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EMPIRICAL EVIDENCE ON EUROPEAN DUAL EXCHANGE RATES AND ITS RELEVANCE FOR LATIN AMERICA

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ABSTRACT

This paper uncovers some important empirical regularities for the European dual exchange markets of the early 1970s, examines some of the stylized facts about the Latin American dual-rate regimes and assesses whether there are strong parallels between the two. It concludes that one should be cautious about applying the lessons from the European experience to the Latin American ones.

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Introduction

As the Bretton Woods system collapsed in the early 1970s, several European countries adopted two-tier exchange markets as an intermediate step in the transition from fixed to flexible exchange rates. Such an arrangement involved the formal establishment of separate exchange markets, with separate exchange rates, for current and capital account transactions. The exchange rate for current account transactions was generally pegged by the authorities, while the rate for capital account transactions was free to fluctuate. The hope was that the two-tier exchange market would relieve some pressure on official reserves caused by massive shifts in capital flows while insulating commercial transactions from exchange-rate fluctuations.

France, Italy and Belgium (actually the Belgium-Luxembourg Economic Union, or BLEU) were the major European countries that used two-tier exchange markets in the early 1970s, although Belgium had adopted its system in 1957. The U.K. and the Netherlands used a second exchange rate for a small group of capital-account transactions, as did France both before adopting its full-fledged dual rate system and again in the 1980s.[1]

Dual exchange rates have had quite a long history in Latin America. In the 1960s and 1970s, for example, dual rates were used by such countries as Argentina, Chile, the Dominican Republic, Ecuador, Jamaica, Nicaragua, Paraguay, Peru and Uruguay. In the 1980s, dual exchange rates were also widely used. Mexico operated dual exchange rates

[1] Belgium operated a dual exchange market from 1957 to 1990. Between May 1971 and May 1983 both capital inflows and capital outflows were assigned to the market for capital account transactions, whereas before May 1971 and after May 1983 capital inflows could go through either exchange market. France used a dual exchange market from August 23, 1971 to March 21, 1974. It operated a *devise titre*, a second exchange rate applicable to resident purchases and sales of foreign securities, during the period August 11, 1969-October 20, 1971 and again during the period May 21, 1981-May 22, 1986. Italy operated a dual exchange market from January 22, 1973 to March 22, 1974. The Netherlands established an O-guilder market for nonresidents investing in Dutch guilder bonds between September 6, 1971 and February 1, 1974. The U.K. operated a separate investment currency exchange rate for certain capital account transactions conducted by U.K. residents from 1947 until October 23, 1979.

for most of the 1980s, Argentina adopted dual rates for a period in 1981 and again in 1982, Bolivia experimented with dual rates in 1982, and Costa Rica, the Dominican Republic, El Salvador, Guatemala and Jamaica all tried the arrangement in the early or mid 1980s. Finally, the use of dual rates has not been limited to Latin America or Europe: South Africa, Iran, the Sudan, Syria, Uganda, Zaire, Egypt, Nigeria, and the francophone African countries, among others, have also relied on dual exchange rates at various times.

The European experience has been described by Lanyi (1975) and others, and indeed, has inspired a large theoretical literature. Nevertheless, there has been no attempt to assemble a set of empirical regularities in the European data. In addition, little is known about the more recent Latin American episodes. The question posed in this paper is whether the European experience with dual exchange rates can contribute to our understanding of the Latin American experience. The approach will be to uncover some important empirical features of the European dual exchange markets, develop some of the stylized facts about the Latin American regimes, and then assess whether there are strong parallels between the two. Obviously the European and Latin American regimes will be similar in that they are both characterized by two officially-sanctioned exchange markets with two separate exchange rates, but unless the similarity goes much beyond that, it would be misleading to use the European framework to deepen our understanding of the Latin American regimes.

The paper is divided into three parts. The first part sets out the theoretical framework of a dual rate system and then provides a set of empirical regularities about the European cases. The second part develops some key features of the Latin American episodes. The third part raises doubts about the applicability of the European experience to the Latin American one.

I. Empirical regularities in the European dual exchange market

1. The spread

The defining feature of a dual exchange market is that current and capital account transactions are channeled into separate exchange markets---a commercial exchange market for current account transactions and a financial exchange market for capital account transactions. Foreign exchange may stand at a premium or a discount in the financial exchange market as compared to its price in the commercial exchange market.

The dual rate system (DRS) introduces a distortion into residents' portfolios. The distortion is created by the level of the premium or discount as well as its evolution over time.

To see this more clearly, consider an individual living in a country that operates a DRS. In order to purchase securities denominated in foreign currency, the individual abstains from consumption today, using the freed resources to purchase the securities at the financial exchange rate.

Specifically, if X_t is the financial exchange rate in period t (home currency/foreign currency) and P_t is the domestic price index in period t (the value of one unit of consumption), then an individual investing a unit of purchasing power in foreign bonds in period t receives P_t/X_t worth of these bonds. In period t+1, these bonds pay off $(1+i^*_t)P_t/X_t$ units of foreign currency, where i* is the foreign nominal interest rate. The individual repatriates the interest at the commercial rate available at t+1, since interest income is a current-account transaction, and repatriates the principal at the financial rate available at t+1. Thus the bonds pay off the equivalent of

$$\left[\frac{X_{t+1} + i_t^* S_{t+1}}{P_{t+1}}\right]\frac{P_t}{X_t}$$

consumption units in period t+1, where S is the commercial exchange rate (home currency/foreign currency).

If we define the domestic inflation rate as $\Pi_t = (P_{t+1} - P_t) / P_t$, the rate of depreciation of the commercial rate as $\delta_t = (S_{t+1} - S_t) / S_t$, and the rate of depreciation of the financial rate as $f_t = (X_{t+1} - X_t) / X_t$, then the pay-off expression above can be rewritten as

$$(1) \qquad \frac{(1 + f_t) + \frac{S_t}{X_t} i_t^* (1 + \delta_t)}{1 + \Pi_t}$$

Expression (1) represents the real payoff in domestic output units from holding foreign securities for one period. When domestic and foreign securities are perfect substitutes, arbitrage ensures that this payoff equals one plus the domestic real rate of interest, and domestic residents will equate it to their intertemporal marginal rate of substitution between future and current consumption.[2]

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[2] The proof can be obtained most easily by maximizing a two-period utility function for a representative individual subject to the appropriate budget constraints:

$$\text{Max } \{U(c_t) + \beta U(c_{t+1})\}$$

$$\text{subject to} \qquad P_t c_t + X_t B_t = Y + S_t i^*_{t-1} B_{t-1} + X_t B_{t-1}$$

$$P_{t+1} c_{t+1} = Y + S_{t+1} i^*_t B_t + X_{t+1} B_t$$

where U is the contemporaneous utility function, P is the domestic price level, Y is the (fixed) endowment, B_t is period t savings, and β is the discount rate. One of the first-order conditions is

$$[U'(c_t) / \beta U'(c_{t+1})] = (P_t/P_{t+1}X_t)[X_{t+1} + S_{t+1} i^*_t] = [(1+f_t) + (S_t/X_t) i^*_t (1+\delta_t)] / (1+\pi_t)$$

where the left-hand side of the above expression is the intertemporal marginal rate of substitution.

The real payoff to foreigners from holding foreign-currency denominated bonds for one period is

$$(2) \qquad \frac{1 + i_t^*}{1 + \Pi_t^*}$$

which is one plus the world real rate of interest. Consequently, the dual exchange market creates a wedge (w) between the foreign return and the return actually received by home residents who hold foreign-currency denominated bonds. The wedge is equal to the ratio of (1) and (2), or

$$(3) \quad w = \frac{(1 + \pi_t^*)}{1 + i_t^*} \left[\frac{(1 + f_t) + \frac{S_t}{X_t} i_t^* (1 + \delta_t)}{1 + \Pi_t} \right]$$

If we simplify this result by invoking the law of one price, where $P_t = S_t P^*_t$, $P_{t+1} = S_{t+1} P^*_{t+1}$, then the term $(1 + \pi_t)$ in (3) can be rewritten as $(1 + \delta_t)(1 + \pi^*_t)$. That allows us to rewrite (3) as

$$(4) \quad w = \frac{1 + (S_t / X_t) i_t^*}{(1 + i_t^*)} + \frac{(f_t - \delta_t)}{(1 + \delta_t)(1 + i_t^*)}$$

Equation (4) shows that the DRS distorts the domestic rate of return through both the level of the premium as well as its evolution over time.The first term on the right hand side of (4) represents the distortion that arises when there is a difference between the financial and commercial rates at a point in time. It is the static effect of the DRS. The second term

Let us now examine the main empirical features of the dual exchange rate regimes used by Belgium, France and Italy in the early 1970s. We start by examining the data on the monthly spread between the commercial and financial exchange rates in the three European countries during the early 1970s, where the spread is defined as the percentage difference between the two rates, $[(X_t-S_t)/S_t]100$. Figure 1 illustrates these spreads and Table 1 summarizes the key statistics on the spreads.[4]

The striking feature is the smallness of the spreads. In the European experience, spreads were generally under four percent. As we shall see later, Latin American spreads have often been in the hundreds of percent.

Figure 1 shows that the Belgian spread was generally 1% or less. In March, 1973, a spread of -2.05% emerged but lasted less than one month. Over the period May 1971 to March 1974, the mean spread was 0.04%, with a standard deviation of 0.67%. Figure 2, which shows the Belgian spread over the past twenty years, reveals that the early 1970s period was not an aberration. Over the last two decades, the mean spread has been 1.8%, with a standard deviation of 2.6%. The only big jumps in the spread occurred in 1976Q1, when the spread exceeded 10%, and between 1981Q3 and 1982Q2, when spreads of 7-11% emerged.

Figure 1 reveals that the spreads between the commercial and financial exchange rates were small for France and Italy as well. In France, for example, the mean spread over the duration of the DRS was -0.46%, with a standard deviation of 2.35%. Italy experienced somewhat larger spreads on average than its two European neighbors; spreads between 4 and 7% prevailed during eight of the fifteen months in which its system was in operation. The mean spread was consequently a bit higher, at 3.9%, with a standard deviation of 2.08%.

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[4] The complete data set is provided in the appendix.

The data yield three empirical features of the European DRS:

(E.1) Spreads between the financial and commercial exchange rates are relatively small, generally less than four percent.

(E.2) Jumps in the spread are short-lived.

(E.3) Spreads can be positive or negative, reflecting a premium or discount in financial foreign exchange.

Since the DRS distorts intertemporal behavior by means of the spread, a natural question is to ask how domestic macroeconomic policies influence the spread. The theoretical literature provides little guidance. Most descriptive models suggest that macro policies affect the spread immediately and permanently. Optimizing models suggest this influence is at most temporary or even nonexistent.

The only empirical work to date on the determinants of the spread has been Flood and Marion (1989). They found that over the periods 1963-1987 and 1963-1971, Belgian policy variables had no statistically significant effect on the Belgian spread but U.S. interest rates seemed to matter.

In order to check whether these results are robust to different time periods, specifications, and countries, we run additional tests below. We begin with Belgium. The Belgian spread is regressed on a constant, lagged spreads, Belgian government spending, Belgian money, Belgian output, the U.S. interest rate, the U.S. inflation rate and realignment dummies.

Several comments about the specification are in order. First, we are not trying to test any specific model. Hence we include determinants of the spread suggested by both

descriptive and optimizing models. Lagged spreads are included because of the serial correlation in the spread time series. Dummy variables are included to capture any effect on the spread from expected realignments of the commercial rate in the European snake arrangement or the European Monetary System (EMS). (This link has been observed by Gros, 1988). The first dummy variable takes on a value of one in any period when there was an actual devaluation of the Belgian commercial franc against the Deutschemark and a value of zero otherwise. The dummy incorporates the rational expectations view which equates expected with actual exchange-rate changes. The second (third) dummy variable takes on a value of one in any period when there was a devaluation of the French franc (Italian lira) against the DM and a value of zero otherwise. The rationale here is that when speculative pressures develop with regard to other European currencies and they are forced to adjust their parities or leave the European arrangement, speculation might spill over to the Belgian commercial franc. One piece of support for this view comes from the fact that the dramatic widening of the Belgian spread in 1976Q1 corresponded to the departure of the French franc from the snake.[5]

A second comment about the regression specification is that, where appropriate, explanatory variables are put in one-plus-growth-rate form in order to have relatively stationary processes explaining a relatively stationary spread. Moreover, if domestic policies affect the spread, optimizing models suggest they do so in part by influencing the intertemporal marginal rate of substitution which in turn may respond more to policy growth rates than to policy levels. Third, Belgian money rather than domestic credit is chosen as one of the exogenous policy variables since there is evidence that the authorities were sterilizing reserve movements during the sample period. Fourth, "foreign" variables are proxied by U.S. data. The U.S. nominal interest rate and inflation rate are entered

[5] In 1976Q1, the Belgian current account also shifted into deficit. This suggests that another way to proxy expected changes in the Belgian commercial franc would be to use current-account movements.

separately in the regression in order to have a less restrictive form for the foreign real interest rate as an explanatory variable.

