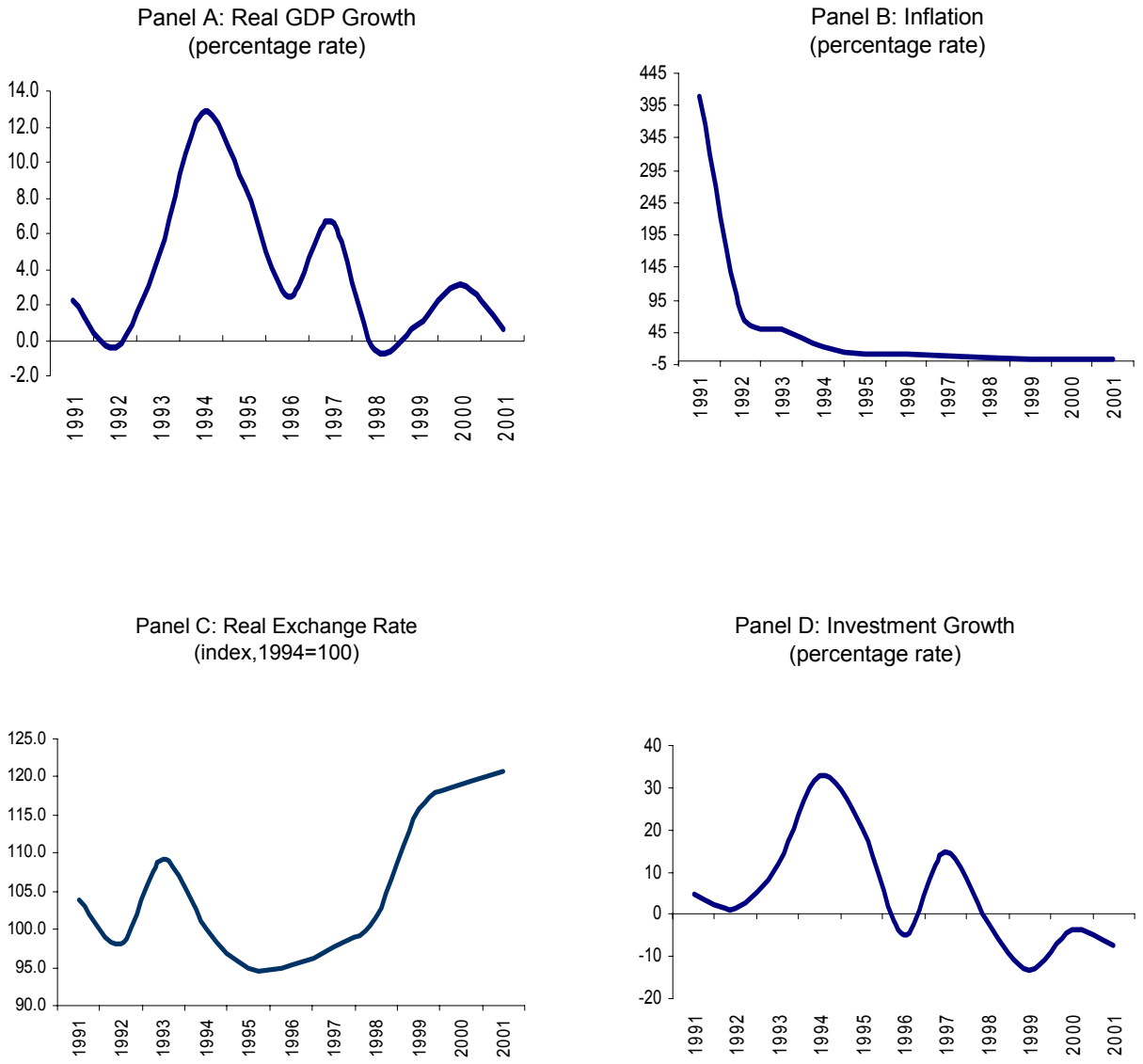
Appendix Table A1. Description of the Variables