The regressions are based on quarterly data. Six estimation periods are considered. The first estimation covers the entire sample period for which quarterly data on all variables are available (1963Q3 to 1989Q4). The second estimation (1963Q3 to 1987Q4) drops the last eight quarters from the complete sample on the belief that they might be contaminated by the anticipated end of the Belgian dual exchange market. The third through fifth estimations cover three subperiods which reflect different institutional practices (1963Q3-1971Q1, 1971Q2-1983Q1 and 1983Q2-1987Q4). The middle subperiod coincides with the Belgian practice of channeling capital inflows and outflows through the financial market. The first and last periods coincide with an asymmetric treatment of capital flows, with capital outflows assigned to the financial market and capital inflows free to go through either market. The last estimation covers the EMS period (1979Q1 to 1987Q4).

The results are reported in Table 2. Across estimations, the U.S. interest rate and the lagged spread appear to be significant determinants of the spread. An increase in either leads to an increase in the premium on financial foreign exchange. [6]

In most estimations at least one of the realignment dummies is also significant, suggesting that expectations of an adjustment in the Belgian commercial franc can affect the spread. In the EMS period, devaluation of the Belgian commercial franc against the DM has a positive and significant effect on the spread. Over the complete sample as well as over some of the subperiods, devaluation of the French franc against the DM has a positive and significant effect on the Belgian spread, revealing that weakness in the French

[6] Note that over the estimation period 1963Q3-1971Q1, which covers Bretton Woods, the U.S. real interest rate affects the spread via the U.S. inflation component rather than the nominal interest rate component but is significant only at a 90% confidence interval. A Dickey-Fuller test indicates that one cannot reject the hypothesis that the spread follows a random walk during this subperiod. Realignment dummies are absent since the snake and EMS came later. Note also that in the subperiod 1983Q2-1987Q4, it is the spread lagged two periods that is significant. Dum2 is absent from the regression since it is identical to dum1. The explanatory power of the regression also falls dramatically in this last subperiod.

Because the size of the spread and its evolution over time should also depend on the degree of separation of the two exchange markets, it is important to examine some of the institutional practices of the Belgian, French and Italian authorities. For instance, were all transactors permitted free access to the appropriate exchange market? Which transactions were assigned to each market? Did leakages occur?

In general, transactors were allowed free access to the appropriate exchange market in the European DRS. This was particularly true for Belgium, where current and capital account transactions were substantially free from restrictions. In France and Italy, the introduction of a DRS was not accompanied by the lifting of certain capital account restrictions, so access was not completely free. For instance, the French authorities continued to place restrictions on banking operations, borrowing abroad, and direct and portfolio investment.[8] In the Italian case, certain controls such as the 50 percent deposit on capital exports (established in July 1973) pushed some transactions to a black market for banknotes, where the black rate for dollars was even higher than the financial rate.

In all three European countries, current-account transactions were broadly channeled through the commercial exchange market and capital-account transactions through the financial exchange market. Nevertheless, the separation of the two markets was not complete, because of both officially-sanctioned and illegal leakages across markets.[9] For example, in some cases the authorities allowed a few transactions to go through either market at the agent's discretion. If speculative capital outflows led to a premium in foreign financial exchange, then some transactors wanting to sell foreign exchange for home currency could switch to the financial exchange market while other transactors who wanted to buy foreign exchange could switch to the commercial exchange market. The discretion

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[8] See the IMF's *Annual Reports on Exchange Arrangements and Exchange Restrictions*, various issues, for details.

[9] The exact classification of transactions by exchange market for each of the European countries can be found in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions.*

to switch markets thus moderated the spread. Another reason that complete separation of current-account and capital-account transactions was not strictly applied was that, in practice, it proved difficult to control certain transactions, especially those related to tourism, remittances, and profits from foreign investments. Thus the authorities sometimes required specific current-account transactions to be carried out in the financial market or capital transactions in the commercial market. In addition, the authorities sometimes reclassified certain transactions with the intent of dampening a growing spread. For example, if financial foreign exchange began to sell at a larger premium, the authorities occasionally shifted some commercial transactions in surplus at the commercial rate to the financial market. It was hoped that the net sales of foreign exchange induced by the reclassification would moderate the premium and lessen speculative activities against the commercial exchange rate.[10]

In addition to officially-sanctioned arbitrage between the two exchange markets, it was widely conjectured by central bank authorities that illegal private arbitrage activities occurred, becoming more prevalent the bigger the spread and the longer that spread persisted. Leakages, in turn, may have dampened the spread over time.

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[10] During May, 1971, a period of heightened speculation against the dollar, Belgium made important changes in the classification of transactions which resulted in almost complete separation of the commercial and financial exchange markets. Nevertheless, a small number of current transactions could be undertaken in either exchange market and individual licenses could be granted to allow certain capital account transactions through the commercial market. In addition, domestic and foreign banknotes, representing private travel expenses and so forth, could be bought and sold on the financial market. In January, 1974, outward payments of investment earnings were again permitted to be channeled through either market, thereby establishing a major link between the markets.

Under the French scheme, there was also a broad separation of commercial and financial transactions, but it was by no means complete. Some current-account items, such as travel, tourism, investment income, workers' remittances and banknote transactions, were channeled through the financial market. A few financial transactions, such as those related to commercial credits, were channeled through the commercial exchange market.

Under the Italian system, current and capital account transactions were as nearly as possible separated into the corresponding exchange markets. Nevertheless, all purchases and sales of foreign banknotes, which accounted for a substantial portion of tourist expenditures and workers' remittances, were assigned to the financial exchange market.

Because there is no available data on the extent of fraudulent leakages, the correlation between these leakages and the spread cannot yet be treated as an empirical regularity. Nevertheless, an understanding of economic incentives and testimonial support from central bank officials lends some credence to such a linkage. Lanyi (1975) provides a detailed description of how such illegal transactions can take place. As an illustration, consider the case where financial foreign exchange goes to a premium. Individuals have a bigger incentive to try to obtain foreign exchange for asset trades by going through the commercial exchange market. They can do this by falsely invoicing exports and imports. The demand for foreign exchange to finance asset purchases can be disguised by overinvoicing imports or by underinvoicing exports. In fact, Gros (1988), Bhandari and Decaluwe (1987) and others have appealed to fraudulent leakages as a rationale for the gradual reduction of a large spread created by a one-time shock to the economy. Hence leakages might help explain the empirical regularity cited earlier, namely that big spreads are short-lived. Perhaps a careful look at cross-country trade data along the lines of Bhagwati (1964) could reveal a measure of false invoicing under the DRS and whether it responds to changes in the spread.

During periods of heightened speculative activity, not only did officially-sanctioned and fraudulent leakage occur, but the authorities sometimes relieved pressure on official reserves by allowing the commercial exchange rate to float in its separate market. For instance, before August, 1971, the Belgian commercial franc was pegged to the dollar within a narrow band, but between August and December of 1971, the Belgian commercial franc floated against all currencies except the Dutch guilder. With the Smithsonian Agreement at the end of 1971, the commercial franc rate was again confined to specific margins for the dollar. During the rest of the 1970s and the 1980s, the authorities maintained a peg for the commercial franc, but not always to the dollar.[11] Under the

French DRS, the authorities initially pegged the commercial rate to the dollar and then to a group of European currencies (the "snake"). The commercial franc dropped out of the European snake in January, 1974, and the commercial franc floated from that point until March 1974, when the DRS was abolished. Under the Italian DRS, the authorities initially pegged the commercial lira to the snake currencies, but abandoned the peg on February 13, 1973, just weeks after the DRS was established. The commercial and financial lira then floated in separate markets until the DRS was abolished in March, 1974. [12]

In summary, we observe the following institutional regularities[13] concerning the European DRS:

(E.8) Private agents are granted unrestricted access to the appropriate exchange market, with some exceptions.

(E.9) Current-account transactions are channeled through the commercial exchange market and capital-account transactions through the

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[11] Belgium became a member of the European "snake" in April, 1972, thereby limiting the fluctuations in the commercial franc relative to other European members. In March, 1973, Belgium abandoned the peg against the dollar but kept the commercial franc in a narrow band with the other snake countries. In March, 1979, it joined the European Monetary System (EMS). The arrangement called for the commercial franc to move within narrow margins for EMS currencies, but allowed it to float against the dollar. The commercial franc has been adjusted periodically as part of EMS realignments, while throughout the period the financial franc has floated freely.

[12] The lack of data makes it impossible to measure the extent of foreign-exchange intervention in the financial market. In the Belgian case, it appears that neither systematic intervention over the long run nor large-scale short-run intervention occurred in the financial exchange market. (See Bindert, 1979). The main reason given by the Belgian authorities for not intervening in the financial market was that such intervention could have a destabilizing effect on expectations. The lack of data also makes it impossible to assess the extent of intervention by the French and Italian authorities in their financial exchange markets. The general view is that there was little or no management of the financial exchange rate, at least via direct foreign-exchange intervention. More indirect ways of influencing the rate, such as changing the mix of transactions going through the financial market, altering quantitative controls or encouraging public sector borrowing/lending through the financial market, were attempted.

[13] Statements (5) - (7) are not empirical regularities in the sense of describing correlations in the data, but can be thought of as institutional regularities.

coefficients, β_2 and β_3, are significant. However, they are approximately equal in val but opposite in sign to the β_0 and β_1 coefficients, respectively. As a result, the net coefficient on the foreign interest rate becomes much closer to zero under the DRS. (β $\beta_3 = 0.088$). The Belgian DRS thus provided little insulation from foreign interest rat disturbances during this turbulent period.

For France, the regression is run for the period June 5, 1970 to March 15, 1974 on-shore rates are not available before mid-1970. We find that the coefficients β_0 and are not significantly differe.nt from zero. These results suggest that in the period befor DRS, French on-shore and off-shore rates were similar and that on-shore rates were insulated from foreign interest rate changes. Recall that during this period France oper the *devise titre* where a second exchange rate applied to resident transactions in foreign securities. The adoption of a full-fledged DRS does not seem to have mattered for inte rates. Both dummy coefficients are insignificant. The insignificance of the slope dur coefficient, β_3, suggests that the French DRS failed to insulate domestic interest rates changes in Eurodollar rates.

For Italy, also, the adoption of the DRS did not buy additional insulation from foreign interest rate disturbances. In the period without the DRS, the coefficients β_0 β_1 are significantly different from zero. This suggests that capital controls already in p created a wedge between the Italian on-shore and off-shore rates and provided some insulation from foreign interest rate disturbances. The dummy coefficients are not significantly different from zero. The insignificance of β_3 implies that the operation of DRS added nothing to the insulating power of existing controls.[14]

In summary, these preliminary tests lend some support to the view that:

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[14] The results reported in Table 4 have been corrected for first-order serial correlation. Similar results obtained for each country using ordinary least squares and adding a lagged dependent variable on the rig hand-side of the equation. Similar results were also achieved by running regressions in interest rate l rather than in logs.

(E.11) The DRS provides little insulation of domestic interest rates from foreign interest rate disturbances.

Another motive for adopting a DRS is the desire to insulate official reserves from speculative capital flows. The European DRS, by creating a fluctuating exchange rate for capital-account transactions, was designed to remove some pressure from official reserves caused by large shifts in capital flows. Nevertheless, this does not mean that official reserves are fully protected against speculative forces. Trade financing (a capital-account item included in the commercial exchange market) could potentially be an important vehicle for speculating against the commercial rate. Lanyi (1975, p. 719) writes:

" 'Leads and lags' in the settlement of commercial claims, or variations in the initial terms of commercial financing, are believed to have been responsible for a large proportion of the short-term capital movements occurring during the foreign exchange crises of recent years. Thus, so long as trade financing remains in the official market, the dual exchange market cannot effectively act as a buffer for official reserves against speculative forces. However, a separation of trade financing from the exchange market for current transactions would not only be extremely difficult to administer but would also eliminate an important advantage of separate exchange markets---namely, that they shield current account transactions from the exchange rate fluctuations caused by capital movements."

In order to see if there is any empirical support for this claim, we examine the value of short-term trade credits as a percent of total short-term capital transactions by the private non-bank sector. According to Giavazzi and Giovannini (1989), during periods of heightened speculative activity, the bulk of short-term capital will flow in and out through the financial market when there are no capital controls but may occur through trade credits when capital controls are in place. In Table 5, we report some evidence on the importance of trade credits as a vehicle for moving capital in and out of a country during the 1970-75

period. Since only France and Italy provide disaggregated trade credit figures in their balance-of-payments accounts, Table 5 displays the data for just those two countries.

The data are somewhat difficult to interpret. For France, when pressures mount in 1971 in favor of the franc, short-term capital seems to move mostly through the financial market rather than through changes in trade credits. Short-term capital inflows as a share of trade rise from 3.8% in 1970 to 5.4% during 1971, while trade credits as a share of short-term capital inflows fall from 41.6% to 18.2%. Of course, the DRS was not adopted until August of 1971, so trade credits may have become a more important channel for speculative activity in the latter part of the year. When pressures mount again in 1973, this time against the franc, trade credits seem to be a more important channel. Trade credits as a share of short-term capital outflows rise from 73.7% in 1972 to 92.4% during 1973 while capital outflows as a share of trade fall from 1.9% to 1.3%.

The Italian data provide some additional insights into the vehicles for speculative activity under the DRS. Rising pressure against the lira brought about the adoption of a DRS in January, 1973, yet for the year 1973 the bulk of short-term capital seems to move through the financial market rather than through changes in trade credits. Trade credits as a share of capital outflows fall from 34% in 1972 to only 7.7% during 1973, while capital outflows as a fraction of total trade rise from 22.9% to 40.2%. The drop in the share of trade credits may be due in part to regulations imposed by the authorities on leads and lags. Worried about capital outflows via trade financing, the Italian central bank shortened the maturity of export credits and limited the possibility of pre-paying imports.

Based on the French and Italian data, we tentatively conclude:

(E.12) The DRS cannot fully insulate official reserves from speculative activity. Trade financing becomes a vehicle for moving capital in and out of the country unless additional regulations on leads and lags are imposed.

II. Latin American dual rates in the 1980s

The use of multiple exchange rates by Latin American countries has a long history and has been widespread. In the 1980s, there were at least nine episodes in which countries adopted two separate exchange markets and assigned a broad set of transactions to each.

In this section we present some of the stylized facts about dual exchange markets in Argentina 1981, Argentina 1982, Bolivia 1982, Costa Rica 1981-83, the Dominican Republic 1982-85, El Salvador 1982-86, Guatemala 1984-88, Jamaica 1982-83 and Mexico 1982-88.

We start by examining the spreads between the two officially-recognized exchange rates for these episodes. (As will become clear later, we shall call the two rates the principal rate and the secondary rate rather than the commercial rate and the financial rate.) Graphs of these spreads are presented in Figures 3-11 and the key statistics are displayed in Table 6.

Whereas the spreads in the European episodes are quite small, usually in the 1-4% range, the Latin American spreads are large and variable. In all the episodes spreads in excess of 50% appeared, and in four out of the nine episodes (Bolivia, Dominican Republic, Guatemala and Mexico), spreads exceeded 100% at times. Bolivia experienced spreads above 500% and Guatemala experienced spreads above 200%. Mexico and Costa Rica had relatively small spreads by Latin American standards, but even they had average spreads way in excess of the European episodes. Mexico's mean spread between 1982 and 1988 was 15% and Costa Rica's was almost 19%.

The following observations can thus be made at the outset:

(LA.1) Spreads between the principal and secondary exchange rates are large and variable. In Latin America, spreads often exceed fifty percent and are sometimes in the hundreds of percent.

(LA.2) Large spreads can be persistent.

(LA.3) Spreads are almost always positive, reflecting a premium for secondary foreign exchange.

The magnitude of these spreads raises a puzzling question: if the Latin American DRS is like the European DRS, why are the Latin American spreads so much bigger? Careful research on the institutional features and operation of the Latin American episodes is needed in order to untangle the puzzle. While such an undertaking is beyond the scope of this paper, several hypotheses come to mind. First, the wider spreads could be due to the fact that in most Latin American countries, access to both foreign exchange markets is controlled so that leakages have limited ability to affect the spread. The IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* indicates that in many cases, purchases of foreign exchange for both commercial and financial transactions are subject to the prior approval of the Central Bank. The fact that the black rate often deviates substantially from the two officially-recognized exchange rates is also an indicator of controlled access to the legal exchange markets. Second, the secondary exchange rate could be heavily managed by Latin American central banks. Figures 12-20 show that in some cases, both the principal and the secondary exchange rates were pegged by the authorities. In those circumstances, the spread can be any size the authorities choose. Third, the segmentation of the foreign exchange market in the Latin American cases is often different. Specifically, the balance of transactions assigned to the secondary exchange market is in

large deficit at an exchange rate close to the principal rate. Fourth, the spreads in Latin America could be larger because of one-sided uncertainty. The risk of holding domestic currency could be so high that there are insufficient inflows of foreign exchange to reduce the premium on financial foreign exchange. Fifth, the nature of the disturbances or the nature of the disequilibrium facing the Latin American countries could be different. The Europeans faced speculative pressures due to the relatively expansionary monetary and fiscal policies pursued by the U.S. The pressures abated when the Europeans abandoned the dollar peg. The Latin American countries generally face speculative pressures due to the relatively expansionary monetary and fiscal policies pursued domestically. These pressures may be reduced by the eventual devaluation of the home currency against the dollar, but the underlying disequilibrium is rarely eliminated.

Whatever the story turns out to be, the fact remains that the spread between the two exchange rates can be a hundred times greater in the Latin American episodes than the European ones. Moreover, there are distinguishing features surrounding the Latin American spreads:

(LA.4) The principal rate is usually pegged; the secondary rate is often pegged or managed.

(LA.5) The black market rate for dollars is equal to or greater than the secondary rate for dollars.

(LA.6) Access to both the principal and secondary exchange markets is generally restricted.

It would be a useful exercise to check whether the Latin American spreads are determined by the same set of factors that influence the European spreads. Unfortunately,

the limited duration of the DRS in most Latin American countries means that the data will be contaminated by agents' beliefs about the possible exchange-rate arrangements to follow. We sidestep this problem somewhat by focusing on the spread for the Dominican Republic.

The Dominican Republic operated a DRS from the late 1960s to January, 1985, although its DRS functioned on a *de jure* basis only after August, 1982, when commercial banks were authorized to deal in the secondary market.[15] The segmentation of the foreign exchange market was such that most financial transactions as well as many imports of merchandise and invisibles were channeled through the secondary market. Spreads were generally small, 10% or less, until 1974, but rose to about 45% by 1982. Over the first three quarters of 1983, the spread averaged about 55%. By the end of 1983 the spread had jumped to over 80%. In 1984, pressure from the IMF to reunify the foreign exchange market along with a government move to shift all imports to the secondary market increased expectations that the DRS would be abolished. In early 1984, the spread jumped to over 180%, and by the end of 1984, just three weeks prior to the abolition of the DRS, the spread was about 200%.

In order to test whether the determinants of the Dominican Republican spread are similar to those of the European spreads, we use quarterly data to regress the Dominican Republican spread on lagged spreads, the U.S. real interest rate disaggregated into its nominal interest rate and inflation components, and on Dominican Republican fiscal and monetary policy variables. Output data is not available on a quarterly basis.

Since the data is increasingly contaminated by the anticipated end of the DRS and the uncertainty about the foreign-exchange regime to follow, we drop the last five quarters of the DRS period. Estimating over this truncated sample means that we are not able to test whether the spread responds to an expected devaluation of the official rate since no formal

[15] This authorization was removed in November,1983, though certain exchange banks were permitted to continue operations in the secondary market.

devaluation occurred until the DRS was abolished. However, we are able to test whether the spread responds to foreign interest rates and domestic macro policies.

The results are reported in Table 7. Only the coefficients on the lagged spreads are significantly different from zero. Neither the U.S. interest rate nor domestic policy variables appear to influence the spread.[16] An F-test to check whether the *real* U.S. interest rate is a significant determinant failed to reject the null that the U.S. nominal interest rate and the U.S. inflation rate jointly do not predict the spread. Another F-test failed to reject the null that Dominican Republican fiscal and monetary variables jointly do not predict the spread. The results are similar when the estimation is redone over each half of the sample period. Those regressions are also reported in Table 7. More work, both theoretical and empirical in nature, is required to identify key determinants of the Dominican Republican spread and to see if they can explain the other Latin American spreads as well.

Based on our tests using Dominican Republican data, we conclude:

(LA.7) Unlike the European experience, the exchange-rate spread in the Dominican Republic is unaffected by foreign interest rate changes.

As mentioned previously, a sharp difference between the Latin American and European DRS concerns the assignment of transactions to the two exchange markets.[17] This point deserves further elaboration. Table 8 highlights the assignment of transactions by exchange market. We observe that the classification is not along commercial-financial

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[16] The regression results for the long sample period can be rewritten in first differences:

$$\Delta spr_t = 0.194 + .3\Delta spr_{t-1} \quad \text{where} \quad \Delta spr_t = spr_t - spr_{t-1}.$$

Hence the change in the spread this period is positively related to the change in the spread last period.

[17] There have been many Latin American experiments with dual rates where the secondary rate has applied to one type of transaction, such as debt service repayments or tourist expenditures. Such cases are not considered here. The nine episodes selected contain a broader set of transactions in each exchange market.

lines. Hence we refrain from using the terminology "commercial" exchange market and "financial" exchange market. Granted, the European authorities likewise did not have a strict separation along commercial-financial lines, but it was broadly so. The same cannot be said for the Latin American cases.

Turning to Table 8, we see that during Argentina 1981 and Argentina 1982, imports, most exports and amortization payments on foreign loans were channeled through the principal exchange market and everything else went through the secondary market. Yet in both episodes, a time-varying mixed rate was quickly established which specified that a percentage of export receipts and import payments had to be settled in the secondary market.

In Bolivia, only wheat imports and public debt servicing went through the principal market, so that most trade and financial transactions were together in the secondary market. Costa Rica initially channeled specified imports, most exports and certain debt repayments through the principal exchange market. Eventually, however, most imports were channeled through the secondary market.

In the Dominican Republic under the *de jure* DRS of the early 1980s, only certain approved imports and capital transactions went through the principal market, so once again, most trade and financial transactions were grouped together in the secondary market. El Salvador and Guatemala had a mixed rate where a time-varying percentage of trade was assigned to the secondary exchange market. Jamaica used the principal exchange market only for essential imports (food) and traditional exports (bauxite) and for debt-related transactions, so again, a number of trade and financial transactions were handled together in the secondary market. Mexico used its principal exchange market for merchandise export receipts in excess of a certain amount, for authorized imports and for repayments of principal and interest on foreign-currency loans held by the public and private sectors. Everything else was channeled through the secondary market.

With respect to the Latin American cases, we conclude:

(LA.8) In no case are current-account transactions broadly channeled through the principal exchange market and capital-account transactions through the secondary market.

The fact that the separation is less between trade and financial transactions than between various kinds of trade transactions leads one to suspect that the Latin American regimes are more like the multiple exchange-rate regimes of many developing countries than like the European dual exchange markets. The two exchange rates essentially create a tax-subsidy scheme for certain targeted commercial transactions and create more of a goods-market distortion than an intertemporal distortion in consumption-savings behavior. This view is reinforced by two further observations found in Table 9: (1) more than two rates or mixed rates for trade were adopted in each case, and (2) the spread was not the only means of influencing capital flows; quantitative controls on capital transactions continued to operate for the duration of the DRS in most cases and domestic interest rates were usually set by the authorities and enforced through credit rationing.

Another issue raised by Table 9 is that in all cases, the use of the DRS was not a substitute for eventual devaluation of the home currency. This raises the question of whether the motive for adopting the DRS wasn't somewhat different in Latin America.

Recall that the Europeans used the DRS in the early 1970s in order to limit the impact of massive short term capital movements as the world moved from fixed to flexible exchange rates. In the Latin American episodes, the evidence suggests that dual exchange rates were designed to delay an across-the-board devaluation of the currency.

Figures 12-20 illustrate the behavior of three exchange rates during the operation of the Latin American DRS: the principal rate, the secondary rate, and the black rate (all denominated in terms of home currency/ U.S. $). In all cases, the adoption of the DRS generated a premium for the dollar on the secondary market. Consequently, transactions

assigned to this market were essentially devalued at adoption. The principal rate was also devalued at the outset about half of the time.

Over the duration of the DRS, transactions were often reclassified and assigned to the secondary market. Hence there was a devaluation for these transactions as well. Table 9 indicates that in seven of the nine episodes, some transactions were reclassified in this way. The two episodes exempt from reclassification were of relatively short duration, Argentina 1981 (6 months) and Bolivia (7 months).

Perhaps the most striking evidence that the Latin American DRS was a means to delay devaluation is that in all cases, abolition of the DRS was accompanied by a devaluation of the principal rate, often to a level corresponding to the previous secondary rate. These devaluations can be seen in Figures 12-20 and are recorded in Table 9. In summary:

(LA.9) The DRS is always supplemented by additional exchange rates or mixed rates; quantitative controls on capital-account transactions are usually maintained.

(LA.10) Adoption of the DRS is accompanied by a devaluation of the home currency in the principal market about half the time; abolition of the DRS is always accompanied by a devaluation of the home currency.

III. Conclusion

While the European experience with dual exchange markets has been commented on by numerous authors, there has been no attempt to put together a set of correlations in the data for that period. Section I attempts to fill that gap by developing some of the empirical regularities surrounding the European dual exchange market of the early 1970s. We

examined the behavior the the spread between the commercial and financial exchange rates since its level and evolution generate the intertemporal distortion which influences international capital flows. We showed that the spread has generally been quite small, that it is generally unaffected by domestic policy changes but sensitive to foreign interest rate disturbances. The spread is also influenced by officially-sanctioned as well as illegal leakages across the two exchange markets, and these leakages change the nature of the distortion created by the dual exchange market. We also showed that the dual exchange market was best suited to handle temporary disturbances, that it provided only modest insulation of domestic interest rates, and that it could not fully insulate official reserves from speculative activity.

In Section II, we emphasized some of the institutional features of the more recent Latin American dual exchange markets. There we focused on the huge spreads between the principal and secondary exchange rates, the sorts of transactions channeled to each exchange market, and the fact that a devaluation of the home currency often accompanies and always follows the use of the dual exchange market. We also provided some preliminary evidence that the Latin American and European spreads may be explained by different factors. More research is needed in order to develop a comprehensive set of empirical regularities for the Latin American episodes. Nevertheless, the differences uncovered here should make one cautious about applying the lessons from the European experience to the Latin American ones. Latin American dual exchange markets seem to be adopted for different reasons, administered in a different fashion, and to have generated a different type of distortion.