Variable	Description
Investment ratio	$(K_t - K_{t-1}) / K_{t-1}$ .Our definition of K_t is only Gross Fixed Capital, so it includes machinery, equipment and construction, excluding inventory changes. This information is in real terms and it comes from the notes to the financial statements. Source: CONASEV.
Sales	Total sales as stated in the financial statements. Source: CONASEV.
Dollar debt	Total liabilities denominated in dollars (or in other currencies different to soles). This information appears in the notes to the financial statements. Source: CONASEV.
Short term liabilities	These are liabilities with maturity less than one year. This information comes from firm's the balance sheet. Source: CONASEV.
Total liabilities	Total liabilities from the firm's balance sheet. Source: CONASEV.
Assets	Total assets from the firm's balance sheet. Source: CONASEV.
EBITDA	Earnings before interest, taxes, depreciation and amortization as it appears in the financial statements. Source: CONASEV.
Tradability	It is a dummy variable which values 1 if the sector in considered "tradable" and 0 if it is "non tradable".
Export Ratio	As most firms do not state their export share in total sales, we used an export ratio by economic sectors. This information comes from the input-output matrix used by the government to estimate output variations. Source: INEI (Instituto Nacional de Estadística e Informática).
Real Exchange Rate Index	The real exchange rate is the bilateral real exchange rate, which is the RER between the domestic currency (sol) and the dollar adjusted for the inflation differential between Peru and USA. We use annual average index with 1994 = 100. Source: Banco Central de Reserva del Perú.
TAMEX	Average lending rate in dollars. This is the average of the outstanding commercial loans of the banking system. Source: SBS (Superintendencia de Banca y Seguros).

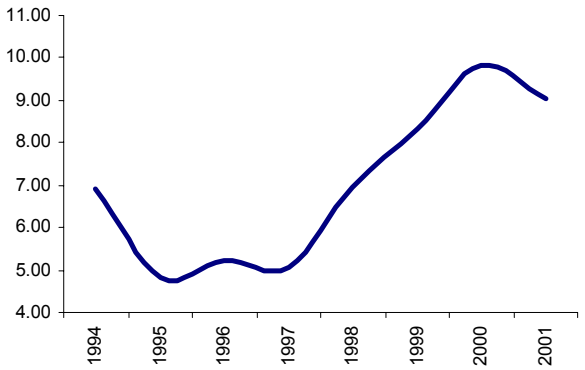
Figure 1: Main Economic Indicators



Source: Banco Central de Reserva del Perú

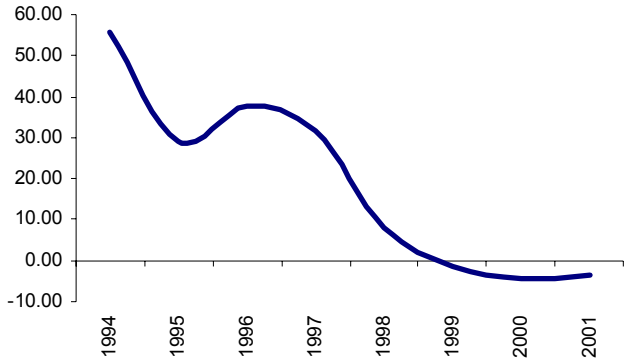
Figure 2: Financial Statistics

Panel A: Nonperforming Loans (1994-2002)
(end of period, percentage rate)



Source: Superintendencia de Banca y Seguros

Panel B: Banking Credit in Foreign Currency: 1994-2001
(rate of growth)