Until we have a deeper understanding of the Latin American regimes, it would be unwise to apply the models based on the European experience to the Latin American episodes. It may be that the financial models developed to understand the European experience, with their emphasis on money-market equilibrium, the distortion in the intertemporal marginal rate of substitution and the insulation of the domestic interest rate,

are inappropriate for Latin America. Instead, real models which incorporate elements of both tariffs and quotas may be required to capture the nature of a distortion which appears to be more of a goods-market one than an asset-market one.

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TABLE 1

Spreads (%) [1]

	Belgium[2]	France[3]	Italy[4]
MEAN	0.04	-0.46	3.90
MAXIMUM	1.27	5.03	7.48
MINIMUM	-2.05	-5.54	0.76
ST. DEVIATION	0.67	2.35	2.08

[1] The spread is defined as [(X - S)/S]*100 where X is the financial exchange rate and S is the commercial rate. Rates are expressed as domestic currency/U.S.S. Calculations are based on monthly data and are period averages for Belgium and Italy and end of period observations for France.

[2] For the period May 1971 - March 1974. Source: IMF *International Financial Statistics* Tape.

[3] For the period August 1971 - March 1974. Source: Central Bank of France.

[4] For the period January 1973 - March 1974. Source: Central Bank of Italy.

TABLE 2
Dependent Variable: Belgian spread
Six Sample Periods

variable	(1)	(2)	(3)	(4)	(5)	(6)
constant	.6431	.7029	-.3746	1.0813	1.0438	.6424
	(4.05)	(4.14)	(-.75)	(4.02)	(4.79)	(3.28)
sprL1	.6608	.6516	.9814	.5245	.2278	.8366
	(6.90)	(6.58)	(5.23)	(4.03)	(1.32)	(5.35)
sprL2	-.0690	-.0841	-.3782	-.0595	-.3557	-.2635
	(-.75)	(-.88)	(-1.71)	(-.48)	(-2.21)	(-1.94)
int	.0022	.0024	.0011	.0036	.0022	.0033
	(3.61)	(3.74)	(.47)	(3.88)	(2.22)	(3.63)
infla	-.2482	-.2800	.6256	-.6059	.1806	-.2236
	(-2.40)	(-2.58)	(1.88)	(-3.66)	(1.14)	(-1.42)
dum1	-.0044	-.0042	---	-.0025	.0112	.0189
	(-.60)	(-.56)		(-.27)	(1.19)	(3.00)
dum2	.0325	.0331	---	.0393	---	---
	(3.85)	(3.78)		(3.73)		
dum3	-.0135	-.0150	---	-.0219	-.0067	---
	(-1.70)	(-1.82)		(-1.92)	(-.87)	
gov	-.0060	-.0060	-.0223	-.0072	.0007	-.0078
	(-.83)	(-.74)	(-1.07)	(-.53)	(.13)	(-.95)
mon	-.0644	-.0754	.0187	-.0891	-.0553	-.0826
	(-2.05)	(-2.20)	(.38)	(-1.59)	(-1.76)	(-2.10)
out	.0776	.0850	.1445	.1516	-.0472	.0775
	(1.35)	(1.39)	(1.10)	(1.47)	(-1.08)	(1.20)
adj R^2	.64	.64	.70	.70	.13	.83

T-statistics are in parentheses. Data is quarterly. Six sample periods are chosen. Equation (1) runs for 63:3-89:4, (2) for 63:3-87:4, (3) for 63:3-71:1, (4) for 71:2-83:1, (5) for 83:2-87:4, and (6) for 79:1-87:4. The dependent variable is the spread X/S (actually one plus the spread). SprL1 and sprL2 are the spreads lagged one period and two periods, respectively. Int is the 3-month U.S. Treasury bill rate. Infla is P^*_t/P^*_{t-1}, where P^* is the U.S. wholesale price index. Dum1, dum2 and dum3 are dummy variables taking on a value of one in periods when there was a devaluation of the Belgian franc, the French franc or the Italian lira, respectively, against the DM under the snake or EMS and zero otherwise. Gov is one plus the growth rate of Belgian government expenditures deflated by the Belgian CPI, mon is one plus the growth rate of nominal Belgian money, and output is one plus the growth rate of Belgian industrial production. Data are taken from the IMF's *International Financial Statistics* tape.

TABLE 3

Dependent Variable: France-Italy Spread (71:9-74:3)

Variable	(1)	(2)
constant	.7593 (4.03)	.5278 (2.30)
sprL1	.5870 (4.82)	.6531 (4.72)
int	.0056 (3.23)	.0041 (2.16)
infla	-.2534 (-1.85)	-.1173 (-0.63)
dum	-.0029 (-.39)	-.0014 (-0.16)
mon	-.1218 (-2.01)	-.0856 (-1.35)
country dum	.0104 (1.82)	-----
adj R^2	.8097	.7201

T-statistics are in parentheses. Data is monthly. Equation (1) is run on pooled data for France and Italy over the entire sample period. Equation (2) is run on French data only. For most variable definitions, see Table 2. The variable dum is a dummy variable which takes on a value of one when there is a devaluation of the domestic currency against the DM and a value of zero otherwise. The country dummy variable takes on a value of one for Italy and a value of zero for France. Data source: IMF's *International Financial Statistics* tape.

TABLE 4

Interest Rate Insulation

Dependent Variable: $\ln[(1 + i^f)/(1+i^n)]$

Weekly Data: Jan 67-Mar 74 (Belgium), Jun 70-Mar 74 (France and Italy)

Variable	Belgium (1)	France (2)	Italy (3)
Constant	-0.028	-0.026	-0.083
	(-2.73)	(-1.17)	(-2.35)
$\ln(1 + i^*)$	0.391	0.474	1.516
	(3.65)	(1.51)	(2.64)
dum	0.023	0.007	0.048
	(2.23)	(0.31)	(0.78)
dum * $\ln(1 + i^*)$	-0.303	-0.305	-0.756
	(-2.14)	(-0.89)	(-0.92)
adjusted R^2	0.038	0.032	0.072

T-statistics are in parentheses. Reported results have been corrected for serial correlation. The off-shore rate, i^f, is the Friday Eurocurrency rate in London for 3-month deposits in Belgian francs, French francs or Italian lira. The on-shore rate, i^n, is the Friday rate on 3-month Treasury Bills in Belgium, France or Italy. The foreign interest rate, i^*, is the Friday Eurocurrency rate in London for 3-month dollar deposits. The term dum takes on a value of one when the DRS is in effect and zero otherwise. For Belgium, the dummy takes on a value of one when the strengthened-rules version of the DRS is in effect (May 14, 1971-March 15, 1974).

Data source: Harris Bank *Foreign Exchange Weekly Review*

TABLE 5

Trade Credits as Speculative Capital Movements

Dates	1970	1971	1972	1973	1974	1975
France						
Credits/Inflows 1	41.6	18.2	41.6	42.6	47.6	---
Credits/Outflows	77.5	28.9	73.7	92.4	72.0	---
Inflows/Trade 2	3.8	5.4	2.8	4.1	5.0	
Outflows/Trade	2.0	2.7	1.9	1.3	2.7	
Italy 3						
Credits/Inflows	20.1	24.8	17.3	6.9	51.0	76.4
Credits/Outflows	33.1	28.6	34.0	7.7	53.8	74.4
Inflows/Trade	17.0	18.6	16.6	46.4	37.3	28.7
Outflows/Trade	17.9	20.6	22.9	40.2	33.8	30.0

1. Short-term trade credits (liabilities to foreigners) as a percent of total short-term capital inflows by the private non-bank sector and short-term trade credits (claims on foreigners) as a percent of total short-term capital outflows by the private non-bank sector.
2. Short-term private capital inflows as a share of imports plus exports.
3. Separate data for short-term capital flows not available. Shares based on all capital transactions, both short and long-term. Share of trade credits is underestimated.

Note: French DRS operated between August 1971 and March 1974. Italian DRS operated between January 1973 and March 1974.

Sources: *Balance des Paiements entre La France et L'Exterieur*, Direction du Tresor; *Bolletino Statistics*, Banca d'Italia.

TABLE 6

LATIN AMERICAN DUAL RATE SYSTEM IN THE 80'S (SPREADS %)[1]

COUNTRY	MAXIMUM	MEAN	MINIMUM	ST.DEVIATION
ARG. 81	57.21	44.33	32.08	8.21
ARG. 82	79.72	48.50	19.92	26.29
BOLIVIA	524.01	289.79	84.70	167.34
COSTA RICA	76.51	18.78	-4.59	17.13
DOMINICAN[2] REPUBLIC	113.33	69.73	48.58	17.53
EL SALVADOR	93.2	62.99	43.00	12.20
GUATEMALA[3]	280.00	80.50	0.40	96.44
JAMAICA	66.15	57.90	52.12	5.87
MEXICO[4]	108.79	15.14	-1.26	18.54

[1]Based on end of month observations, except for El Salvador where the data is based on monthly averages.
[2]Based on data between August 1982 and December 1984, when the DRS operated *de jure*.
[3]Based on data between November 1984 and de facto reunification in June 1988.
[4]Based on data between August 1982 and February 1988.

Data source: IMF's *International Financial Statistics* and various central bank publications.

TABLE 7

Dependent variable: spr (Dominican Republic)

	Equations		
variable	(1)	(2)	(3)
constant	.1947	.0734	.5367
	(.9469)	(.3648)	(.9171)
sprL1	1.3297	1.4573	1.1997
	(9.7272)	(5.9072)	(5.5373)
sprL2	-.3133	-.5227	-.1734
	(-2.1373)	(-1.9616)	(-.7591)
int	.0017	-.0006	.0019
	(1.7058)	(-.3441)	(1.1884)
infla	-.2033	-.0074	-.5132
	(-1.1363)	(-.0525)	(-1.0003)
gov	-.0172	-.0071	-.0448
	(-.9886)	(-.4816)	(-1.1170)
mon	.0029	.0205	-.0091
	(.0955)	(.6667)	(-0.1613)
adj R^2	.97	.86	.95

T-statistics are in parentheses. Data is quarterly. Equation (1) run over the period 70:1 to 83:3, equation (2) run over the first half of the sample, 70:1 to 76:4, and equation (3) runs over the second half of the sample, 77:1 to 83:3. Spr is the spread X/S. SprL1 and sprL2 are the spreads lagged one period and two periods, respectively. Int is the 3-month U.S. Treasury bill rate. Infla if P^*_t/P^*_{t-1}, where P^* is the U.S. wholesale price index. Gov is one plus the growth rate of Dominican Republican government expenditures deflated by the Dominican Republican CPI and mon is one plus the growth rate of nominal domestic money.

Results are unchanged when domestic credit is used as the monetary policy variable instead of the money base. Third and fourth quarter lags of the spread are insignificant in all cases. Data are taken from the IMF's *International Financial Statistics* tape.

TABLE 8

DIVISION OF FOREIGN EXCHANGE MARKET

COUNTRY	PRINCIPAL MARKET	SECONDARY MARKET
ARGENTINA 1981	Imports, most exports, amortization payments on foreign loans (Mixed rate for trade[1])	All else
ARGENTINA 1982	Imports, exports (Mixed rate for trade)	All else
BOLIVIA	Wheat imports, public debt service payments	All else
COSTA RICA (as of May 1983)	Payments of external debt service, imports of certain essential commodities, 40% of private sector debt service payments, 99% of export proceeds, 100% of official capital inflows	All else, including most imports
DOMINICAN REP. (as of Dec. 1984)	Debt repayments, oil imports, specified imports	All else
EL SALVADOR (as of Dec. 1984)	70% of export proceeds, 60% of import payments	All else
(as of late 1985)	Proceeds from coffee and sugar exports, inflows of foreign loans to public sector and the banking system,some specified imports such as fuel and medicine, interest and amortization payments of the public sector and banking system	Imports of consumer goods, imports of most inputs and invisibles, some traditional exports, most proceeds from nontraditional exports of goods and services, private capital inflows, authorized capital outflows
GUATEMALA (as of 1984)	Most export receipts, proceeds from foreign borrowing, external public debt payments, certain private debt payments all official transactions, essential imports (Market handles about 55% of exports and 35% of imports.) Mixed export rate in effect.	All else
GUATEMALA (as of June 1986)	Exports, imports, most capital transactions	Remittances, tourism, low-priority imports
JAMAICA	Essential imports, traditional exports,specified invisibles, exports to CARICOM countries	All else
MEXICO (as of Aug.82)	Priority imports, petroleum export proceeds, foreign debt payments	All else
(as of Dec. 82)	Merchandise export proceeds, foreign debt repayments including principal and interest, specified impon payments	All else

[1] Mixed rate means that a set percentage of the transactions goes through the principal market and the remainder through the secondary market.

TABLE 9

DESCRIPTIVE FEATURES OF THE LATIN AMERICAN DRS IN THE 1980'S

FEATURE	ARG.81	ARG 82	BOLIVIA	COSTA RICA	DOM.REP	EL SAL	GUATEMALA	JAMAICA	MEXICO
Adoption date	6/22/81	7/6/82	3/24/82	3/9/81	8/24/82	8/9/82	11/16/84	1/10/83	8/5/82
Reunification date	12/24/81	10/30/82	11/5/82	11/11/83	1/23/85	1/22/86	6/23/88	11/24/83	2/ /88
Duration (months)	6	4	7	32	29	41	43	10	66
Pre-DRS regime	crawl	controlled float	$peg	$peg	$peg	$peg	$peg	$peg	controlled float
Post-DRS regime	controlled float	controlled float	$peg	$peg	controlled float	$peg	$peg	$peg (1 month) controlled float	controlled float
Price on secondary foreign exchange market	premium	premium	premium	premium (brief discount)	premium	premium	premium	premium	premium (brief discount)
Devaluation of home currency in principal mkt.									
at adoption	yes	yes	no	yes	no	no	no	no	yes
during DRS	yes	yes	no	yes	no	no	yes	no	yes
at reunification	yes	yes	yes	yes	yes	yes	yes	yes	yes
Use of additional exchange rates or mixed rates	mixed	mixed	mixed	additional and mixed	additional	mixed	additional and mixed	additional	additional
Use of additional controls on capital	yes	yes	yes	yes	yes	yes	few	yes	few
Reclassification of transactions during DRS	no	yes	no	yes	yes	yes	yes	yes	yes
Size of spread in month preceeding reunification (%)	38	20	384	3.6	206	93	3.6	66	2
Management of principal rate	controlled float (mini deval.)	controlled float (mini deval.)	peg	peg then float	peg	peg	peg	peg	controlled float (mini deval.)
Management of secondary rate	free	free, peg	free	managed, peg	controlled float	managed, peg	free, controlled float	free, peg	free, crawl

FIGURE 1: European Spreads (Percentage)

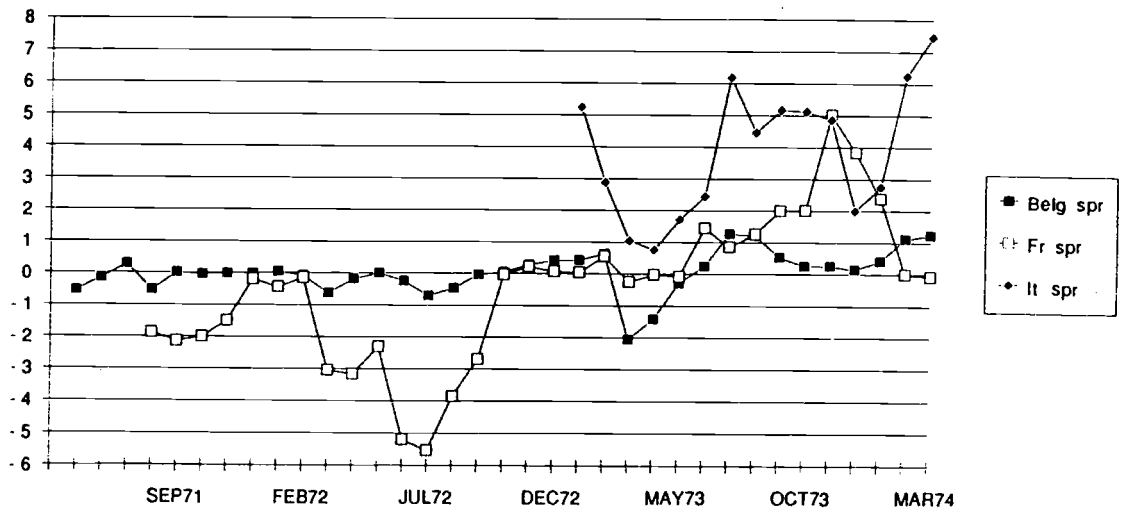


FIGURE 2

QUARTERLY SPREAD OF THE PERIOD AVERAGE DATA (BELGIUM)

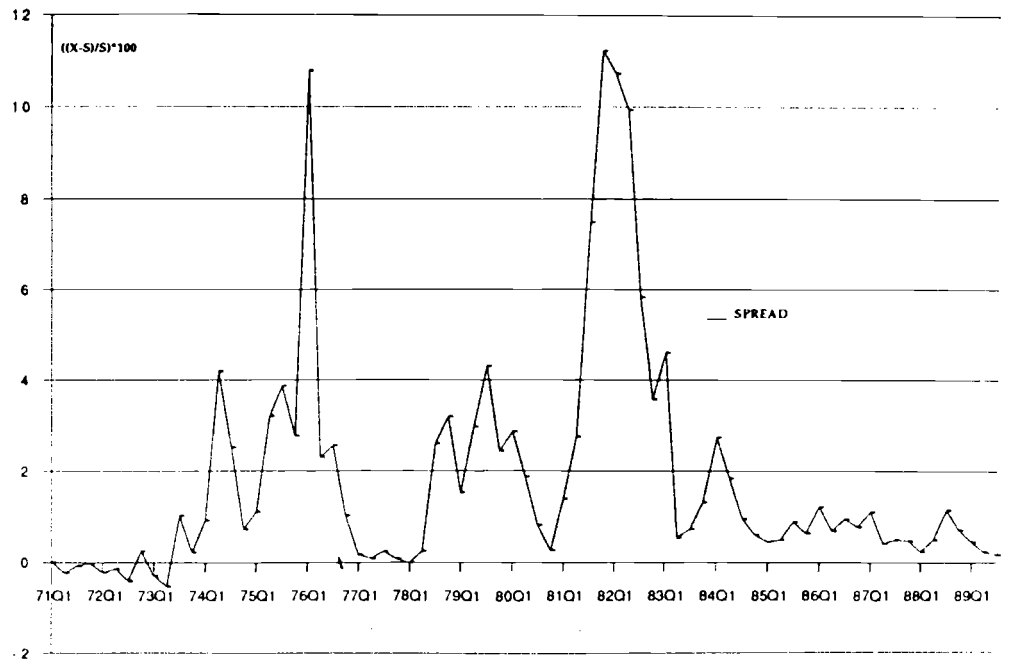


FIGURE 3

Argentina '81 spread [(x-s)/s]*100

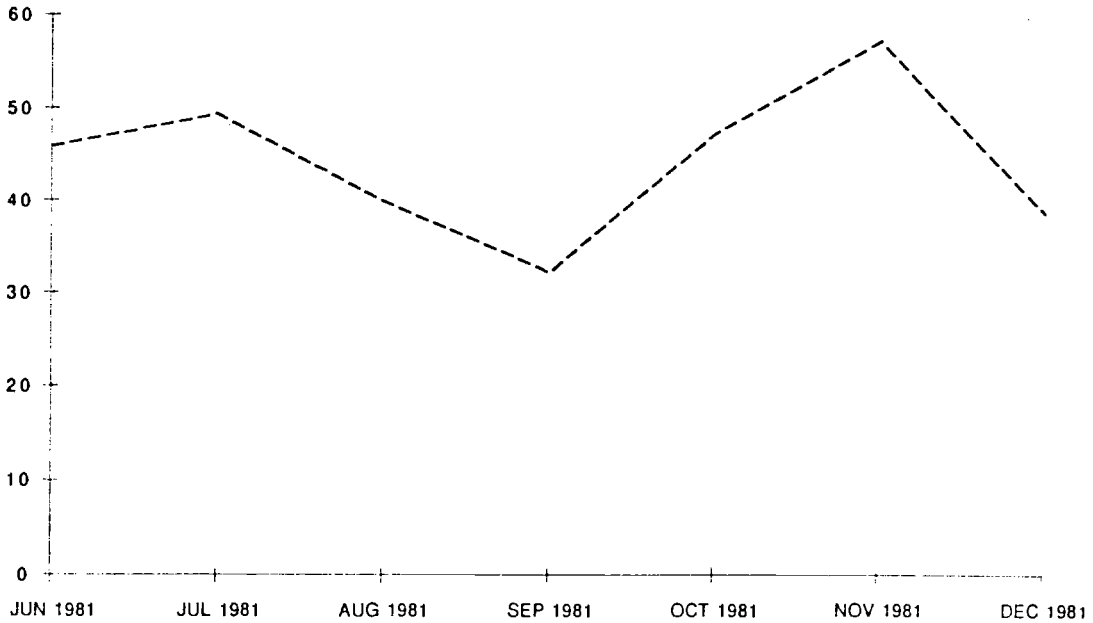


FIGURE 4

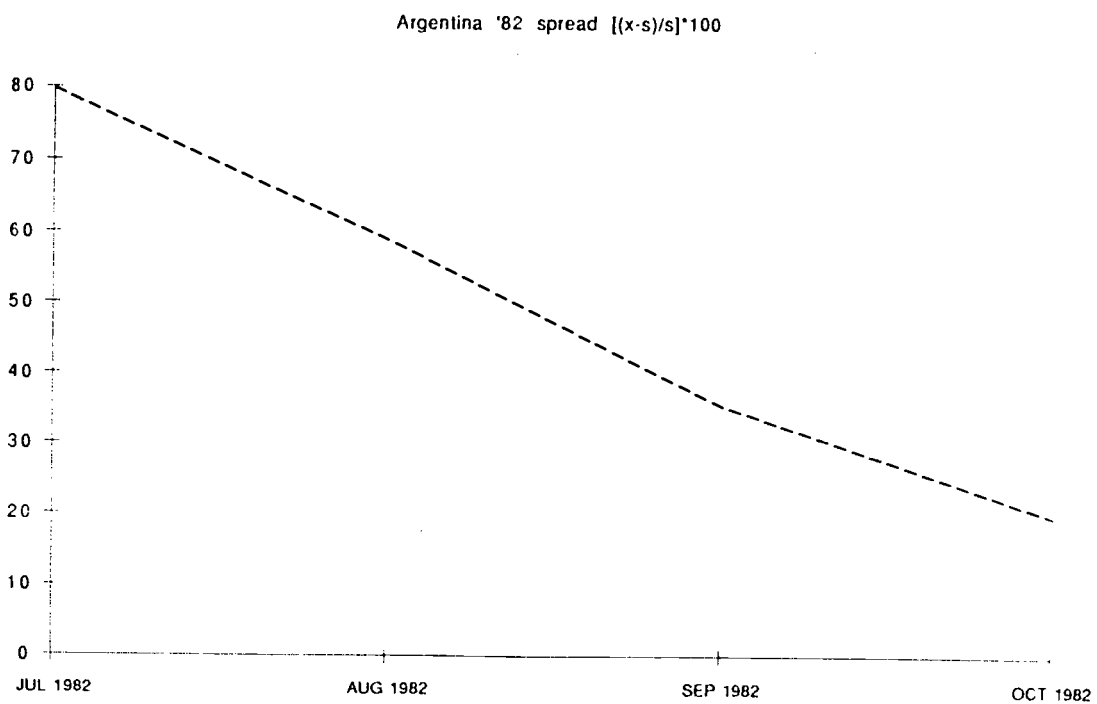

Argentina '82 spread [(x-s)/s]*100
80
70
60
50
40
30
20
10
0
JUL 1982
AUG 1982
SEP 1982
OCT 1982