Source: Banco Central de Reserva del Perú

Table 1

Chronology of Economics and Political Events in Peru: 1994-2001

Date	Events
1994-January	COPRI, the privatization committee, introduced two programs aimed at boosting participation of Peruvian citizens and corporations in the privatization program.
1995-January	Combination of prudent monetary and fiscal policies yield an annual inflation rate of 13.72% (from 7 649,6% in 1990).Tension broke out along the border with Ecuador.
1995-February	Ecuador and Peru reached a cease-fire agreement. Release of GDP growth for 1994: 12,8%.
1995-April	Alberto Fujimori was reelected for a five-year period.
1995-June	Economy Minister Jorge Camet began to negotiate a commercial debt restructuring plan for Peru`s external debt.
1995-November	Peru reached a Brady style debt reduction agreement with creditor banks.
1996-December	The MRTA terrorist group attacked the Japanese Embassy. The entry requirements for the banking sector were eased.
1997-April	The military successfully rescued the hostages in the Japanese Embassy
1998-January	Exchange rate starts to depreciate due to low metals prices, lower fishing and agricultural output due to bad weather conditions ("El Niño").
1998-July	The marginal reserve requirement for foreign exchange deposit was reduced to 35% from 45%, as capital outflows began.
1998-October	To ease liquidity pressures the government launched the first liquidity program to support the banking system. The average reserve requirement for foreign exchange deposit was reduced. International Reserve decrease by US$ 143 millions.
1998-October	Peru and Ecuador signed a historic peace agreement ending a 56-year border dispute.
1999-January	New cabinet was appointed. After the Brazilian crisis starts pressures on the Peruvian Sol. Highest depreciation rate in a one month period January (6,3%).
1999-September	The second government program to support banking system was in place.
2000-April	After two round of elections, Fujimori was controversially certified as the winner.
2000-September	The public outcry against the president erupted when videotapes showed his closest political aide, Vladimiro Montesinos, bribing opposition legislators.
2000-October	Fujimori had to resign due to extensive disapproval. Valentin Paniagua succeeded to the presidency. The Economy Ministry and the Central Bank followed prudent policies to avoid speculative attacks due to political uncertainty.
2001-March	Toledo and Garcia (former president of Peru) won first-round elections. Given the unexpected result, pressures against the Sol were observed.
2001-June	Toledo won the president election.
2001-August	Toledo confirmed the appointment of economist Richard Webb as the new Central Bank president and Pedro Pablo Kuczinsky as Minister of Finance and Congress passed most of the short-term economic measures proposed by Prime Minister Roberto Dañino.
2001-December	Fiscal deficit was 2,8% of GDP due to expansionary fiscal policy in the midst of a severe economic recession and deflationary pressures

Source: Banco Central de Reserva del Perú
www.duke.edu/~charvey/Country_risk/couindex.htm

Table 2: Main Characteristics of the Sample
Number of observations by productive sector by year

SECTOR	1994	1995	1996	1997	1998	1999	2000	2001
Commerce	4	5	5	4	4	4	5	5
Construction	2	2	3	1	2	1	2	2
Mining	17	19	17	16	13	18	18	17
Fishing	1	1	0	1	2	2	2	3
Services	17	21	19	16	19	20	21	19
Manufacture	66	73	67	61	49	55	53	53
Agriculture	0	2	7	7	9	10	8	7
TOTAL	**107**	**123**	**118**	**106**	**98**	**110**	**109**	**106**

Source: CONASEV

Table 3: Main Statistics

VARIABLE	1994		1995		1996		1997	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
INVESTMENT RATIO	33.4%	15.0%	35.2%	17.0%	16.9%	9.4%	20.3%	10.8%
DOLLAR DEBT RATIO	53.7%	53.1%	58.3%	62.5%	59.9%	62.2%	59.1%	62.8%
SHORT TERM DEBT RATIO	74.8%	78.3%	74.8%	78.5%	75.0%	76.8%	72.8%	76.1%
SALES TO LAGGED ASSETS RATIO	nd	nd	124.3%	109.7%	104.1%	92.3%	97.9%	87.4%
TOTAL DEBT TO LAGGED ASSETS RATIO	nd	nd	62.5%	58.4%	57.7%	56.2%	59.2%	52.2%
EBIDTA TO LAGGED ASSETS RATIO	nd	nd	11.7%	10.0%	9.2%	6.2%	9.4%	7.6%

VARIABLE	1998		1999		2000		2001	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
INVESTMENT RATIO	18.4%	10.2%	11.6%	5.8%	3.6%	0.1%	2.1%	1.2%
DOLLAR DEBT RATIO	67.2%	74.0%	64.5%	72.5%	62.7%	66.7%	63.5%	71.6%
SHORT TERM DEBT RATIO	70.9%	72.2%	69.5%	72.0%	65.4%	64.8%	62.1%	57.7%
SALES TO LAGGED ASSETS RATIO	78.1%	66.5%	76.1%	59.7%	71.4%	55.5%	68.1%	54.0%
TOTAL DEBT TO LAGGED ASSETS RATIO	58.0%	53.0%	56.6%	49.0%	50.9%	46.9%	46.6%	44.1%
EBIDTA TO LAGGED ASSETS RATIO	5.3%	4.8%	6.6%	5.5%	6.1%	5.6%	4.8%	4.9%