FIGURE 5

Bolivia spread [(x-s)/s]*100

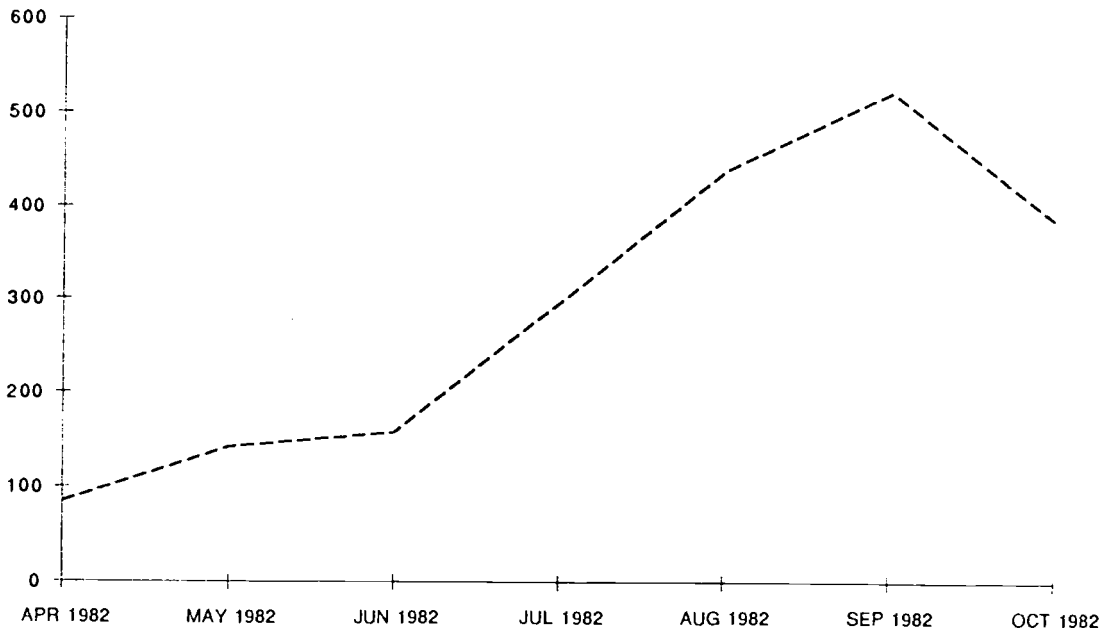


FIGURE 6

Costa Rica '81 spread [(x-s)/s]*100

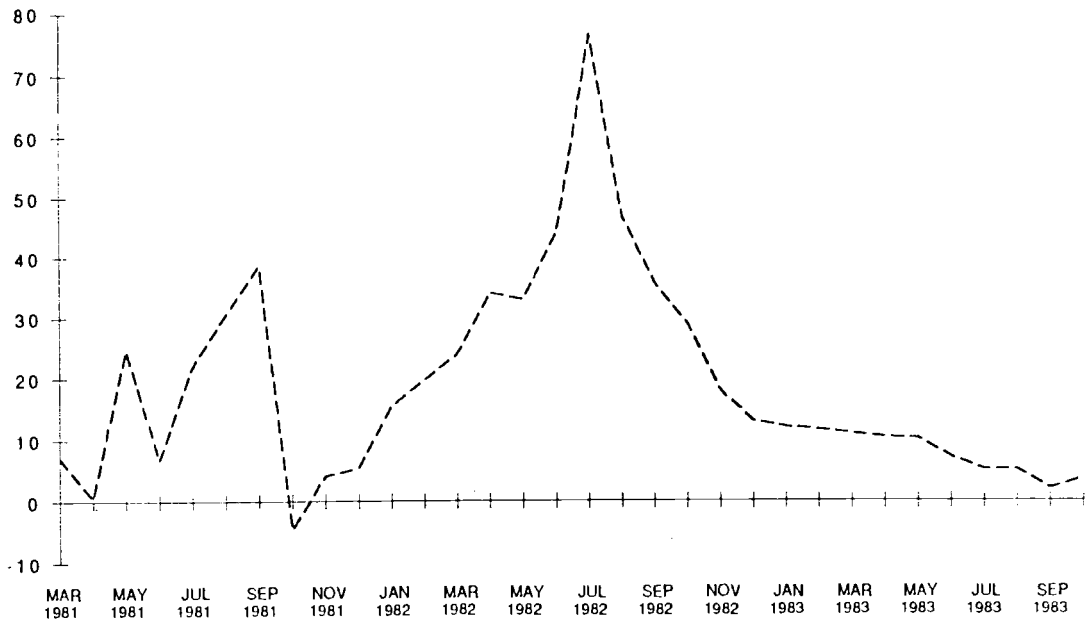


FIGURE 7

Dominican Republic spread [(x-s)/s]*100

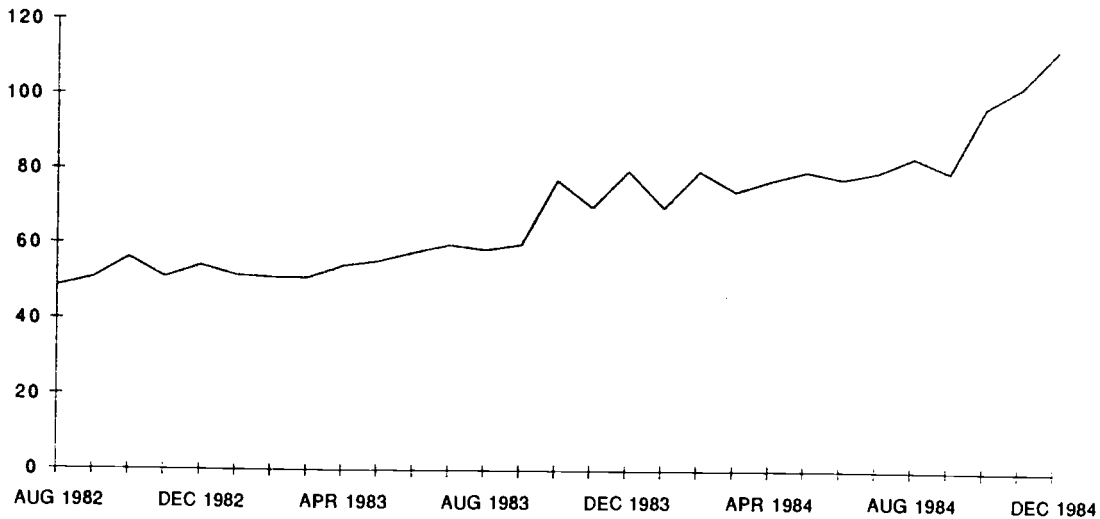


FIGURE 8

El Salvador spread [(x-s)/s]*100

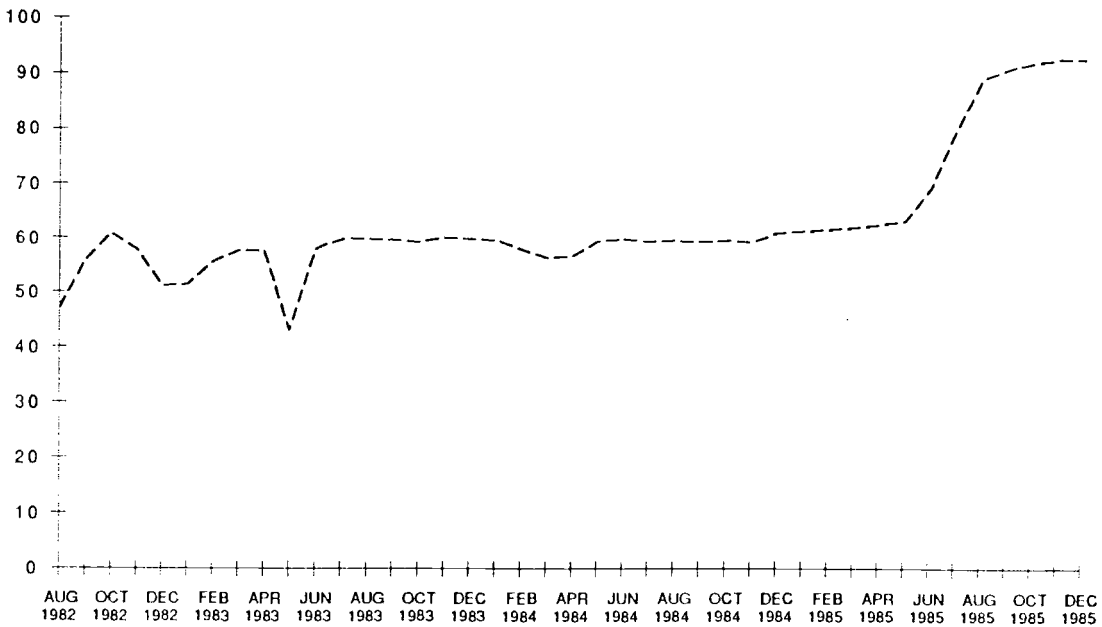


FIGURE 9

Guatemala spread [(x-s)/s]*100

FIGURE 10

Jamaica '83 spread [(x-s)/s]*100

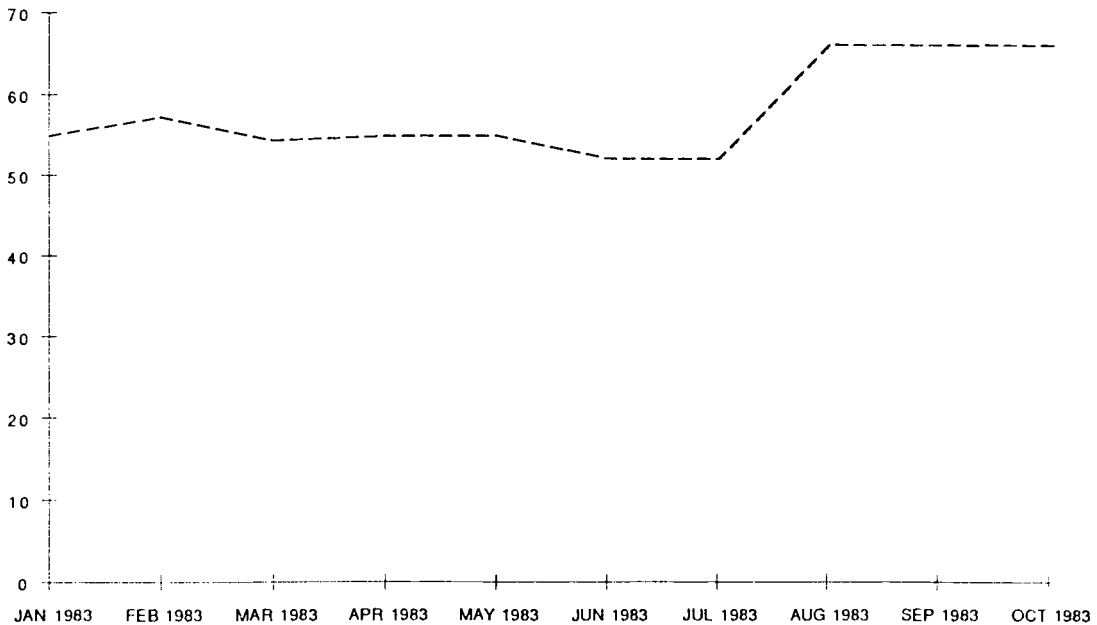


FIGURE 11

Mexico spread [(x-s)/s]*100

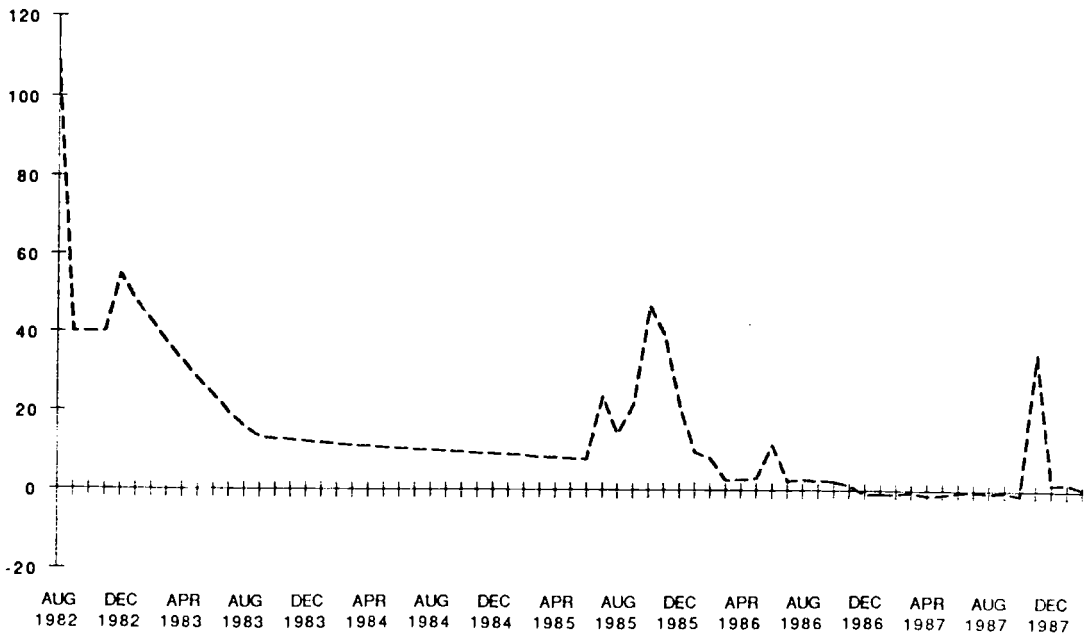


FIGURE 12

Argentina '81 exchange rates

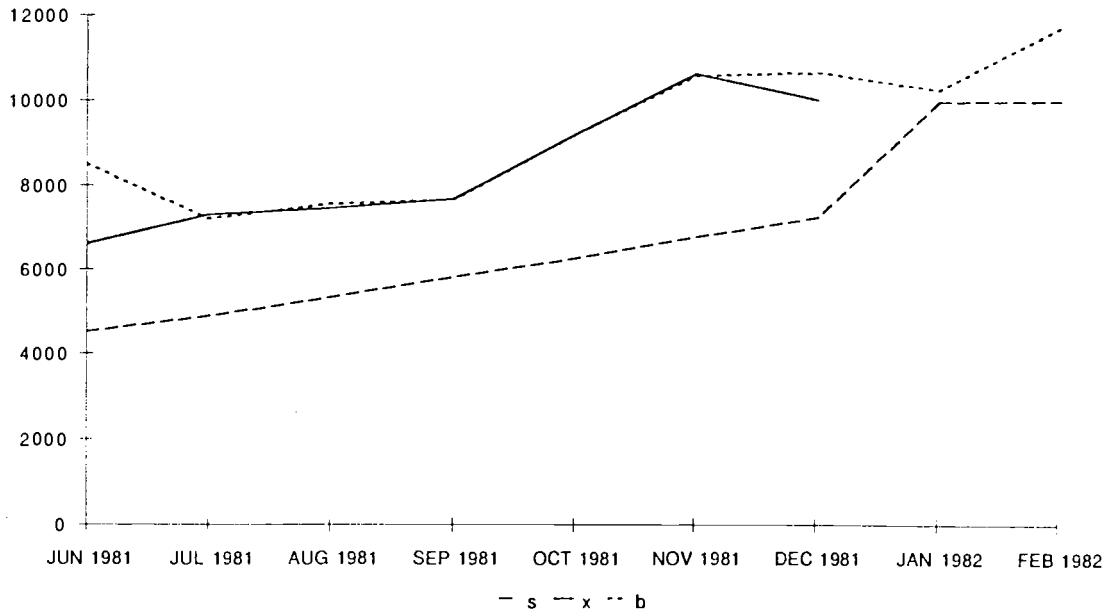


FIGURE 13

Argentina '82 exchange rates

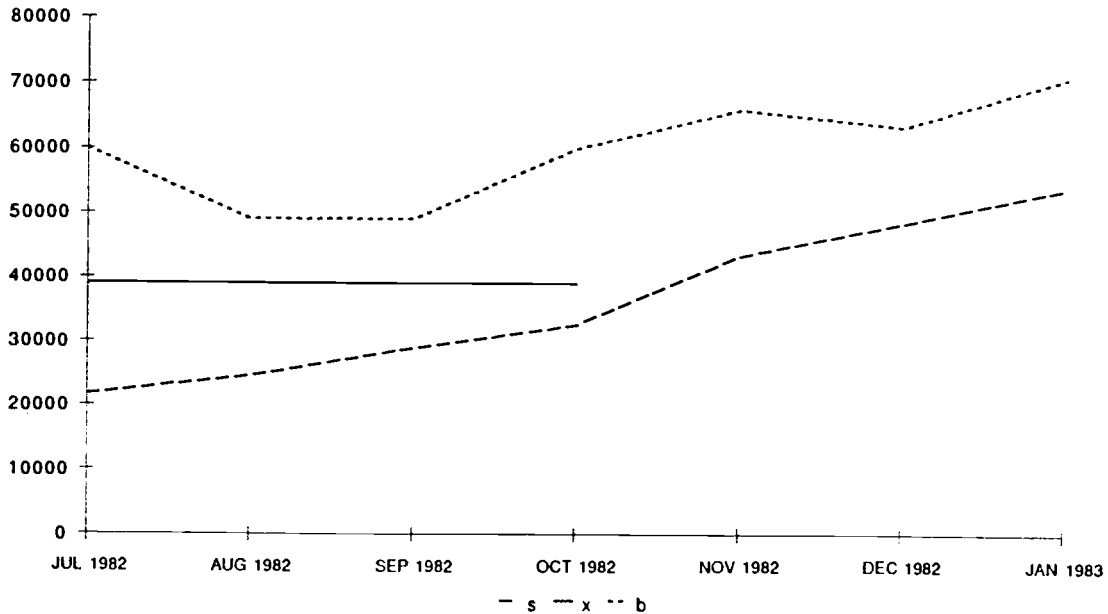


FIGURE 14

Bolivia exchange rates

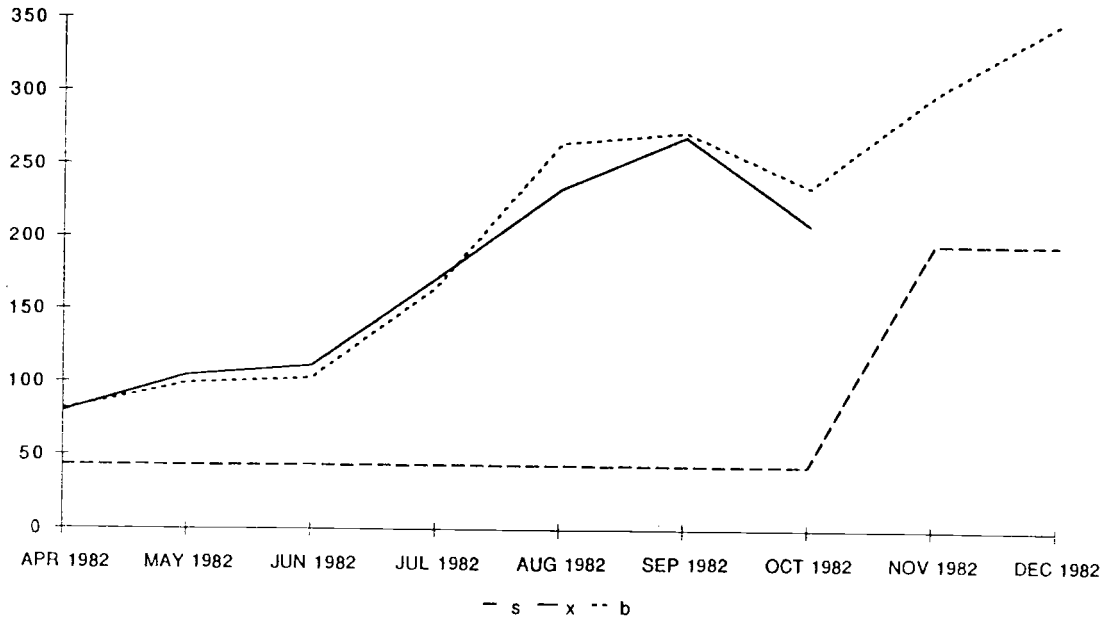


FIGURE 15

Costa Rica '81 exchange rates

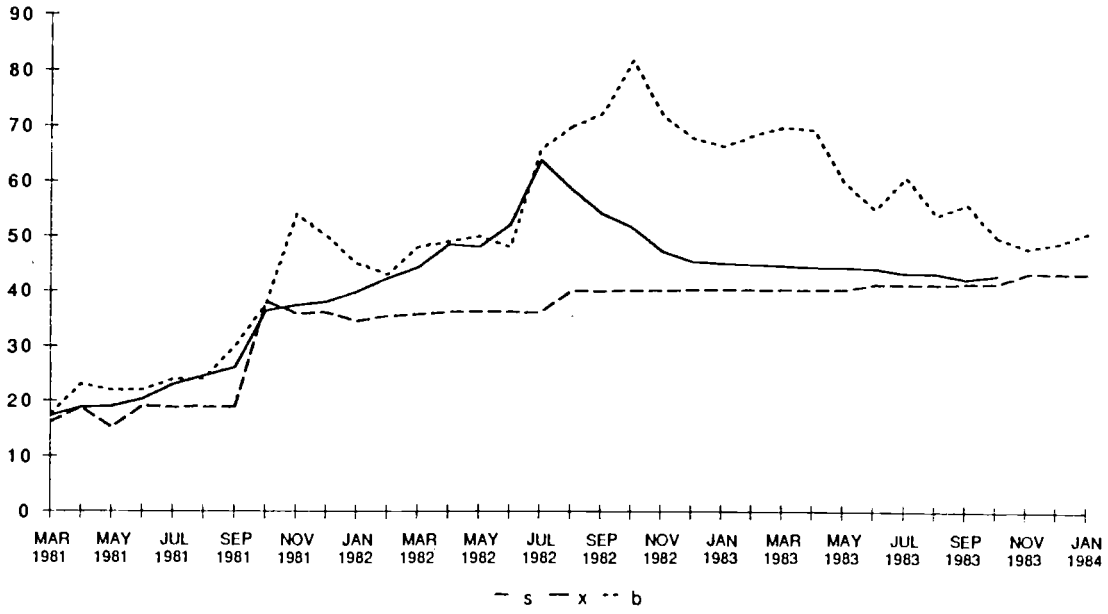


FIGURE 16

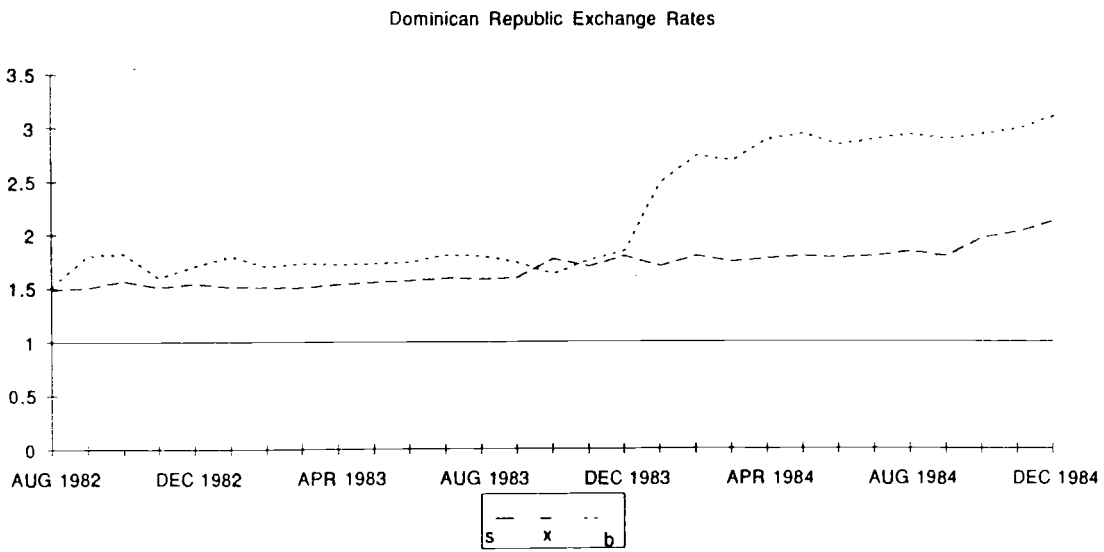

Dominican Republic Exchange Rates
3.5
3
2.5
2
1.5
1
0.5
0
AUG 1982
DEC 1982
APR 1983
AUG 1983
DEC 1983
APR 1984
AUG 1984
DEC 1984
s
x
b