Source: CONASEV

Table 4. Effect of Dollar Debt Ratio and Real Exchange Movements on Investment
GMM Estimation - Sample 1994-2001

	Dependent Variable: Investment [(Kt - Kt-1)/Kt-1]								
Independent Variables	**Equation 1**	**Equation 2**	**Equation 3**	**Equation 4**	**Equation 5**	**Equation 6**	**Equation 7**	**Equation 8**	**Equation 9**
Lagged Investment Ratio	-0.156***	-0.118***	-0.119***	-0.109***	-0.112***	-0.127***	-0.129***	-0.142***	-0.139***
	[0.017]	[0.016]	[0.016]	[0.016]	[0.015]	[0.017]	[0.016]	[0.014]	[0.012]
Interaction Effects									
Lagged Dollar Debt Ratio x D(Log Bilateral RER)	-1.029*	-0.313	-0.188	-0.289	-0.341	-0.994	-0.300	-0.674*	-0.707**
	[0.716]	[0.691]	[0.640]	[0.545]	[0.669]	[0.817]	[0.641]	[0.394]	[0.366]
Tradability x D(Log Bilateral RER)		-0.382							
		[0.447]							
Export Ratio x D(Log Bilateral RER)			0.008						
			[0.008]						
Main Effects									
Lagged Dollar Debt Ratio		-0.145	-0.133	-0.130*	-0.196*	-0.001	-0.107	-0.115	
		[0.094]	[0.095]	[0.098]	[0.104]	[0.090]	[0.096]	[0.089]	
Lagged Total Debt Ratio	0.010	0.128**	0.111*	-0.049	0.165**	0.119*	0.043	0.156**	0.065
	[0.044]	[0.064]	[0.068]	[0.095]	[0.070]	[0.066]	[0.077]	[0.065]	[0.045]
Year dummies									
D97	0.017	0.044	0.043*	0.043*	0.006	0.036	0.052*		
	[0.032]	[0.027]	[0.026]	[0.024]	[0.025]	[0.026]	[0.027]		
D98	0.065	0.098***	0.087***	0.090***	0.035	0.071**	0.099***		
	[0.047]	[0.033]	[0.029]	[0.030]	[0.027]	[0.028]	[0.032		
D99	0.059	0.113**	0.054**	0.070**	-0.01	0.059*	0.083**		
	[0.067]	[0.051]	[0.027]	[0.029]	[0.028]	[0.032]	[0.033]		
D00	-0.036	-0.009	-0.019	-0.015	-0.076***	-0.024*	-0.012	-0.126***	-0.138***
	[0.075]	[0.015]	[0.012]	[0.013]	[0.017]	[0.013]	[0.014]	[0.020]	[0.018]
D01	-0.039							-0.129***	-0.139**
	[0.076]							[0.020]	[0.020]
Controls									
Lagged Short Term Debt Ratio				0.177*					
				[0.091]					
Current Firm Sales		0.058	0.059			0.036	0.065	0.0742*	0.092**
		[0.047]	[0.045]			[0.048]	[0.046]	[0.046]	[0.042]
Lagged Firm Sales					0.0020				
					[0.027]				
Firm Size (Log Assets)					0.452***				
					[0.105]				
TAMEX x (Lagged Dollar Debt Ratio)						0.021***			
						[0.008]			
Lagged EBIDTA							0.471***		
							[0.182]		
Regression Statistics									
N observations	416	410	410	416	412	405	408	410	410
Sargan Test	24.68	21.31	22.000	20.760	16.920	19.590	20.450	26.050	24.590
p-value	0.214	0.379	0.340	0.411	0.658	0.484	0.430	0.164	0.218
First order Autocorrelation	-2.900	-2.780	-2.740	-2.730	-2.760	-2.730	-2.790	-2.690	-2.540
p-value	0.004	0.006	0.006	0.006	0.006	0.006	0.005	0.007	0.011
Second order Autocorrelation	-1.690	-1.480	-1.540	-1.440	-0.940	-1.400	-1.310	-1.580	-1.640
p-value	0.092	0.139	0.125	0.151	0.347	0.161	0.192	0.114	0.101