FIGURE 17

El Salvador exchange rates

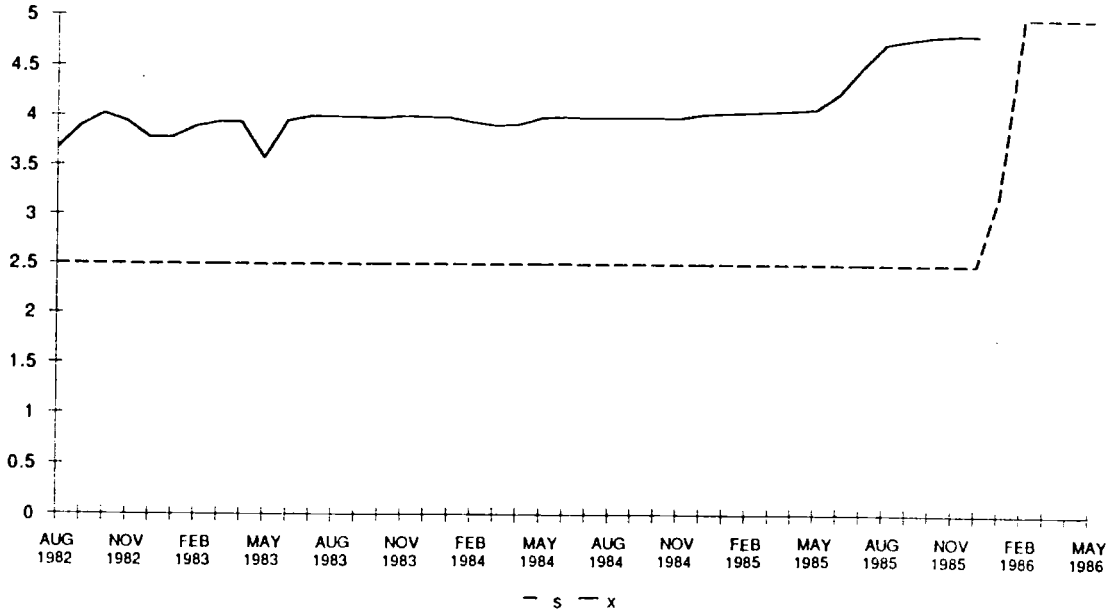


FIGURE 18

Guatemala exchange rates

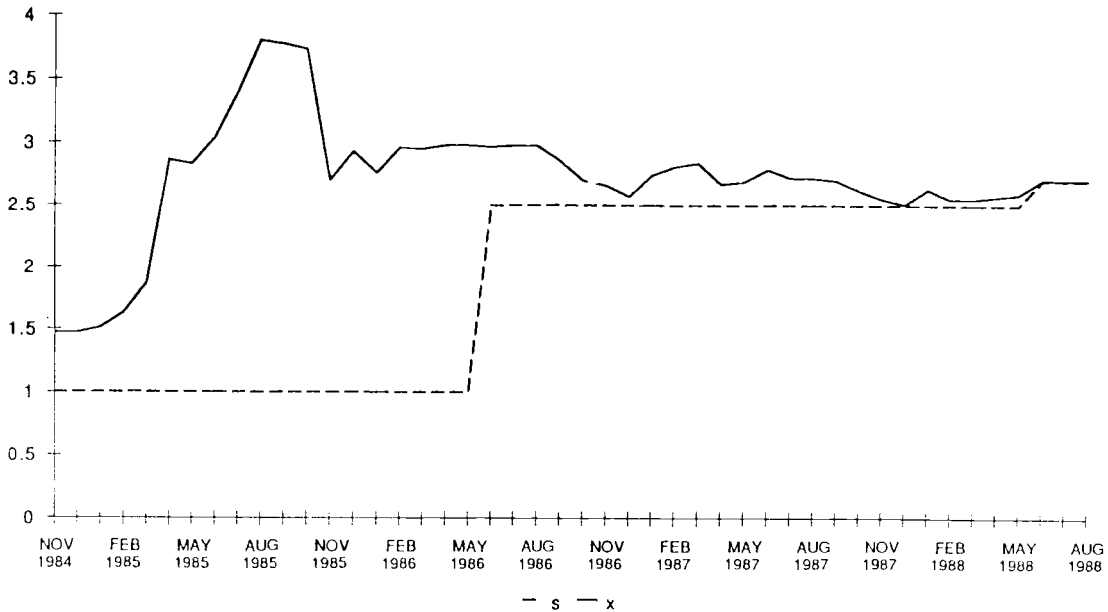


FIGURE 19

Jamaica '83 exchange rates

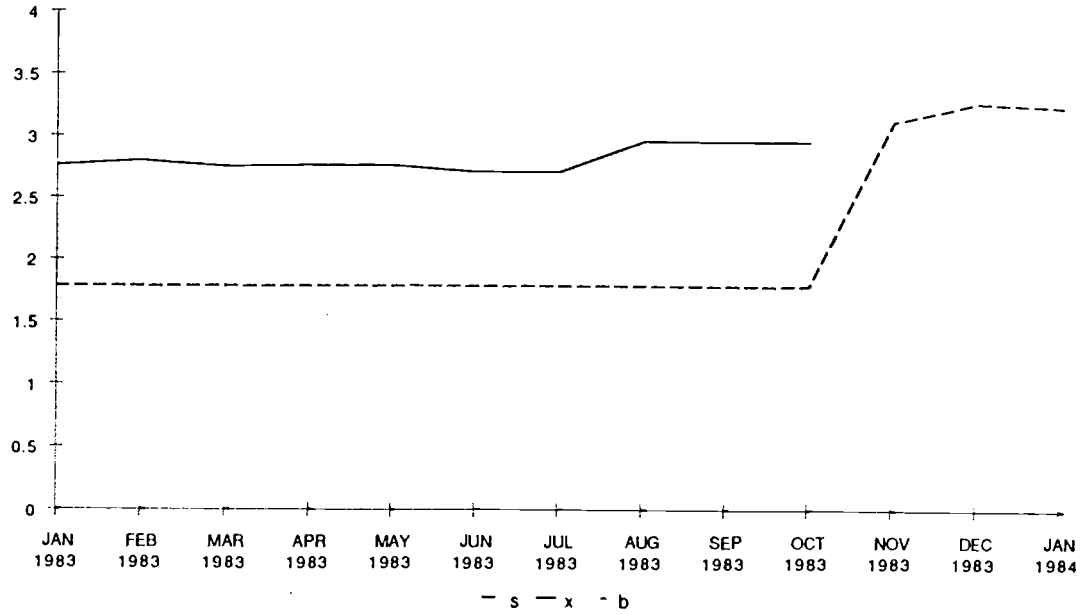
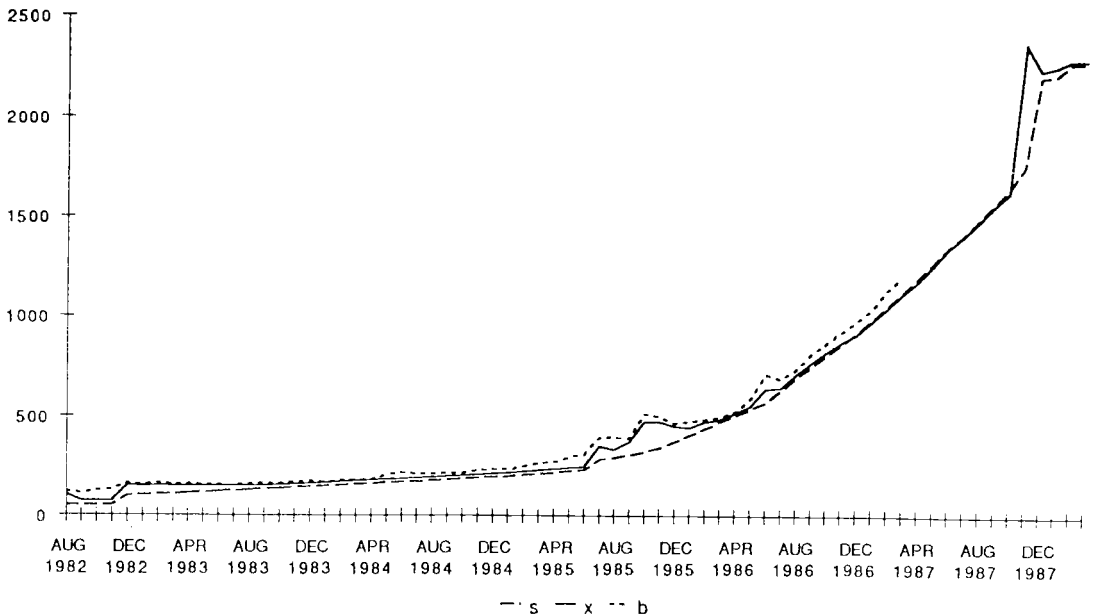


FIGURE 20

Mexico exchange rates



APPENDIX

COUNTRY	BELGIUM	BELGIUM		
SUBJECT	S	X		
DESCRIPTION	PRINCIPAL RATE	SECONDARY RATE	SPREAD	
	PERIOD AVERAGE	PERIOD AVERAGE	((X-S)/S)*100	
UNITS	FRANCS	FRANCS		
MAY71	49.63	49.36	-0.544025791	MAXIMUM SPREAD
JUN71	49.725	49.65	-0.150829563	1.274388181
JUL71	49.67	49.81	0.281860278	
AUG71	49.125	48.87	-0.519083969	
SEP71	47.813	47.82	0.01464037	
OCT71	46.817	46.8	-0.036311596	MINIMUM SPREAD
NOV71	46.321	46.32	-0.002158848	-2.056140705
DEC71	45.486	45.48	-0.013190872	
JAN72	44.42	44.44	0.045024764	
FEB72	43.831	43.8	-0.070726198	
MAR72	43.92	43.65	-0.614754098	AVERAGE SPREAD
APR72	44.1	44.02	-0.181405896	0.044569439
MAY72	43.967	43.97	0.006823299	
JUN72	43.94	43.84	-0.227583068	
JUL72	43.819	43.51	-0.705173555	
AUG72	43.861	43.66	-0.458265885	ST. DEV. SPREAD
SEP72	43.955	43.94	-0.03412581	0.676712173
OCT72	44.17	44.19	0.045279602	
NOV72	44.085	44.21	0.283543155	
DEC72	44.107	44.29	0.414900129	
JAN73	44.12	44.31	0.430643699	
FEB73	41.749	42.01	0.625164675	
MAR73	39.686	38.87	-2.056140705	
APR73	40.151	39.58	-1.422131454	
MAY73	39.442	39.33	-0.28396126	
JUN73	37.469	37.56	0.242867437	
JUL73	35.468	35.92	1.274388181	
AUG73	36.964	37.42	1.233632724	
SEP73	36.942	37.14	0.535975313	
OCT73	36.586	36.68	0.25692888	
NOV73	38.722	38.82	0.253086101	
DEC73	40.419	40.48	0.150919122	
JAN74	42.822	43	0.415674186	
FEB74	41	41.46	1.12195122	
MAR74	39.952	40.45	1.246495795	

MONTHLY DATA FOR ITALY AND FRANCE.

	ITALY				FRANCE			
COUNTRY SUBJECT DESCRIPTION UNITS	ITALY S (AE OR WE) COMM. RATE LIRA	ITALY X FINN. RATE LIRA	SPREAD ((X-S)/S)*100		FRANCE S COMMERCIAL RATE FRANCS	FRANCE X FINANCIAL RATE FRANCS	SPREAD ((X-S)/S)*100	
AUG71					5.51	5.41	-1.87	MAX SPREAD
SEP71					5.53	5.41	-2.14	5.03
OCT71					5.53	5.42	-2.01	
NOV71					5.51	5.43	-1.51	
DEC71					5.23	5.22	-0.19	MIN SPREAD
JAN72					5.14	5.12	-0.43	-5.54
FEB72					5.07	5.06	-0.16	
MAR72					5.03	4.88	-3.04	
APR72					5.03	4.87	-3.16	AVERAGE SPREAD
MAY72					5.01	4.89	-2.32	-0.46
JUN72					5.00	4.74	-5.20	
JUL72					5.00	4.73	-5.54	
AUG72					5.00	4.81	-3.86	STDEV SPREAD
SEP72					5.01	4.87	-2.70	2.35
OCT72					5.06	5.05	-0.04	
NOV72					5.05	5.06	0.22	
DEC72					5.12	5.13	0.08	
JAN73	585.29	616.15	5.27	MAX SPREAD	5.07	5.07	0.04	
FEB73	575.89	592.59	2.90	7.48	4.53	4.56	0.55	
MAR73	573.58	579.64	1.06		4.54	4.53	-0.24	
APR73	589.00	593.49	0.76		4.57	4.57	-0.02	
MAY73	589.15	599.27	1.72	MIN SPREAD	4.45	4.44	-0.07	
JUN73	596.68	611.33	2.46	0.76	4.11	4.17	1.46	
JUL73	580.16	616.01	6.18		4.07	4.10	0.86	
AUG73	573.31	598.95	4.47		4.33	4.38	1.27	
SEP73	564.61	593.79	5.17	MEAN SPREAD	4.25	4.34	2.00	
OCT73	565.80	594.84	5.13	3.90	4.23	4.31	2.01	
NOV73	591.84	620.64	4.87		4.49	4.72	5.03	
DEC73	606.91	619.07	2.00		4.71	4.89	3.84	
JAN74	646.51	664.40	2.77	ST.DEV SPREAD	5.23	5.36	2.39	
FEB74	653.52	694.26	6.23	2.08	4.79	4.79	0.00	
MAR74	636.57	684.19	7.48		4.85	4.85	-0.06	

COUNTRY	BELGIUM	BELGIUM		
SUBJECT	S	X		
DESCRIPTION	PRINCIPAL RATE PERIOD AVERAGE	SECONDARY RATE PERIOD AVERAGE	SPREAD	
UNITS	FRANCS	FRANCS	((X-S)/S)*100	
71Q1	49.634	49.64	0.012088488	MAXIMUM SPREAD
71Q2	49.665	49.55	-0.231551394	11.23181686
71Q3	48.869	48.83	-0.079805193	
71Q4	46.208	46.2	-0.017313019	
72Q1	44.057	43.96	-0.220169326	
72Q2	44.002	43.94	-0.140902686	MINIMUM SPREAD
72Q3	43.878	43.7	-0.405670268	-0.51510725
72Q4	44.121	44.23	0.247047891	
73Q1	41.852	41.73	-0.291503393	
73Q2	39.021	38.82	-0.51510725	
73Q3	36.458	36.83	1.020352186	AVERAGE SPREAD
73Q4	38.576	38.66	0.21775197	1.834528652
74Q1	41.258	41.64	0.925881041	
74Q2	38.159	39.76	4.19560261	
74Q3	38.684	39.66	2.523006928	
74Q4	37.705	37.98	0.729346241	ST. DEV. OF SPREAD
75Q1	34.863	35.25	1.110059375	2.602764867
75Q2	34.995	36.12	3.214744964	
75Q3	38.096	39.57	3.869172617	
75Q4	39.162	40.25	2.77820336	
76Q1	39.218	43.45	10.79096333	
76Q2	39.263	40.17	2.310062909	
76Q3	39.041	40.04	2.55884839	
76Q4	36.899	37.28	1.032548308	
77Q1	36.757	36.82	0.171395925	
77Q2	36.168	36.2	0.088476001	
77Q3	35.635	35.72	0.238529536	
77Q4	34.812	34.84	0.080432035	
78Q1	32.264	32.26	-0.012397719	
78Q2	32.449	32.53	0.249622485	
78Q3	31.643	32.47	2.613532219	
78Q4	29.612	30.56	3.201404836	
79Q1	29.284	29.73	1.523015981	
79Q2	30.272	31.17	2.966437632	
79Q3	29.117	30.37	4.303327953	
79Q4	28.602	29.3	2.440388784	
80Q1	28.782	29.61	2.876797999	
80Q2	29.055	29.6	1.875752882	

COUNTRY	BELGIUM	BELGIUM	
SUBJECT	S	X	
DESCRIPTION	PRINCIPAL RATE PERIOD AVERAGE	SECONDARY RATE PERIOD AVERAGE	SPREAD
UNITS	FRANCS	FRANCS	((X-S)/S)*100
80Q3	28.439	28.67	0.812264848
80Q4	30.691	30.77	0.257404451
81Q1	33.801	34.27	1.387532913
81Q2	37.184	38.21	2.759251291
81Q3	39.791	42.77	7.486617577
81Q4	37.741	41.98	11.23181686
82Q1	41.48	45.93	10.72806172
82Q2	45.01	49.48	9.931126416
82Q3	47.554	50.33	5.837574126
82Q4	48.718	50.46	3.575680447
83Q1	47.342	49.52	4.600566094
83Q2	49.612	49.88	0.540191889
83Q3	53.079	53.46	0.717797999
83Q4	54.493	55.21	1.315765328
84Q1	55.257	56.77	2.738114628
84Q2	55.28	56.3	1.845151954
84Q3	59.007	59.57	0.954124087
84Q4	61.592	61.96	0.597480192
85Q1	65.368	65.66	0.44670175
85Q2	62.166	62.47	0.489013287
85Q3	57.561	58.07	0.884279286
85Q4	52.417	52.75	0.635290078
86Q1	48.025	48.61	1.218115565
86Q2	45.865	46.18	0.686798212
86Q3	43.109	43.52	0.953397202
86Q4	41.689	42.01	0.769987287
87Q1	38.13	38.55	1.101494886
87Q2	37.415	37.57	0.414272351
87Q3	38.17	38.36	0.49777312
87Q4	35.621	35.79	0.474439235
88Q1	35.057	35.14	0.236757281
88Q2	35.711	35.89	0.501246115
88Q3	39.111	39.56	1.148014625
88Q4	37.194	37.46	0.715169113
89Q1	38.754	38.93	0.454146669
89Q2	40.528	40.62	0.227003553
89Q3	40.272	40.34	0.168851808