Standard errors in parenthesis. */**/*** denote statistical significance at the .10/.05/.01 level

Table 5: Time Variation of Dollar Debt Ratio
GMM Estimation - Sample 1994-2001

Dependent Variable: Investment ratio [(Kt - Kt-1)/Kt-1]	
Lagged Investment	-0.080***
	[0.018]
Dollar debt ratio x D1996	-0.190
	[0.172]
Dollar debt ratio x D1997	-0.110
	[0.162]
Dollar debt ratio x D1998	-0.356**
	[0.178]
Dollar debt ratio x D1999	-0.456***
	[0.161]
Dollar debt ratio x D2000	-0.390**
	[0.163]
Dollar debt ratio x D2001	-0.468**
	[0.189]
Total debt ratio	0.703***
	[0.114]
D1997	0.074
	[0.070]
D1998	0.237
	[0.059]
D1999	0.292
	[0.034]
D2000	0.295
	[0.034]
D2001	0.414
	[0.421]
Constant	-0.040
	[0.083]
Observations	522
Sargan Test	30.410
P-value	0.064
AC (1)	-2.220
P-value	0.026
AC(2)	0.800
P-value	0.426

Standard errors in parenthesis. */**/*** denote statistical significance at the .10/.05/.01 level

Table 6: Tobit and Probit Estimations for Debt Composition
GMM DIFFERENCE - SAMPLE 1994-2001

TOBIT ESTIMATION

VARIABLES	DOLLAR DEBT RATIO	SHORT TERM DEBT RATIO
Size (assets)	1.045	-3.327***
	[0.703]	[0.634]
Tradable / Non Tradable	0.368	0.139
	[2.736]	[2.674]
Export Ratio	0.115***	-0.007
	[0.038]	[0.050]
d1995	4.266**	0.771
	[1.822]	[1.660]
d1996	5.149***	2.131
	[1.806]	[1.626]
d1997	6.356***	3.365**
	[1.803]	[1.667]
d1998	12.727***	1.791
	[1.823]	[1.749]
d1999	9.971***	1.545
	[1.938]	[1.869]
d2000	8.07***	0.914
	[1.974]	[1.905]
d2001	8.653***	-0.498
	[1.950]	[1.919]
Constant	46.188***	111.738***
	[9.004]	[7.511]
Observations	1015	1015
Left censoring point	66	74
Number firms	163	163
Wald Test	95.600	39.190
P-value	0.000	0.000

PROBIT ESTIMATION

VARIABLES	DOLLAR DEBT RATIO	SHORT TERM DEBT RATIO
Size (assets)	0.015	-0.291***
	[0.066]	[0.059]
Tradable / Non Tradable	-0.167	0.127
	[0.297]	[0.248]
Export Ratio	0.015***	-0.002
	[0.005]	[0.004]
d1995	0.390**	-0.016
	[0.193]	[0.181]
d1996	0.599***	0.038
	[0.189]	[0.179]
d1997	0.555***	0.000
	[0.193]	[0.182]
d1998	1.102***	-0.064
	[0.204]	[0.188]
d1999	0.782***	-0.007
	[0.212]	[0.199]
d2000	0.623***	-0.149
	[0.212]	[0.201]
d2001	0.788***	-0.254
	[0.214]	[0.203]
Constant	-0.781	3.286***
	[0.810]	[0.698]
Observations	1070	1070
Number firms	163	163
Log likelihood	-588.180	-607.807
Wald Test	43.580	38.350
P-value	0.000	0.000

Notes:

TOBIT: In both cases, the left censored point was taken from the median.

PROBIT: In both cases, if the variable exceded the median value, it was assigned a value of 1.

Standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%